Data General
Data General Corporation, Westboro, Massachusetts 01580

Customer Documentation

Installing, Starting, and Stopping AOS/VS

093-000675-02

Installing, Starting, and Stopping AOS/VS

093-000675-02

For the latest enhancements, cautions, documentation changes, and other information on this product, please see the Release Notice (085-series) supplied with the software.

Printed in the United States of America
Revision 02, July 1992
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Ordering No. 093-000675

Notice

Installing, Starting, and Stopping AOS/VS
093–000675–02

Revision History:

Original Release – March 1990
First Revision – July 1991
Second Revision – July 1992

Effective with:

AOS/VS Rev. 7.70

A vertical bar in the margin of a page indicates substantive change from the previous revision.

Instructions for Inserting Dividers

The tab dividers included with your manual will make the manual easier to use — but only if you insert them. Please insert the tab dividers as follows:

Tabbed Divider	Insert Before Page
VSGEN	4–1
Startup & Shutdown	6–1
Emergency Procedures	6–47
Updates	7–1
Disk Formatter	8–1
Installer	9–1
Index	Index–1

We have also included a blank divider for your convenience.

Preface

AOS/VS, the Advanced Operating System/Virtual Storage, is one of the Data General (DGC) operating systems for ECLIPSE® MV/Family and DS–series computer systems.

This manual tells how to install AOS/VS and, after installation, how to start and stop an AOS/VS system on your ECLIPSE MV/Family computer. It also tells how to install updates and new releases of AOS/VS. For fast reference, please insert and use the tabbed dividers following the directions preceding the Preface.

This manual does not describe deskside ECLIPSE MV/Family computers (including ECLIPSE MV/3000™ DC series systems, ECLIPSE MV/5000™ DC series systems, ECLIPSE MV/2500™ DC, ECLIPSE MV/2000™ DC, ECLIPSE MV/1400™ DC, and ECLIPSE MV/1000™ DC systems) on which AOS/VS is preinstalled and the System Management Interface (SMI) is enabled. Using preinstalled AOS/VS is described in *Starting and Updating Preinstalled AOS/VS* and in *Starting and Updating Preinstalled AOS/VS on ECLIPSE MV/3000™ DC series and MV/5000™ DC Series Systems* (069–000481). Using the SMI is described in *Using the AOS/VS System Management Interface (SMI)* (069–000203).

This manual explains how to get AOS/VS up and running, and how to keep it current. Other aspects of AOS/VS, like details on the EXEC program, backup, and system security, are explained in a different manual, *Managing AOS/VS and AOS/VS II*, which contains the conceptual and hands–on information you need to make sound decisions about running the system.

This manual is organized as follows:

Chapter 1 is an overview of system software, MV/Family hardware, and the steps involved in installing, starting, and stopping an AOS/VS system. It also describes keyboard control keys.

Chapter 2 tells how to bring up your first AOS/VS system on ECLIPSE MV/4000® DC, ECLIPSE MV/4000 SC, and Data General DS/4000–series computers. This chapter assumes you are starting with blank disks. Read it when starting from scratch with any of the computers above (but not with an ECLIPSE MV/4000 computer).

Chapter 3 tells how to bring up your first AOS/VS system on the following computers:

ECLIPSE MV/40000™;
ECLIPSE MV/20000™ Models 1, 2, and C;
ECLIPSE MV/18000™ Models 1 and 2;
ECLIPSE MV/15000™ Models 8, 10, and 20;
ECLIPSE MV/10000™ SX and ECLIPSE MV/10000™;
ECLIPSE MV/9300™, ECLIPSE MV/9500™, and ECLIPSE MV/9600™;
ECLIPSE MV/8000®, ECLIPSE MV/8000® II and ECLIPSE MV/8000® C;
ECLIPSE MV/7800™, ECLIPSE MV/7800™ C, ECLIPSE MV/7800™ XP;
ECLIPSE MV/6000®; and
ECLIPSE MV/4000®.

	This chapter assumes you are starting with blank disks. Read it if starting from scratch with any computer above.
Chapter 4	tells how to run the VSGEN program to generate a tailored operating system. Read it whenever you want to generate or modify an AOS/VS operating system.
Chapter 5	tells how to bring up the multiuser environment, which supports many timesharing and batch users concurrently. It leads you through creating user profiles, initializing the EXEC program, editing the system UP and DOWN macros to make startup and shutdown easier, and creating a tailored error message file. Read this chapter after generating your first AOS/VS system—later, you may want to reread selected parts of it.
Chapter 6	details system startup, normal shutdown, and abnormal shutdown. You'll follow the steps described here when you start up and shut down your system. There are two tabbed dividers for this chapter.
Chapter 7	explains how to install updates and new releases of AOS/VS. You'll read this after receiving an update or a new release.
Chapter 8	details the Disk Formatter program, which formats physical disks into logical disk units for use with AOS/VS.
Chapter 9	explains the Installer program, which installs an AOS/VS system on a logical disk unit.
Appendix A	summarizes peripheral device names and codes.
Appendix B	lists and briefly describes files shipped with AOS/VS.
Appendix C	explains first–time powerup steps for MV/4000 SC, MV/4000 DC, and Data General DS/4000–series. You'll need this information to power up your computer before anything has been installed on its disk(s).
Appendix D	explains first–time powerup steps for MV/20000, MV/15000, MV/10000, MV/8000–series, MV/7800, MV/6000, and MV/4000 (meter–high) systems. You'll need this information to power up your computer before anything has been installed on its disk(s). (For first–time powerup on an ECLIPSE MV/40000 system, see *Starting ECLIPSE MV/40000™ –Series Systems*. For first–time powerup on an ECLIPSE MV/9000™ –Series system, see *Starting ECLIPSE MV/9500™ Computer Systems*.)

What About Peripherals?

Peripherals include disk units, tape and/or diskette units, the system console, user terminals, and letter–quality, laser, and line printers.

Before you can begin, at least one disk unit, one tape or diskette unit, and a system console (DASHER® terminal) must be connected to your computer, and all must have adequate power.

A Data General engineer usually installs the hardware, so you need no information on this. In fact, a Data General engineer often brings up the first system. But we include this material because you may want to do it.

Related Documentation

This section describes manuals that you might find helpful additions to this one.

Hardware Operation

To run an operating system, you must know how to use the switches and controls on your computer, tape and disk units, system console, and printer(s). See the appropriate documentation from the list that follows:

- System console—*DASHER® Operator Reference Series* manual for your system console.
- Disk units—014–series booklets for your disk unit(s); or, for older units, *DGC Disk Drives* (014–000099).
- Tape units—*Magnetic Tape Transports* (014–000095). Operator Reference Series manual that describes how to operate a tape unit.
- Line printers—*DGC Line Printers* (014–000089). Describes how to operate line printers.

For device status errors and other information, you might want to refer to the manual for the appropriate device.

Hardware Error Diagnostics and System Control Program (SCP)

The Advanced Diagnostic EXecutive (ADEX) system is an optional diagnostics package for MV/Family systems. ADEX provides a complete suite of diagnostics, including tests for peripherals and system exercisers for Data General hardware. ADEX is shipped on tape or diskettes, and it can be installed on the system disk along with AOS/VS. It provides easy, fast access to hardware diagnostics from a system startup menu. For information on how to install and run ADEX, see the *ADEX Operator's Manual* (014–000744).

Many MV/Family computers allow remote diagnostic testing. If your computer permits this, and you have a contract with Data General that supports it, see the manual *Communications Switch–II User Operation and Installation Guide* (015–000207).

The System Control Program (SCP) features that you need for routine operation are covered in this manual. For more information, refer to the SCP manual that came with your computer.

First–Time Powerup

First–time and routine powerup involve turning on peripherals and using at least one switch on the computer front panel.

For most computers, these steps are described in a "Starting" manual shipped with the hardware. The manual you are reading duplicates these steps in Appendixes C and D (for first–time powerup) and Chapter 6 (for routine powerup). However, ECLIPSE MV/40000 and ECLIPSE MV/9000–Series front panel information you need for first–time and routine powerup is explained only in the "Starting" manuals for those systems.

Generally, the first–time and routine cold–start steps for a given computer are similar for all Data General operating systems (AOS/VS, DG/UX™, DG/RDOS, AOS/RT32) and for

non–Data General operating systems. Therefore, we try to describe these steps in a manual that's independent of the operating system—like a "Starting" manual—so that users with any Data General operating system, or a non–Data General operating system, can read them.

AOS/VS and Related Software

This manual explains only a few tasks involved in maintaining and using the AOS/VS operating system. Some other tasks, and the manuals that explain them, are

- Recovering from errors—*AOS/VS and AOS/VS II Error and Status Messages* (093–000540) describes all the operating system error messages, including those you might encounter during system installation, startup, and shutdown.
- Managing and running your system—*Managing AOS/VS and AOS/VS II* (093–000541) explains system management issues like backup and security. It is a companion manual and sequel to the manual you are reading now. *Using the CLI (AOS/VS and AOS/VS II)* (093–000646) describes the AOS/VS and AOS/VS II file and directory structure and how to use the CLI, a command line interpreter, as the interface to the operating system.
- Understanding AOS/VS and AOS/VS II terms and concepts—*AOS/VS and AOS/VS II Glossary* (069–000231).
- Using the SED text editor—*Learning to Use Your AOS/VS System* (069–000031) and *SED Text Editor User's Manual* (093–000249) describe using the SED editor shipped with AOS/VS.

If your system includes Data General's office automation system, CEO, see the manual *Managing the CEO® System* (093–000286), which describes how to install and manage the CEO office automation software.

You might also need the pertinent networking manuals if your system is connected to other computers in a network. If you have bought the AOS/VS Performance Package—which includes the Class Assignment and Scheduling Package (CLASP), a separate product—you will want to see the accompanying manuals.

After you get your system and multiuser environment up and running, you will want to run other software, like compilers and data management products. These are described in manuals shipped with the software.

A full list of related documentation is located at the back of this manual, after the index.

Release and Update Notices

AOS/VS Release and Update Notices have the latest details on all system software: enhancements, new features, and improvements. Release and Update Notices are supplied both as printed listings and as disk files that you can print. For AOS/VS Revision 7.70, the filename of the Update Notice in directory :UTIL is 085_000147_16 for Model 3900; for Model 31133 the filename is 085_000780_09. For AOS/VS Revision 7.60, the filename of the Release Notice for Model 3900 is 085_000147_14, and for Model 31133, the filename is 085_000780_06.

You should read the Release or Update Notices, at least in part, because they summarize new features as well as known problems (and suggested solutions). Both Release and

Update Notices assume that you know the operating system well—so parts of them may be difficult to understand until you *do* know the system.

Document changes files, also in :UTIL, are part of each update, but you must print these yourself after installing the new software. The document changes filenames have the form 0*ss_nnnnnn_rr*, where *ss* is the series, *nnnnnn* is the part number, and *rr* is the revision (for example, 093_000675_01 is the document changes file for this manual). We suggest that, as you receive new software revisions from Data General, you print the document changes file(s) and update the manual(s) as needed.

The Newsletter

Finally, if you subscribe to Data General's Software Subscription Service you will find the *AOS/VS Monthly Newsletter* a useful source of information on the latest enhancements to the operating system.

Reader, Please Note:

We use these conventions for command formats in this manual:

REQUIRED required *[optional]* ...

Where	Means
REQUIRED	You must type the uppercase word, such as a command (or its accepted abbreviation), as shown.
required	You must type an argument, filename, or other variable in place of the lowercase word or letter. For example, the x in @MTx0 can be B, C, D, or J, depending on the type of magnetic tape drive. Sometimes we show { required1 / required2 } which means you must type *one* of the arguments. Do not type the braces; they only set off the choice.
[optional]	You have the option of typing this argument. Do not type the brackets; they only set off what is optional.
...	You may repeat the preceding entry or entries. The explanation will tell you exactly what you may repeat.

Additionally, we use certain symbols in special ways:

Symbol	Means
↵	Press the NEW LINE key on your terminal's keyboard. If there is no NEW LINE key, press the Carriage Return (CR) key.
)	The AOS/VS operating system CLI prompt.
Su)	The AOS/VS Superuser prompt.
SCP–CLI>	The AOS/VS SCP CLI prompt.

All numbers are decimal, except for device codes and numbers marked octal. For example

... 27 buffers ...	means 27 decimal
... device code 27 ...	means 27 octal
... 27 octal ...	means 27 octal

We show CLI and SCP CLI commands in UPPERCASE; but you can type them in lowercase, uppercase, or any combination. Finally, we use

This typeface to show your entry.
This typeface to show system queries and responses.
`This typeface to show listings and status displays.`

Contacting Data General

Data General wants to assist you in any way it can to help you use its products. Please feel free to contact the company as outlined below.

Manuals

If you require additional manuals, please use the enclosed TIPS order form (United States only) or contact your local Data General sales representative.

Telephone Assistance

If you are unable to solve a problem using any manual you received with your system, free telephone assistance is available with your hardware warranty and with most Data General software service options. If you are within the United States or Canada, contact the Data General Customer Support Center (CSC) by calling 1–800–DG–HELPS. Lines are open from 8:00 a.m. to 5:00 p.m., your time, Monday through Friday. The center will put you in touch with a member of Data General's telephone assistance staff who can answer your questions.

For telephone assistance outside the United States or Canada, ask your Data General sales representative for the appropriate telephone number.

Joining Our Users Group

Please consider joining the largest independent organization of Data General users, the North American Data General Users Group (NADGUG). In addition to making valuable contacts, members receive *FOCUS* monthly magazine, a conference discount, access to the Software Library and Electronic Bulletin Board, an annual Member Directory, Regional and Special Interest Groups, and much more. For more information about membership in the North American Data General Users Group, call 1–800–253–3902 or 1–508–443–3330.

End of Preface

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Chapter 1 – About Installing, Starting, and Stopping AOS/VS

Chapter 2 – Bringing Up the Starter System on Blank Disks — ECLIPSE MV/4000 DC, MV/4000 SC, and Data General DS/4000–Series Computers

Chapter 3 – Bringing Up the Starter System on Blank Disks — All Computers Except ECLIPSE MV/4000 DC, MV 4000 SC, and Data General DS/4000–Series

Chapter 4 – Generating a Tailored AOS/VS System

Chapter 5 – Creating the Multiuser Environment

Chapter 6 – Startup and Shutdown

Chapter 7 – Handling Updates and New Revisions from Data General

Chapter 8 – The Disk Formatter

Chapter 9 – Using the Installer

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Chapter 1
About Installing, Starting, and Stopping AOS/VS

Read this chapter for an introduction to installing, starting, and stopping an AOS/VS system.

Installing your first system (Chapters 2–5) is one part of this. Routinely *starting and stopping* AOS/VS is another part. (*Managing* is yet another part, covered in another manual: *Managing AOS/VS and AOS/VS II*). This chapter outlines both the installing and starting/stopping parts. It assumes that AOS/VS is new to you. The major sections in this chapter are

- What is AOS/VS?
- The ECLIPSE MV/Family Computers
- AOS/VS File Structure
- What's Involved in System Installation?
- Finding Information on Other AOS/VS Management Tasks
- Cautions and Control Characters
- If You Make a Mistake

What Is AOS/VS?

AOS/VS is a multitasking, multiprogramming, demand–paged, virtual storage operating system. You can use it to support users on a time–sharing basis, to run batch jobs, or to perform control applications on a real-time basis. You communicate with AOS/VS by typing Command Line Interpreter (CLI) commands on a terminal.

AOS/VS runs on all Data General 32–bit, ECLIPSE® MV/Family and DS–series computers except the ECLIPSE® MV/30000 and ECLIPSE® MV/40000 HA.

Figures 1–1 and 1–2 show the hardware in typical minimum ECLIPSE MV/Family installations. The names MTB0, MTC0, DPF0, and DPJ0 are AOS/VS device names. There can be, and often are, additional tape and disk units.

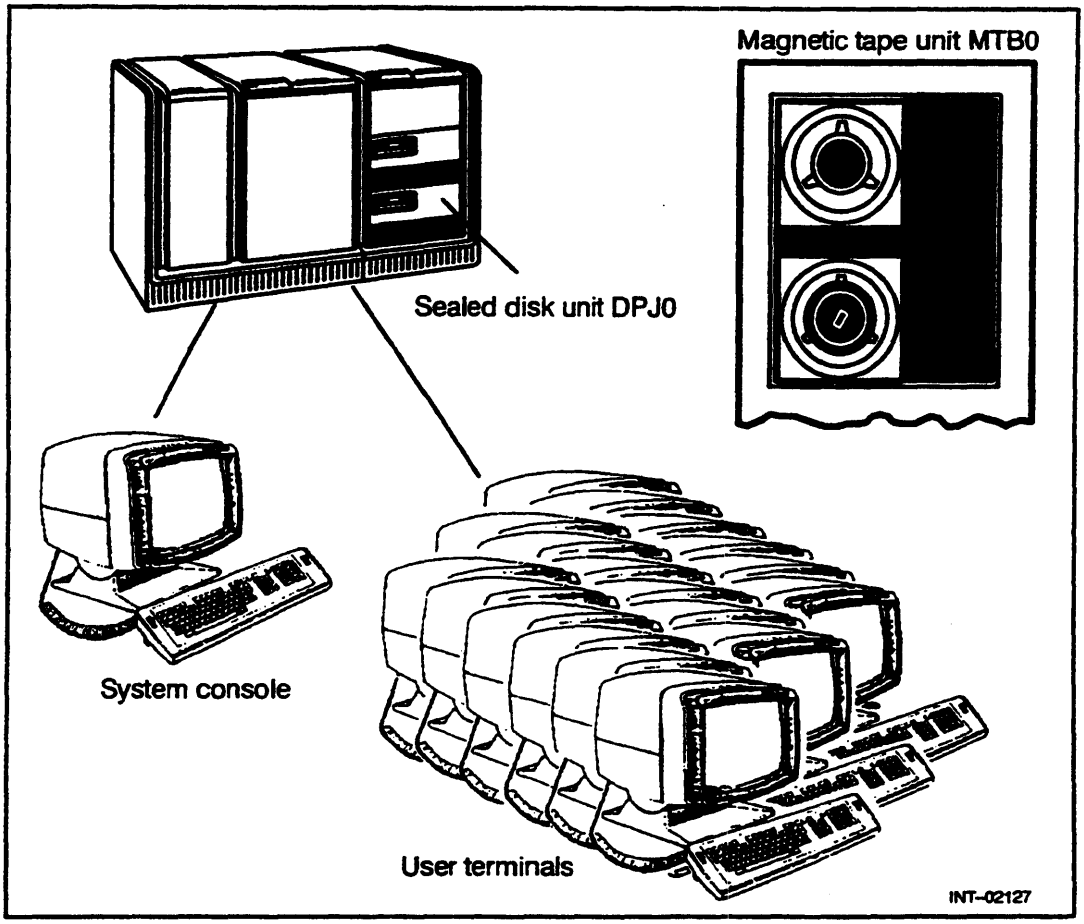

Figure 1–1 Sample AOS/VS ECLIPSE MV/15000™ System Hardware Configuration

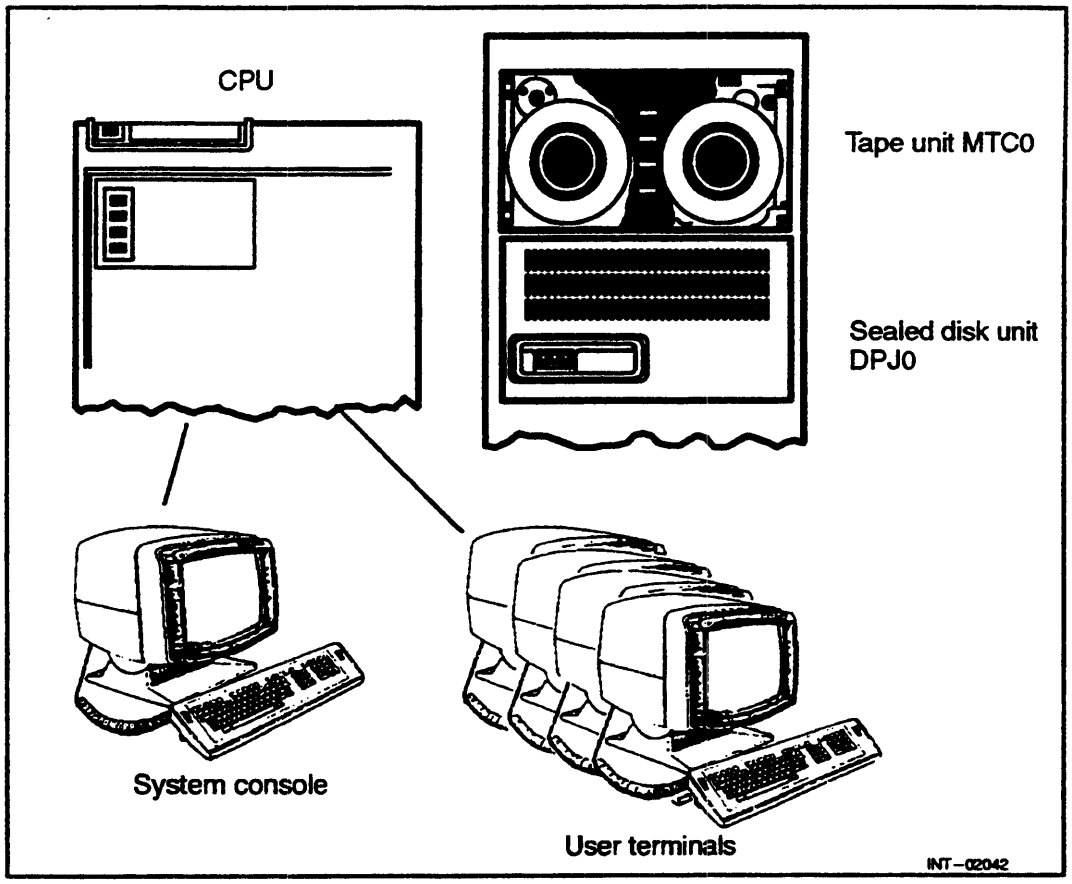

Figure 1–2 Sample AOS/VS ECLIPSE MV/7800™ XP System Hardware Configuration

The ECLIPSE® MV/Family Computers

The Data General MV/Family has a broad range of 32-bit systems, from the ECLIPSE MV/40000™ to the ECLIPSE MV/1000™DC computer. (Deskside ECLIPSE systems, including ECLIPSE MV/5000™ DC series systems, ECLIPSE MV3000™ DC series sytems, ECLIPSE MV/2500™ DC, ECLIPSE MV/2000™ DC, ECLIPSE MV/1400™ DC and ECLIPSE MV/1000™ DC ship with AOS/VS preinstalled and the System Management Interface (SMI) enabled, so you don't need to read this book to use these machines. Instead, read *Starting and Updating Preinstalled AOS/VS* and *Starting and Updating Preinstalled AOS/VS on ECLIPSE MV/5000™ DC Series Systems*. Also read *Using the AOS/VS System Management Interface (SMI).*

In all MV/Family computers, AOS/VS runs in the main processor. Another operating system, called the SCP, serves to load vital microcode into the main processor(s), and boot (load) AOS/VS into main processor memory. The SCP also manages powerup and monitors system error conditions.

Physically, MV/Family computers range from the meter-high, two-bay MV/40000 HA with separate peripherals to the compact, self-contained MV/1000 DC.

Operationally—after your first AOS/VS system is generated—update and startup procedures are similar for all MV/Family computers. (Backup procedures—described in *Managing AOS/VS and AOS/VS II*—differ, depending on whether you have magnetic tape. If you don't have a tape unit, you'll use diskettes.)

NOTE: Although their names and central processors are similar, the ECLIPSE MV/7800™, MV/7800 C, and MV/7800 XP computers differ significantly from the MV/7800 DC and MV/7800 DCX. The MV/7800, MV/7800 C, and MV/7800 XP are meter-high computers with one or more peripheral bays. The ECLIPSE MV/7800 DC and MV/7800 DCX are compact, with built-in tape and disk units; they are designed to fit under a desk. In this book (and generally) the name "MV/7800" represents the first type of computer; the name "MV/7800 DC and DCX" represents the second type of computer.

Similarly, the ECLIPSE MV/4000® differs from ECLIPSE MV/4000 DC, MV/4000 SC, and Data General DS/4000-series computers.

Also, the ECLIPSE MV/8000 differs significantly from the MV/8000 II and MV/8000 C computers. In this book, "MV/8000" means the shoulder-high, blue and white computer; "MV/8000 II" and "MV/8000 C" describe the meter-high, earth-tone computer.

AOS/VS File Structure

AOS/VS manages many parts of its file structure, but you need to understand the options that are under your control. A typical AOS/VS file system is made up of several directories, as shown in Figure 1–3.

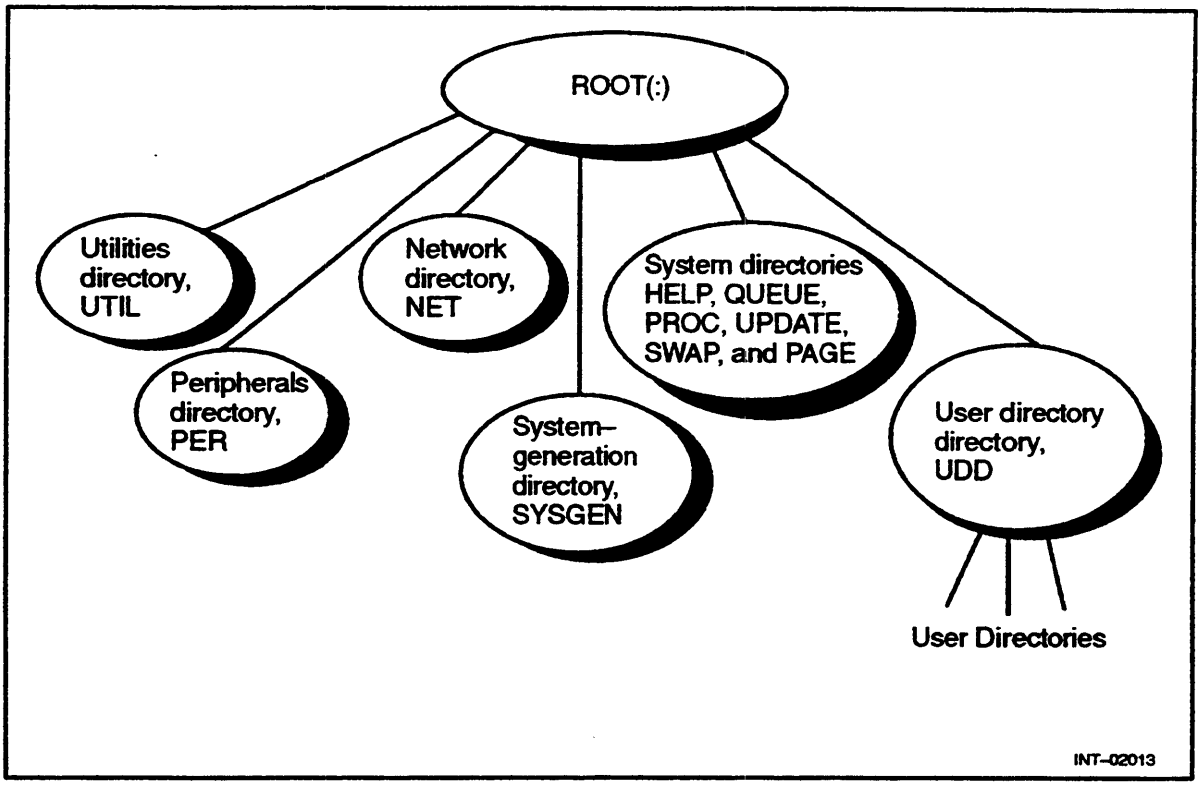

Figure 1–3 AOS/VS System File Structure

The root directory (:) and other system directories are created and managed by AOS/VS or its utility programs. The AOS/VS operating system program file is usually in directory :SYSGEN.

Directory :UDD has an entry for each timesharing *user* directory. A user is an authorized person who can execute other programs—often application programs. So :UDD often has many subordinate directories and uses a lot of storage space.

All these directories, and their subordinate directories, can reside on one *logical disk unit (LDU)*. Or any of these directories can reside on *its own* LDU. An LDU is one or more physical disks created by the Disk Formatter.

Generally, for the most versatile, simple system, you will make each physical disk a single–disk LDU. The system disk (from which you run AOS/VS) is nearly always a single–disk LDU. If you set up an LDU with pieces on more than one disk, all disks must be on line before anyone can access the LDU.

With the Disk Formatter, you can set up a structure in which everything will be on one LDU. Or you can set up a system LDU with separate LDUs for database management and user directories (for example, UDD1, UDD2, UDD3), depending on your needs and number of disk units.

You might set up a multiple–disk LDU to handle a very large file, perhaps a database file, that won't fit on a single disk. The system will then access the multiple–disk LDU as one directory file, providing enough space for the large database.

For an example of a single–disk LDU system, imagine the structure in Figure 1–3 on a single disk. An example of a multiple LDU system which contains a multiple–disk LDU named DATABASE, follows in Figure 1–4.

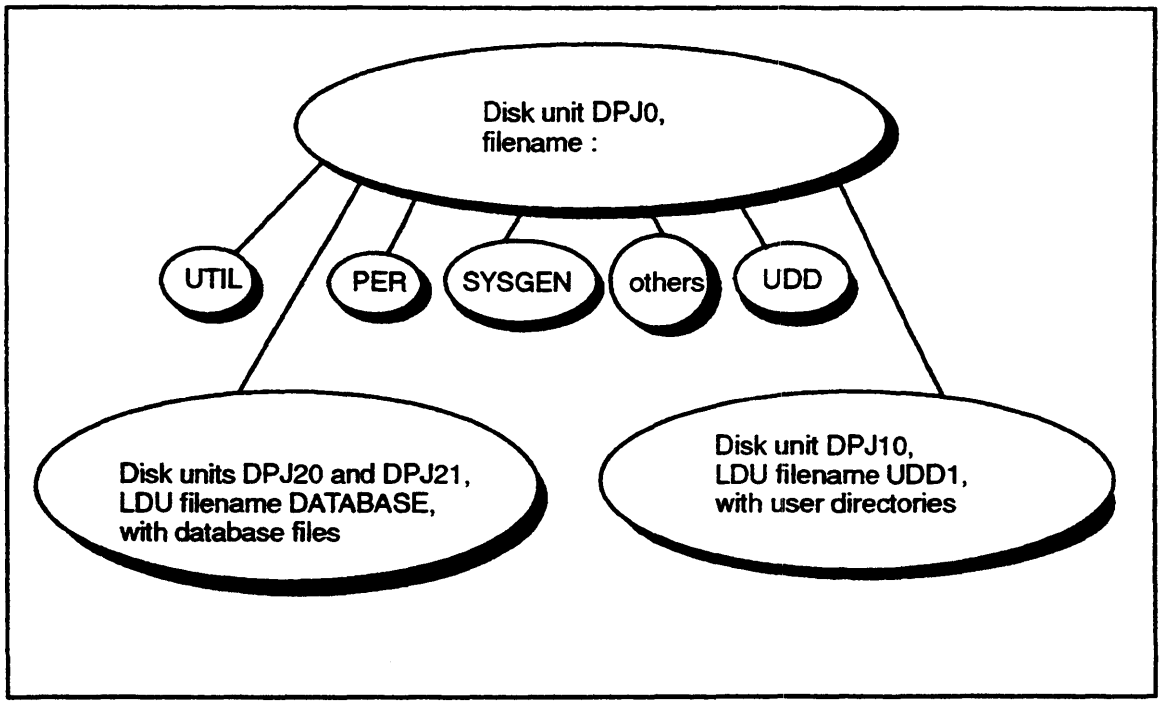

Figure 1–4 System with Several Logical Disk Units

For your first system, you will create a single–disk, one–piece LDU in disk unit 0 on the first disk controller. This will be the system disk. But after you have formatted this LDU, you may need to format other physical disks (if you have other units) and make decisions about their names. We'll give more detail on the specifics later, but mention them here so that you'll know about your options.

What's Involved in System Installation?

The system installation procedure assumes that you are starting with blank disks. It includes running the Disk Formatter to format the disk and install system software, generating a tailored AOS/VS system, and creating the multiuser environment.

For the system installation procedure, you'll need to mount magnetic tape (if you have a tape unit). If your primary disk unit uses a removable pack, you'll also need to insert a pack in the unit. If you don't know how to do these things, refer to the Preface for manuals about disk and tape unit.

Figure 1–5 shows each step that you take in the system installation procedure, from beginning to end.

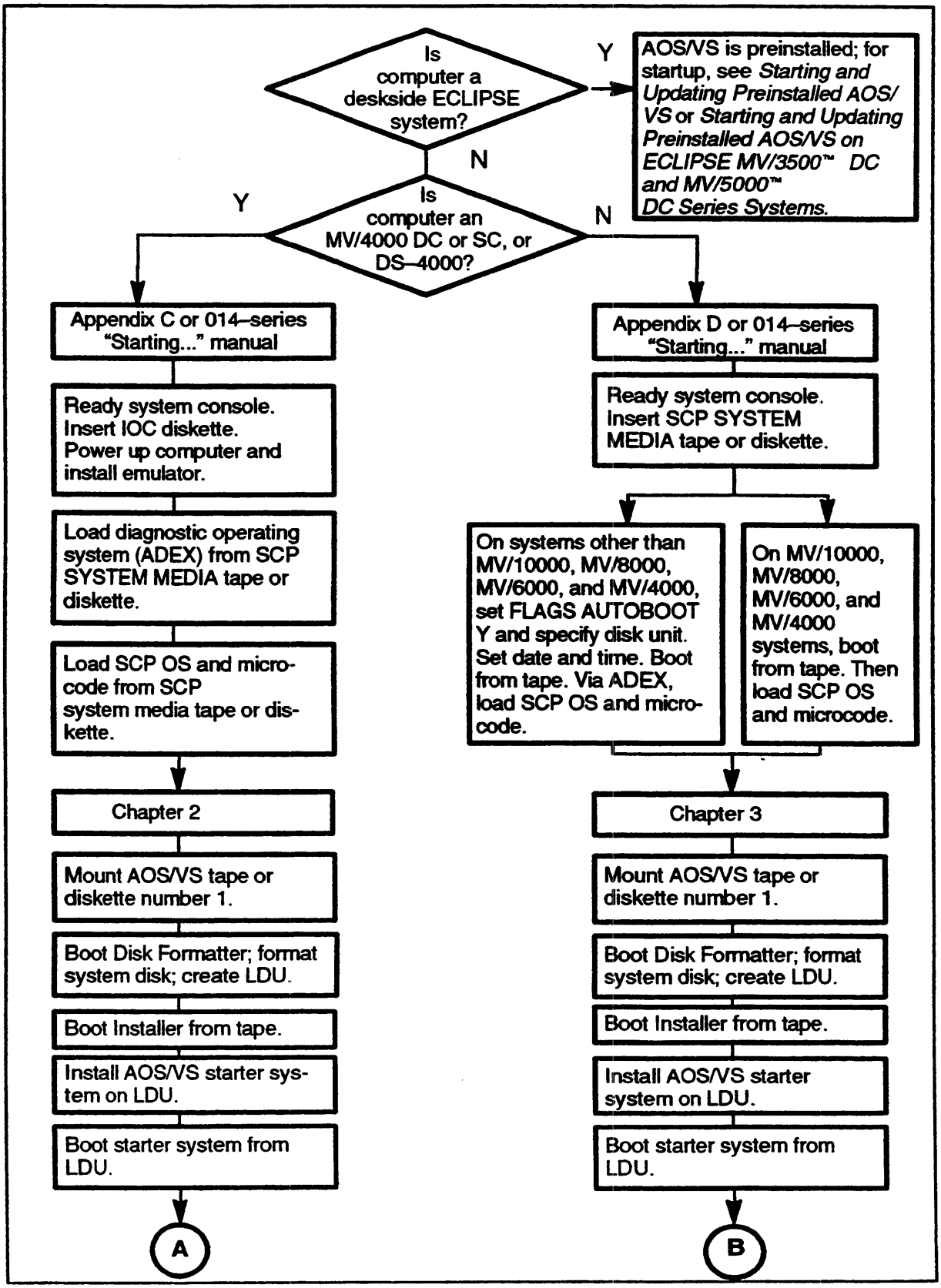

Figure 1–5 How to Install Your First Tailored AOS/VS System (continued)

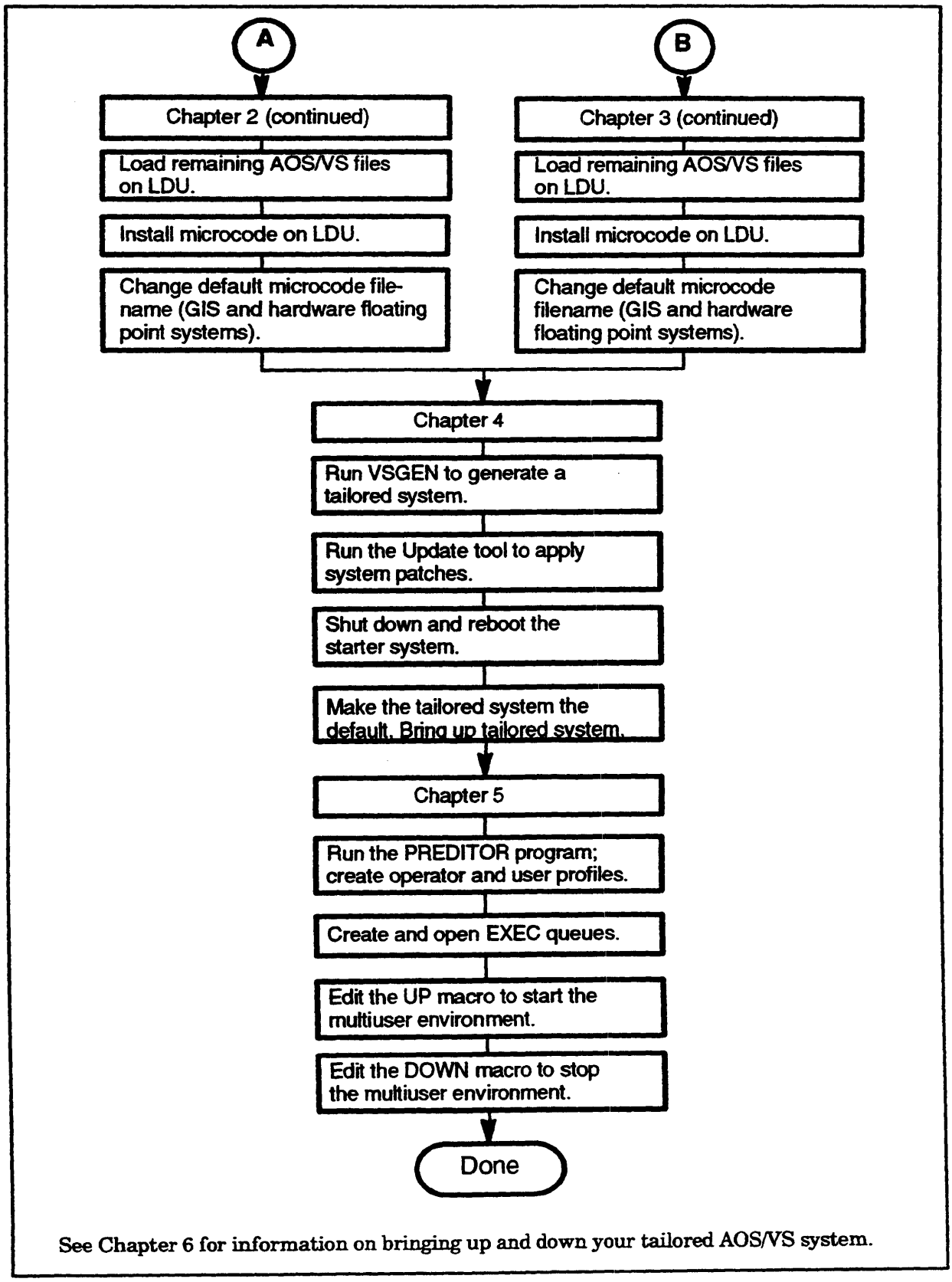

Figure 1–5 How to Install Your First Tailored AOS/VS System (concluded)

Finding Information on AOS/VS Management Tasks

Running and managing an AOS/VS system involves many tasks other than installation, startup, and shutdown. Table 1–1 shows some typical system installation and management tasks and the primary place (manual and chapter) you can find information on them. The topics proceed alphabetically. Any chapter shown without a manual title appears in this manual.

Table 1–1 Finding Information on Starting and Running AOS/VS

Topic	Where to Find Details
Abnormal shutdown	Chapter 6
Backup procedures	*Managing AOS/VS and AOS/VS II*, Chaps. 4, 5, 6, 7
Batch operations	*Managing AOS/VS and AOS/VS II*, Chaps. 3 and 4
Bootstrapping programs	Chapter 6, Startup/Shutdown sections
CLI commands (operator)	*Managing AOS/VS and AOS/VS II*, Chapter 3
Dumping files for backup	*Managing AOS/VS and AOS/VS II*, Chapter 4
Errors	*AOS/VS and AOS/VS II Error and Status Messages*
EXEC commands	*Managing AOS/VS and AOS/VS II*, Chapter 3
EXEC multiuser environment	Chapter 5
Executing user applications	*Managing AOS/VS and AOS/VS II*, Chapter 9
First AOS/VS system	Chapter 2 or 3
Installing	Chapter 2 or 3
Generating	Chapter 4
Fixing LDUs (FIXUP)	Chapter 6
Formatting disks, first system	Chapter 2 or 3
Formatting disks, later on	Chapter 8
Generating tailored system	Chapter 4 (VSGEN)
Installing software, first system	Chapter 2 or 3
Installing software, later on	Chapter 7
Labeled tapes	*Managing AOS/VS and AOS/VS II*, Chaps. 3 and 4
Log file, system	*Managing AOS/VS and AOS/VS II*, Chapter 9
Management decisions	*Managing AOS/VS and AOS/VS II*, Chaps. 11 and 12
Memory Dump (and ESD)	Chapter 6
Microcode, loading, first time	Appendix C or D
Microcode, loading, routine	Chapter 6
Multiuser environment, creating	Chapter 5
Multiuser environment, running	*Managing AOS/VS and AOS/VS II*, Chapter 3
Operator tools, runtime	*Managing AOS/VS and AOS/VS II*, Chapter 9
Power failures	Chapter 6
Queues, creating	Chapter 5
Queues, running	*Managing AOS/VS and AOS/VS II*, Chapter 3
SCP operating system	Chapter 6
Shutdown, normal/abnormal	Chapter 6
Software Trouble Report (STR)	*Managing AOS/VS and AOS/VS II*, Chapter 10
Startup	Chapter 6
System management interface (SMI)	*Using the AOS/VS System Management Interface (SMI)*
Tapes, mounting for users	*Managing AOS/VS and AOS/VS II*, Chapter 3
User logon	*Managing AOS/VS and AOS/VS II*, Chapter 3
User profiles, creating (first time)	Chapter 5
User profiles, creating (general)	*Managing AOS/VS and AOS/VS II*, Chapter 2

Cautions and Control Characters

This section gives some hints and cautions that will help you during the system generation process. Simply read it; don't do anything yet.

CPU and Disk Switches

During the system generation procedure, power will be on to the CPU and the CPU POWER lamp will be lit. The primary disk will be ready and write enabled. While you're working with the system (and whenever a system is running), *don't press the CPU or disk switches.*

If power to the CPU is interrupted, the SCP operating system and microcode will be lost, and they must be reloaded. If power to the disk(s) is interrupted while an AOS/VS program is running, the program will usually abort. In either case, you will need to start the program that was running all over again—a time–consuming nuisance that you can avoid by leaving the switches alone after the CPU and disks are ready.

When AOS/VS is shut down and the SCP is idle, you *can* shut off power to the disk(s) if you wish—but you may want to keep CPU power on permanently. Cutting power to the CPU saves energy, but adds a few steps and a few minutes when you bring the system up again.

System Console

During the system generation procedure (and afterwards) you'll use the system console (DASHER® display or printing terminal) extensively. Normally, when AOS/VS is not running, the SCP CLI controls the console. Its prompt is

SCP–CLI> (On some systems, this prompt includes the characters */Jpn*, where *n* is the number of a job processor)

To the SCP CLI, you type commands that load and run other programs, including AOS/VS operating systems. These AOS/VS programs take control of the system console when they run. When they stop, they type an appropriate message on the console; the SCP CLI regains control of the console and displays the *SCP–CLI>* prompt.

Generally, while AOS/VS is running, you will not need and should not use the SCP CLI. If an *SCP–CLI>* prompt appears on the system console while AOS/VS is running, you may have accidentally typed the break sequence (explained in Table 1–2). You can return control to AOS/VS as described in Table 1–2. Accidental breaks can be annoying. If your computer has a LOCK switch, you can prevent accidental breaks by keeping the computer locked during normal operations.

Keyboard Control (CTRL) Characters

There are several keyboard control sequences and keys that govern terminal display, interrupt program execution, and the like. You *may* need one or more of these for system installation; and it will help to know about them afterward—or if you accidentally enter one of these control character keys or sequences on the keyboard.

To type a control sequence, first press the CTRL key; while you hold the CTRL key down, press the other character. Table 1–2 lists the control characters and special keys and their functions.

Table 1-2 Control Characters and Special Keys

Key(s)	What it Does
CTRL–O	Discards display for the portion of the command that remains to be executed, or until you enter CTRL–O again, whichever happens first. CTRL–O turns off display, and then turns it on again. It does not halt the program. During system installation, you will not want to use CTRL–O. Later, especially on a hardcopy terminal, you can use it to speed up programs that do a lot of writing to the console.
CTRL–S	Suspends display. Display resumes where it stopped when you press CTRL–Q. CTRL–S and CTRL–Q are useful when you want to read long files on a CRT screen, or any time display is too fast to read.
CTRL–Q	Resumes display. If you stopped display with CTRL–S, then press CTRL–Q. If you stopped display with CTRL–O, CTRL–Q has no effect.
CTRL–U	Erases the current input line. This is handy when you have typed a long, erroneous command line and don't want to press the DEL key many times to erase it. CTRL–U is most useful on hardcopy terminals.
CTRL–C CTRL–A	Interrupts execution of an AOS/VS CLI command. You'll find this sequence useful.
CTRL–C CTRL–B	In AOS/VS, aborts the process that issues it (like the CLI or a text editor). You will probably want to avoid using this sequence.
CTRL–D CTRL–D	In AOS/VS, signals an end of file, which usually aborts the issuing process. Generally, avoid this sequence.
CTRL–C CTRL–E	In AOS/VS, creates a memory–image break file (useful for debugging), and aborts the issuing process. Generally, avoid this.
DEL key	Erases the last character typed. In AOS/VS stand–alone programs, DEL echoes as _ for each character erased. In the SCP CLI, DEL echoes as /*x* (a slash; then the character) for each character erased.
BREAK key	Enters the break sequence. On newer CRTs, press the CMD key and, while holding it down, press the BREAK/ESC key; on DASHER D2 CRTs, press the BREAK key; on hardcopy terminals, press the BRK key. Unless it has been disabled, a break sequence typed on the system console gives control to the SCP CLI. To return control to AOS/VS, type TTY and press NEW LINE. Or, on ECLIPSE MV/1000 DC, MV/1400 DC, MV/2000 DC, MV/2500 DC, and MV/4000–series computers, type CONTINUE and press NEW LINE. You can disable the break sequence by locking the computer (using the LOCK switch, if any, or the SCP command FLAGS).

If You Make a Mistake

The programs in the AOS/VS package have good error messages and error recovery. But if you make what appears to be a fatal mistake, you can usually restart the program from the beginning without problems.

If, at the system console, everything seems to have stopped, press CTRL–Q. If CTRL–Q has no effect, press CTRL–O. If CTRL–O has no effect, press CTRL–O to undo the first CTRL–O. Finally, if the *SCP–CLI>* prompt has appeared unexpectedly, type TTY and press NEW LINE—or on an ECLIPSE MV/7800–series, MV/4000–series, MV/5000 DC–series, and MV3000 DC series systems, MV/2500 DC, MV/2000 DC, MV/1400 DC, or MV/1000 DC computer, type CONTINUE and press NEW LINE.

The manual *AOS/VS and AOS/VS II Error and Status Messages* describes important error messages and error recovery.

What Next?

If your computer is an ECLIPSE MV/4000 DC, MV/4000 SC, or Data General DS/4000 (but not an ECLIPSE MV/4000), go to Chapter 2. For any other computer, skip to Chapter 3.

End of Chapter

Chapter 2
Bringing Up the Starter System on Blank Disks — ECLIPSE MV/4000 DC, MV/4000 SC, and Data General DS/4000–Series Computers

Read this chapter

- When your computer system hardware has just been installed and you want to bring up AOS/VS on it.
- Whenever you want to format a new disk, install an AOS/VS system on it, load system files onto it, and bring up the AOS/VS system.

This chapter tells you how to execute all steps needed before you run the VSGEN program to generate your first tailored system on ECLIPSE MV/4000 DC, MV/4000 SC, and Data General DS/4000–series systems only. For information about other ECLIPSE MV/Family computers, see Chapter 3.

The major sections in this chapter are

- Note to Deskside ECLIPSE System Users
- About Your Media
- First–Time Powerup
- Running the Disk Formatter
- Installing the AOS/VS Starter System
- Bringing Up the AOS/VS Starter System
- Step Summary

Note to Deskside ECLIPSE System Users

If you have a Data General DS/7500–series or ECLIPSE MV/1000 DC, MV/1400 DC, MV/2000 DC, MV/2500 DC, MV/3000 DC series, or MV/5000 DC series computer with AOS/VS, don't continue with this chapter! Your system arrived with an easy–to–use model of AOS/VS already installed on the disk. The manuals *Starting and Updating Preinstalled AOS/VS* and *Starting and Updating Preinstalled AOS/VS on ECLIPSE MV/3500™ DC and MV/5000™ DC Series Systems* contain information about using preinstalled AOS/VS on these systems.

About Your Media

All MV/4000 DC, MV/4000 SC, and DS/4000–series computer systems include at least one 737,000 byte diskette unit. An optional extra is a cartridge tape unit. If your system doesn't include a tape unit, all the system components you need to build AOS/VS were supplied on diskettes, organized into the following groups:

- The I/O CB emulator, shipped on one diskette with your computer, is the operating system that runs in the device controllers. This diskette is required for first–time powerup (described in Appendix C).
- The MV/n SCP SYSTEM MEDIA, shipped on two diskettes with your computer, contain firmware that's independent of the operating system: a diagnostic program, diagnostic operating system, CPU diagnostics, CPU microcode, and the SCP operating system. Along with the I/O CB emulator, these diskettes are required for first–time powerup (described in Appendix D). You will need one of them later to install the microcode file on your system disk.
- The latest revision of AOS/VS system programs, shipped on a number of diskettes. Beginning with Revision 7.67, there is no practical difference between an AOS/VS *revision* and an *update*. In either case, a complete system is provided and installed according to the instructions in this manual for installing a revision.

If you have a tape unit, you may receive AOS/VS software programs and updates on one cartridge tape; and you may receive system media and microcode on another. The media you receive depends on your contract with Data General.

Identify the AOS/VS diskettes or tapes. You'll need them soon.

First–Time Powerup

To power up your system for the first time, follow the procedures explained in Appendix C; then return here. The steps explained here assume that the SCP CLI prompt (*SCP–CLI>*) appears on the system console. If this prompt is displayed, first–time powerup steps have already been executed.

Running the Disk Formatter

The Disk Formatter makes physical disks into logical disk units (LDUs). The Disk Formatter writes disk identifiers so AOS/VS will know which disk and LDU it is accessing. The Disk Formatter can also examine the disk surface for *bad blocks* (flawed areas that won't hold information).

Running the Disk Formatter is relatively easy, but because it examines each bit on the disk, the Disk Formatter takes more time than other system generation procedures.

Mistakes and Errors

If you type an incorrect response to a Disk Formatter question, and have not yet pressed NEW LINE to enter the response, press the DEL key or CTRL−U to delete the incorrect characters.

If you have pressed NEW LINE and want to abort formatting, press CTRL−C CTRL−A and go to step 9. If CTRL−C CTRL−A doesn't abort formatting, press the break sequence (CMD and BREAK/ESC keys) and return to step 2.

If you abort formatting by either method during surface analysis, be sure to run the entire FULL format again.

If the Disk Formatter reports a disk or other error, refer to the error message table near the end of Chapter 8.

Disk Formatter Dialog

1. If you received AOS/VS on diskette, insert AOS/VS diskette number 1 in unit 0. If you received AOS/VS on cartridge tape, insert tape number 1 in the unit, label to the right.

2. The SCP CLI prompt is still on the system console. Reset the computer by typing

   SCP−CLI> RESET↵

   After a few moments, the SCP CLI prompt returns.

   With AOS/VS on tape, skip to step 7. With AOS/VS on diskette, continue.

3. Bootstrap (start) from your Data General media. If you are using diskettes, type

   SCP−CLI> BOOT 64↵

   Operating System Load Menu

   1 Continue immediately with operating system load
   2 Enter the Technical Maintenance Menu
   . . .
   The default system pathname is
   . . .
   Enter choice [1]:

4. There is no operating system on the disk. You must enter the Technical Maintenance Menu. Type 2 and press NEW LINE.

Enter choice [1]: 2↵

Technical Maintenance Menu

...
6 Run a specified program
...

Enter choice [1]:

5. Since the Disk Formatter is a specified program, choose option 6:

Enter choice [1]: 6↵

Pathname?

6. Type the Disk Formatter's filename, DFMTR, press NEW LINE.

Pathname? DFMTR↵

Skip to step 9.

7. With AOS/VS on tape, wait for the tape unit READY light to glow. Then bootstrap (start) by typing

SCP-CLI> BOOT 22↵ (Or 23 for an MTJ unit)

Tape file number?

8. Type the file number for the Disk Formatter, which is 2, and press NEW LINE.

Tape file number? 2↵

9. The bootstrap program now loads the Disk Formatter from the supply medium. This takes 15 to 20 seconds. The Formatter starts up and prompts

AOS/VS Disk Formatter Rev n

Full format destroys any AOS/VS file structure, Partial retains it.

Full (F) or Partial (P or NEW LINE)?

Type F and press NEW LINE.

Full (F) or Partial (P or NEW LINE)? F↵

Full format

Specify each disk in the LDU (press NEW LINE when done)

Disk unit name?

10. The *Disk unit name* prompt starts a sequence of questions to identify this LDU.

    A sealed Winchester disk unit named DPJ0 and 737,000–byte diskette unit named DPJ10 are built into your computer system. The add–on units listed in Table 2–1 are options.

Table 2–1 Common System Disk Models, Unit Names, and Device Codes

Model	Description	Unit Name	Device Code
6363	160–Mbyte, sealed Winchester disk	DPJ1	24
6329	120–Mbyte, sealed Winchester disk	DPJ1	24
6328	70–Mbyte, sealed Winchester disk	DPJ1	24
6310	38–Mbyte, sealed Winchester disk	DPJ1	24
6309	737,000–byte, 5.25–inch minidiskette	DPJ11	64

    If you have any add–on Winchester disks, format them after you've formatted the first disk. For your first disk, type

    Disk unit name? DPJ0↵

    After you answer the *Disk unit name* question, the Disk Formatter asks

    Device code [default]?

11. The default device code appears in square brackets. Press NEW LINE to choose the default:

    Device code [default]?↵

    Disk unit name?

12. The Disk Formatter will repeat the *Disk unit name?* and *Device code?* prompts until you press NEW LINE after the *Disk unit name?* prompt. The repetition of these prompts allows you to create an LDU that includes more than one disk.

    Because you want a single–disk LDU, press NEW LINE.

    Disk unit name?↵

    Do you want to allocate a diagnostic area? [Y]

13. The *Do you want to allocate a diagnostic area?* prompt lets you reserve an area on disk for later installation of Data General's Advanced Diagnostic Executive System (ADEX). ADEX can run from a medium other than disk, but it runs much faster from disk; also, diagnostics are easier to run remotely if ADEX is on disk. To use ADEX, you must purchase it and have it installed on the disk by a Data General field engineer. ADEX for MV/Family computers requires a minimum of 8,000 disk blocks, or 4.1 Mbytes. The disk space used by ADEX is lost for AOS/VS file storage.

If you don't want to install ADEX and run it from disk, answer No by typing N and pressing NEW LINE. ADEX runs only from the system disk, which means you should *always* say No if the disk you are formatting isn't the system disk (DPJ0). If you say No, skip to step 15.

If you want to reserve an area for ADEX, press NEW LINE. Then, the Disk Formatter asks

Enter the number of blocks (1750 to 35230) required. [23420]

14. The figures displayed in the prompt are octal values. ADEX needs at least 8,000 blocks (17500 octal) to run. The default, 23420, is 10,000 blocks. Decide on the number of disk blocks needed for the diagnostics you want installed; then type this number *in octal format* and press NEW LINE. The Disk Formatter will now assume that this disk is a system disk. After you type the number of blocks, the system displays the following.

Disk number 1: 00000000000 through n

LDU unique I.D. (1 to 6 characters)? [ ]

The numbers 0 through *n* are the first and last logical addresses on the disk, in octal.

15. The *LDU unique I.D. (...)* prompt indicates that the Disk Formatter wants a unique means to identify the disk. The ID must be between 1 and 6 characters long. We suggest an ID of 1 for your first LDU and 2 for your second (if you have a second hard disk). For the first disk, for example, type

LDU unique I.D. (1 to 6 characters)? [ ] 1↵

LDU name (1 to 31 characters) [ ]?

16. Later, when you start up AOS/VS (or initialize this LDU), the name you type at the *LDU name* prompt will be displayed.

The first disk you format (DPJ0) will be the system root directory (:). For the root disk, the name you type is not important in terms of file access because you never access the root disk by its LDU name.

If you are formatting a second hard disk, however, the name you type here becomes the filename of the LDU. Users can use this name just as any other directory filename. For example, you might use the name UDD. You can always change an LDU name later with a Disk Formatter Partial format (covered in the Disk Formatter chapter).

For your first LDU, DPJ0, we suggest the name ROOT. So, for example, type

LDU name (1 to 31 characters) [ ]? ROOT↵

(If you're formatting the second hard disk, write the disk name down so you will remember it later.)

Access Control List

Username or template (1 to 15 characters)?

17. A user, identified by a username, or a group of users, identified by a template, can have different kinds of access to an LDU. A good general–purpose username template is +, which specifies all users. So type

Username or template (1 to 15 characters)? +↵

Access (O, W, A, R, E, or NEW LINE)?

18. The Disk Formatter wants to know which privileges to give the username(s) you just specified. There are five types of privileges: Owner, Write, Append, Read, and Execute, abbreviated O, W, A, R, and E. Execute (E) access will suffice for most LDUs. So type E and press NEW LINE.

Access (O, W, A, R, E, or NEW LINE)? E↵

Username or template (1 to 15 characters)?

19. The Disk Formatter will repeat the *Username* and *Access* questions, allowing you to give very specific user and access information, until you respond to the *Username* ... prompt by pressing NEW LINE. Later, if needed, you can change access to the LDU. So for now press NEW LINE.

Username or template (1 to 15 characters)?↵

Surface analysis? [N]

20. This step starts a surface analysis for this LDU. (The value in brackets is the value that the Disk Formatter will use if you respond by pressing NEW LINE.)

During surface analysis, the Disk Formatter writes a pattern to each 16–bit word on the disk and reads it back. The Disk Formatter marks as bad the blocks it cannot read back. It's very important for the Formatter to identify all bad blocks so that AOS/VS will bypass them. Indicate that you want a surface analysis of your LDU by typing

Surface analysis? [N] Y↵

Disk number?

21. The Disk Formatter wants you to supply the number of the disk to analyze. For a single–disk LDU, press NEW LINE.

Disk number?↵

You may run up to five (5) patterns. How many would you like to run?

22. The Disk Formatter can run one through five bit patterns on the disk. We recommend that you run all five patterns on each disk you format.

Each pattern takes from about 8 minutes (on a 39–Mbyte disk) to about 24 minutes (on a 120–Mbyte disk) to run. Decide on a number of patterns and enter this number. For example, to run five patterns, type

You may run up to five (5) patterns. How many would you like to run? 5↵

Analyzing disk #n
-- Running pattern n

The Disk Formatter runs the number of patterns you specified, one at a time. (If it finds too many bad blocks, either because the disk is badly deteriorated or because the disk heads are misaligned, the Disk Formatter aborts.)

When the Disk Formatter has finished running the surface analysis patterns, it describes the bad blocks on the disk.

23. If the Disk Formatter found no bad blocks, it displays the message *0 bad disk blocks.* Go to the next step.

If the Disk Formatter found any bad blocks, it displays the following information, where *n* is the number of bad disk blocks.

n bad disk blocks
Display bad block statistics? [N]

The Disk Formatter is asking if you want to see the bad block statistics. These statistics may be useful, so answer yes.

Display bad block statistics? [N] Y↵

The Disk Formatter now displays the bad block statistics on the system console.

Additional bad block number (press NEW LINE when done):

24. You have no additional bad blocks to enter, so press NEW LINE.

Additional bad block number (press NEW LINE when done):↵

n bad disk blocks
Display bad block statistics [N]

25. Press NEW LINE to accept the default value, No, after the prompt.

Display bad block statistics [N]↵

n bad disk blocks

Bitmap size: n
Bitmap address? [default]

The bitmap is a system table that describes which blocks are in use and which are free for data storage.

26. Select the default bitmap address by pressing NEW LINE.

Bitmap address? [default]↵

System LDU? [Y]

27. This step starts a series that determines whether and where an AOS/VS system will reside on the disk. The Disk Formatter skips this question if you allocated a diagnostic area earlier in step 13.

    Your first LDU must be a system disk, so press NEW LINE to accept the default. For your *second* LDU, you would type N and press NEW LINE.

    System LDU? [Y]↵

    Overlay area size? [default]

28. Choose the default area size by pressing NEW LINE.

    Overlay area size? [default]↵

    Overlay area address? [default]

29. Choose the default address by pressing NEW LINE.

    Overlay area address? [default]↵

    Disk number n remap area size? [default]

30. Choose the default remap area size by pressing NEW LINE.

    Disk number n remap area size? [default]↵

    Disk number n remap area address? [default]

31. Choose the default remap area address by pressing NEW LINE.

    Disk number n remap area address? [default]↵

    -- LDU created
    Done!
    . . .
    SCP-CLI>

Congratulations! You've formatted an LDU as a system disk. It will rarely—if ever—need full formatting again. If this LDU may be run as a nonmaster LDU, we suggest that you note the date, LDU ID and unit name, and any bad block information and attach this information to the computer cabinet.

The Disk Formatter is done, and the SCP CLI has control. If you have other new disks, someone must format them into LDUs before they can be used. You might want to create the LDU(s) now, while you're familiar with the procedure. To format the disk(s) now, type CONTINUE at the SCP CLI prompt to return to step 9. To format a disk *not* described in this chapter, refer to Chapter 8.

If you don't want to format other disks now, install the AOS/VS starter system.

Installing the AOS/VS Starter System

The Installer program installs an AOS/VS system from Data General–supplied media onto an LDU. (AOS/VS must reside on disk before it can run.)

Mistakes and Errors

If you make a mistake, handle it the same way as with the Disk Formatter.

If the Installer reports a disk error or other error, refer to the error message table near the end of Chapter 9.

If the Installer stops with an *ABORT* message, return to the first Installer step (for diskette, step 32; for tape, step 48) and run the Installer again.

If you are using diskettes, begin with step 32. If you are using tape, begin with step 48.

Installing the Starter System from Diskettes

32. The SCP CLI prompt appears on the system console. Reset the CPU:

SCP–CLI> RESET↵

(A few moments pass.)

SCP–CLI>

33. Bootstrap from diskette:

SCP–CLI> BOOT 64↵

(There's a delay of 5 to 10 seconds.)

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu

. . .
The default system pathname is
. . .

Enter choice [1]:

34. Again, you need to use the Technical Maintenance Menu, so choose option 2:

Enter choice [1]: 2↵

The Technical Maintenance Menu appears:

Technical Maintenance Menu

. . .

6 Run a specified program
. . .

Enter choice [1]:

35. Since the Installer program is a specified program, choose option 6:

    Enter choice [1]: 6↵

    Pathname?

36. Type the filename of the Installer program, INSTL:

    Pathname? INSTL↵

    The bootstrap program now loads the Installer program into memory. This takes about 15 seconds. The Installer program then displays the following

    AOS/VS Installer Rev n

    Specify each disk in the LDU
    Disk unit name?

37. Remove AOS/VS diskette 1 from disk unit 0 and insert AOS/VS diskette 2.

38. Type the name of your system disk, DPJ0:

    Disk unit name? DPJ0↵

    Device code [24]?

39. Accept the default device code by pressing NEW LINE.

    Device code [24]?↵

    -- Disk bootstrap installed
    Do you want to install a System Bootstrap [Y]?

40. You must install the system bootstrap, SYSBOOT, on the LDU. Press NEW LINE.

    Do you want to install a System Bootstrap [Y]?↵

    Install from which unit [MTC0]?

41. To install the system bootstrap from diskette, type the diskette unit name, DPJ10:

    Install from which unit [MTC0]? DPJ10↵

    Device code [default]?

42. Press NEW LINE to accept the default.

    Device code [default]?↵

The Installer program copies SYSBOOT from the diskette to the LDU. This takes about 30 seconds. Then the Installer program displays

-- System Bootstrap installed
Do you want to install a System [Y]?

43. Remove AOS/VS diskette 2 from the unit, and insert diskette 3. Diskette 3 contains the starter system.

44. You want to install a system, so press NEW LINE.

Do you want to install a System [Y]?↵

Install from which unit [DPJ10]?

45. Press NEW LINE.

Install from which unit [DPJ10]?↵

Device code [default]?

46. To accept the default, press NEW LINE.

Device code [default]?↵

The Installer now reads the AOS/VS system from diskette 3 and copies it to the LDU. This takes 2 to 3 minutes. Then the Installer responds

-- System installed
Done!
...
SCP-CLI>

47. Remove diskette 3 from unit 0.

You've installed the needed bootstraps and an AOS/VS system on an LDU. Now you can bring up the system. Skip to "Bringing Up the AOS/VS Starter System," step 61.

Installing the Starter System from Tape

48. The SCP CLI prompt appears on the system console. Reset the CPU:

SCP-CLI> RESET↵

SCP-CLI>

49. To boot from tape (device code 22 or 23), type

SCP-CLI> BOOT 22↵ (Or 23 for an MTJ unit)

Tape file number?

50. The Installer program is in tape file 3, so type

Tape file number? 3↵

The tape bootstrap program, TBOOT, moves the tape forward to file 3, reads the Installer into memory, rewinds the tape, and executes the Installer. The Installer displays the following information.

AOS/VS Installer Rev n

Specify each disk in the LDU
Disk unit name?

51. Type the unit name of your newly created LDU, DPJ0:

Disk unit name? DPJ0↵

Device code [24]?

52. Press NEW LINE to accept the default device code.

Device code [24]?↵

-- Disk bootstrap installed
Do you want to install a System Bootstrap [Y]?

53. You must install the system bootstrap program, SYSBOOT, on the LDU, so press NEW LINE.

Do you want to install a System Bootstrap [Y]?↵

Install from which unit [MTC0]?

54. Press NEW LINE.

Install from which unit [MTC0]?↵

Device code [22]? (Or *23*)

55. ACCEPT the default value by pressing NEW LINE.

Device code [22]?↵ (Or *23*)

File number [4]?

56. The system bootstrap program, SYSBOOT, is in tape file 4. Press NEW LINE to accept the default.

File number [4]?↵

There's a delay while the tape moves forward to file 4. Then the Installer copies SYSBOOT to the LDU and displays the following.

-- System Bootstrap installed
Do you want to install a System [Y]?

57. You want to install a system, so press NEW LINE.

Do you want to install a System [Y]?↵

Install from which unit [MTC0]?

58. Press NEW LINE to accept the default value.

Install from which unit [MTC0]?↵ (Or *MTJ0*)

Device code [default]?

59. Press NEW LINE to accept the default value.

Device code [default]?↵

File number [5]?

60. The AOS/VS system is always in file 5 of a system tape, so press NEW LINE.

File number [5]?↵

There's a delay while the Installer copies the AOS/VS system from tape to the LDU. Then the Installer displays

-- System installed
Done!
...
SCP-CLI>

You've installed the needed bootstraps and an AOS/VS system on your LDU. Now you can bring up the AOS/VS system.

Bringing Up the AOS/VS Starter System

61. The SCP CLI has control. Use it to reset the computer:

SCP-CLI> RESET↵

SCP-CLI>

62. Boot again, this time from *disk*. The disk device code is 24. So type

SCP-CLI> BOOT 24↵

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu

Loading will continue automatically unless you respond within 45 seconds.

...

Enter choice [1]:

63. Press NEW LINE to accept the default value.

AOS/VS Rev n

Master LDU: x (*x* is the name you specified to the Disk Formatter)

Date (MM/DD/YY)?

64. Type the date as numbers for month, day, and year. Spaces or slashes can separate each number. For example, for November 22, 1992, you'd type

Date (MM/DD/YY)? 11 22 92↵

Time (HH:MM:SS)?

65. Type the time, based on a 24–hour clock, in hours, minutes, and seconds. (Minutes and seconds are optional. If you omit them, the system sets each to 0.) Use spaces or colons to separate items. For example, for 2:30 p.m., you'd type

Time (HH:MM:SS)? 14 30↵

Offset from universal time [+00:00]?

66. Setting the offset from universal or Greenwich Mean Time is not important now, so press NEW LINE to accept the default.

Offset from universal time [+00:00]?↵

Override default specs [N]?
AOS/VS will continue automatically with defaults
unless you respond within 00:00:30

67. Specs are the parameters in the system specification file created during VSGEN. For your first system, you must answer yes, so type Y and press NEW LINE.

Override default specs [N]? Y↵

Automatic reboot [N]?

68. Press NEW LINE to accept the default value.

Automatic reboot [N]?↵

Number of buffers in cache [default]?

69. Press NEW LINE to accept the default value.

Number of buffers in cache [default]?↵

Swap directory definition [default]?

70. Press NEW LINE to accept the default value.

Swap directory definition [default]?↵

Page directory definition [default]?

71. Press NEW LINE to accept the default value.

Page directory definition [default]?↵

Initial load [N]?

72. In an *Initial load,* the system loads the CLI and other needed files onto the LDU. These files must be loaded the first time you bring up the starter system. They need not be loaded again unless—later on—you want to load a new AOS/VS revision. Answer yes by typing Y and pressing NEW LINE.

Initial load [N]? Y↵

Filename [@MTC0:6]?

73. If you are installing AOS/VS from cartridge tape, go to step 78. For AOS/VS supplied on diskettes, get the fourth AOS/VS diskette and insert it in diskette unit 0. This diskette has the CLI and essential system files on it.

74. Type the labeled diskette pathname of the file on diskette. The pathname is @LFD:VOL1:FIRST_DUMP_FILE, so type

Filename [@MTC0:6]? @LFD:VOL1:FIRST_DUMP_FILE↵

PLEASE INSERT A DISKETTE IF NOT ALREADY INSERTED
UNIT [@DPJ10] VOLUME ID [VOL1]? [Y]

75. Confirm by pressing NEW LINE.

PLEASE INSERT A DISKETTE IF NOT ALREADY INSERTED
UNIT [@DPJ10] VOLUME ID [VOL1]? [Y]↵

The starter system now copies files from the diskette to the LDU. It takes about 2 minutes per diskette.

If you see the message *PHYSICAL UNIT OFFLINE,* this probably means you inserted the diskette incorrectly. Remove the diskette from the unit, reinsert it as described earlier (Figure 2–1), and press NEW LINE. If the message is *THE LABEL ON THIS DISKETTE IS NOT THE LABEL REQUESTED,* or *AN UNLABELED DISKETTE HAS BEEN INSERTED,* you've inserted the wrong diskette. Find the fourth diskette in the AOS/VS set (not the system media set or the UD set). Insert it in unit 0, then retry the procedure. If the message is *FILE DOES NOT EXIST,* you probably typed the wrong pathname, or inserted a diskette from the wrong group. Remove the diskette, check its paper label and select another diskette if needed; then try again.

When all files have been copied from diskette, the system prompts

PLEASE INSERT NEXT DISKETTE
UNIT [@DPJ10] VOLUME ID [VOLn]? [Y]

76. Get the next diskette in the AOS/VS set. Remove the diskette from unit 0 and insert the next diskette. Press NEW LINE.

Again, the starter system copies files from the diskette to disk.

Repeat step 75 until the system console displays the following:

PLEASE REMOVE THE DISKETTE
AOS/VS CLI REV n date time
)

Congratulations! You've brought up AOS/VS and its CLI from diskette. The) prompt means that the CLI is ready for a command.

If you get a *FILE DOES NOT EXIST* message, a needed file wasn't loaded. Perhaps you forgot to answer Y to the *Initial Load* question. In any case, run Emergency Shutdown (ESD) by typing

SCP–CLI> RESET↵
SCP–CLI> START 50↵
SCP–CLI>↵

then return to step 61 to try again. Type Y followed by NEW LINE in response to each *REPLACE OLD COPY* message. For a description of errors by numeric code, see the manual *AOS/VS and AOS/VS II Error and Status Messages*.

77. If you are using diskettes, remove the diskette from unit 0. Skip to the next section, "Loading AOS/VS System Files from Diskette," step 79.

78. If you are using tape, press NEW LINE to specify the default, tape file 6:

Filename [@MTC0:6]?↵

The starter system now copies files from tape to the LDU. This procedure takes a while. Then the starter system displays the following.

AOS/VS CLI REV n date time
)

Congratulations! You've brought up AOS/VS and its CLI from tape. The) prompt means the CLI is ready for a command. Skip past the next section, to "Loading AOS/VS System Files from Tape," step 90.

If you get a *FILE DOES NOT EXIST* message, a needed file wasn't loaded. Perhaps you forgot to answer Y followed by NEW LINE to the *Initial load* question. In any case, run Emergency Shutdown (ESD) by typing

SCP–CLI> RESET↵
SCP–CLI> START 50↵
SCP–CLI>↵

then return to step 61 and try again. For a description of errors by numeric code, see the manual *AOS/VS and AOS/VS II Error and Status Messages*.

Loading AOS/VS System Files from Diskette

79. The next steps include loading all the system programs and files that are part of the AOS/VS system. These programs and files are on diskettes numbered 8 through 31, the last diskette. These system files make up the second dump file of AOS/VS programs.

First, turn on Superuser to provide Write access.

```
) SUPERUSER ON⟫
Su)
```

80. To load from a sequence of labeled diskettes, turn CLI Operator mode on:

```
Su) OPERATOR ON⟫
Su)
```

81. Start loading from labeled diskettes via the LOAD command, using the pathname @LFD:VOL1:SECOND_DUMP_FILE, as follows:

```
Su*) LOAD/V/R @LFD:VOL1:SECOND_DUMP_FILE⟫
```

PLEASE INSERT A DISKETTE IF NOT ALREADY INSERTED
UNIT [@DPJ10] VOLUME ID [VOL1]? [Y]

82. You want to accept the default values, unit DPJ10 and volume ID VOL1. So confirm by pressing NEW LINE.

The system now copies the contents of the diskette to the LDU. This takes a few minutes. Because you used the /V switch in the LOAD command, the CLI verifies files loaded by displaying their names on the system console. The /R switch ensures that the most recent version of each file remains on the LDU.

If you see an error message, refer to step 73 for recovery action.

When all files have been copied from the diskette, the system console displays the following.

PLEASE INSERT NEXT DISKETTE
UNIT [@DPJ10] VOLUME ID [VOLn]? [Y]

83. Remove the diskette from unit 0 and insert the next diskette in the AOS/VS diskette set.

84. Press NEW LINE. The system copies files from diskette to the LDU. (If you see the message *PHYSICAL UNIT OFFLINE,* the diskette was inserted incorrectly in the unit or that no diskette was inserted. Remove the diskette from the unit, insert the correct diskette properly as described earlier (Figure 2–1), and press NEW LINE. If the message is *THE LABEL ON THE DISKETTE IS NOT THE ONE REQUESTED,* you've inserted the wrong diskette. Find the correct diskette. Then retry.)

85. Return to step 83 and repeat the sequence until you see the following message.

PLEASE REMOVE THE DISKETTE
Su)

You've loaded all the AOS/VS software from diskettes. During the process, several directories were created: directory :UTIL (with utilities), directory :SYSGEN (for system generation), and directory :HELP (for help).

You're almost done. Next, you'll load a microcode file onto your hard disk.

Loading the Microcode File from Diskette

86. Remove the diskette from unit 0. Get the *second* diskette in the system media set. The paper label of this diskette has the words "AOS FMT" on the last line of text. Insert this diskette in unit 0.

87. Load the microcode files from the diskette by typing

Su) LOAD/V/R @DPJ10↵
MV4000...MCF

Su)

This command puts the microcode file(s) on your LDU.

88. Remove the diskette from unit 0.

89. If your computer has *neither* hardware floating point *nor* the graphics instruction set (GIS), you're done!

If your computer has *either* (or *both*) hardware floating point or the GIS, you must choose the correct microcode filename. Skip to section "Changing the Default Microcode Filename," following step 96.

Loading AOS/VS System Files from Tape

90. With tape, the next steps include loading all the system programs and files that are part of the AOS/VS system. These programs and files are in tape file 7. (If AOS/VS was provided on more than one tape, these files are divided among the file 7's of each tape.) First, turn on Superuser to provide Write access.

) SUPERUSER ON↵
Su)

91. Load the files in tape file 7 by typing

Su) XEQ LOAD_II/V/R/BUFF=8192 @MTC0:7↵ (If your tape unit is an MTJ, type @MTJ0:7 instead of @MTC0:7)

The LOAD_II program verifies (/V switch) the filenames loaded from tape by displaying their names. (Don't be surprised to see warning messages about files already loaded; some files in tape file 7 also exist in tape file 6.) The whole directory

structure on the tape is copied, creating directory :UTIL (with utilities) directory :SYSGEN (for system generation), and directory :HELP (for help).

If AOS/VS was provided on two or more tapes, remove the first tape, insert tape number 2, and retype the LOAD_II command; continue until all files are loaded.

After all the files have been loaded, the CLI Superuser prompt returns.

```
Su)
```

92. Rewind the tape by typing

```
Su) REWIND @MTC0↵                    (Or @MTJ0)
```

Loading the Microcode File from Tape

93. Get the SYSTEM MEDIA cartridge tape and insert it in the tape unit.

94. Load the microcode file from tape file 1 onto the LDU by typing the following:

```
Su) DIR :↵
Su) LOAD/V/R @MTC0:1↵                (Or @MTJ0:1)
   MV4000....MCF
Su)
```

95. Rewind the tape by typing

```
Su) REWIND @MTC0↵                    (Or @MTJ0)
```

96. You've completed loading the Data General–supplied system tapes. Remove the tape from the unit, put the cover on it, and store it safely. You may need it again if you want to run CPU diagnostics. Put the covers on all Data General–supplied tapes and store them safely too.

If your computer has *neither* hardware floating point *nor* the graphics instruction set (GIS), then you're done! If your computer has either of these options, continue with the next step.

Changing the Default Microcode Filename

Next, you'll choose the correct microcode file by identifying it to SYSBOOT. SYSBOOT will then load it into the CPU automatically in the future. To do this, shut the system down and bring it up again as follows.

97. To shut the system down, type BYE at the CLI Superuser prompt:

```
Su) BYE↵
```

Do you really want to shut the system down?

98. Type Y and then press NEW LINE to shut the system down:

```
Do you really want to shut the system down? Y↵
System shutdown
SCP–CLI>
```

99. Press the computer panel POWER switch to OFF, then press the switch again to ON.

Within 30 seconds, the system console shows either

MV/4000 READY

. . .

@

or

MV/4000 READY

. . .

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu

. . .

Enter choice [1]:

100. If you see the Operating System Load Menu instead of the @ prompt, type 2 and press NEW LINE.

Enter choice [1]: 2↵

Continue with step 102.

101. If you see the @ prompt instead of the Operating System Load Menu, type

24L

to load. This displays the Operating System Load Menu. As in the previous step, type 2 and press NEW LINE.

Enter choice [1]: 2↵

Technical Maintenance Menu

. . .

9 View or change the microcode filename

. . .

Enter choice [1]:

102. You want option 9, so type

Enter choice [1]: 9↵

SYSBOOT prompts

Default microcode filename [default]:

103. Type the name of the correct microcode file. The filename to type depends on the options your computer has, as follows, in Table 2–2.

Table 2–2 Microcode Filenames

Hardware Floating Point	Graphics Instruction Set (GIS)	Microcode Filename
No	No	MV4000.MCF
Yes	No	MV4000FP.MCF
No	Yes	MV4000G.MCF
Yes	Yes	MV4000GFP.MCF

For example, with a MV/4000 DC with hardware floating point, without the graphics instruction set, the microcode filename would be MV4000FP.MCF.

104. Now, choose option 1, *Load and start the default operating system*, to load the default operating system *and* the new microcode file:

Enter choice [1]: 1↵

If you see a *FILE DOES NOT EXIST* message, repeat step 103.

AOS/VS Rev n

Date (MM/DD/YY)?

105. Type the current date.

Date (MM/DD/YY)? 11 22 92↵

Time (HH:MM:SS)?

106. Type the current time in 24–hour format.

Time (HH:MM:SS)? 15 10↵

Offset from universal time [+00:00]?

107. If your system is part of a network that spans time zones, you should set the offset from universal or Greenwich mean time now. If so, enter a number representing the number of hours difference between local time and Greenwich mean time. Precede the number by a minus sign for locations west of Greenwich. For example, for Eastern Standard Time, enter −5. Then press NEW LINE. If not, press NEW LINE to accept the default.

Offset from universal time [+00:00]?

Override default specs [N]?
AOS/VS will continue automatically with defaults
unless you respond within 00:00:30

108. You don't want to change the default specifications, so press NEW LINE.

Override default specs [N]?

AOS/VS CLI Rev n.n date time
)

Via the Technical Maintenance Menu, you chose the default microcode file that will be loaded automatically—allowing your computer hardware to do its job. The new default filename has been recorded on disk. The file's name will be displayed as the default microcode filename from now on, and the file will be loaded automatically when you bring up AOS/VS.

You've powered up the system, formatted an LDU, installed an AOS/VS system on the LDU, brought up AOS/VS, and loaded all files you need to generate and use your tailored system.

If you're interested in the files as shipped on the system diskettes, see Table 2−3. For files on the system tape, see Table 2−4. All of these files are now on your LDU. If you loaded an update tape, the LDU also contains directory :UPDATE, which holds the current patch files. Also, the LDU contains the microcode file, MV4000xx.MCF.

Figure 2−1, following Tables 2−3 and 2−4, is a summary of all the steps you've taken—from turning on the system console to locking the computer.

Table 2–3 AOS/VS System Diskettes File Organization

Diskette Number	Diskette Contents	Explanation
1	DFMTR	The Disk Formatter program formats physical disks into LDUs. Run this by entering DFMTR in response to the *Pathname?* prompt.
	INSTL	The Installer program installs a Disk Bootstrap, a System Bootstrap, and an AOS/VS system from a system tape. Run this by entering INSTL in response to the *Pathname?* prompt.
	FIXUP	The Disk Fixer program finds and can correct (fix) disk file errors if an abnormal AOS/VS shutdown occurs. Run this by choosing option 7, "Run FIXUP," from the Technical Maintenance Menu.
	PCOPY	The PCOPY program copies a physical disk to or from a tape or diskette. Run this by typing PCOPY in response to the *Pathname?* prompt. You would use PCOPY to recover your disk structure after a disk crash provided you used PCOPY to create a backup of your disk before the disk crash.
2	SYSBOOT	SYSBOOT is the system bootstrap program. This diskette contains the SYSBOOT program in a form that the Installer program can read. The Installer then installs SYSBOOT on an LDU.
3	AOS/VS system	On the Data General-supplied AOS/VS diskette, this diskette contains the AOS/VS starter system, SYS.PR. Use the Installer program to install the starter system on an LDU. On a system diskette you build yourself, this diskette contains your tailored AOS/VS system. Use the Technical Maintenance Menu to make the tailored system the default system.
4 - 7	First Dump File	The first dump file includes the CLI and other system program files—the system Agent, peripheral manager (PMGR), and copies of programs in diskette 1. AOS/VS copies the contents of these diskettes into the LDU root directory when you specify Initial load, then type the labeled diskette pathname.

(continued)

Table 2–3 AOS/VS System Diskettes File Organization

Diskette Number	Diskette Contents	Explanation
8 - 31	Second Dump File	The second dump file includes the remaining AOS/VS system programs. Copy the contents of this file onto the system LDU using the LOAD command. Contents of this file include: • CONTEST system exerciser • Disk File Editor (FED) • DISPLAY file display • Error message (ERMES) and message object (.OBs) files • EXEC and PREDITOR • HELP directory and files • LABEL tape labeler • Library File Editor • Link • Macroassembler (MASM) • Process Environment Display (PED) • Release Notice • SED and SPEED text editors • System macros • Utility program symbol table files (.ST) • SYSGEN directory with VSGEN system generation program and libraries

(concluded)

Table 2–4 AOS/VS System Tape File Organization

Tape File Number	Tape File Contents	Explanation
0	TBOOT	The Tape bootstrap program is a short program that can load files 1, 2, and 3 from this tape.
1	FIXUP	The Disk Fixer program finds and can correct (fix) disk file errors if an abnormal AOS/VS shutdown occurs. TBOOT loads this program into memory and executes it after you enter 1 at the *Tape file number?* prompt.
2	DFMTR	The Disk Formatter program formats physical disks into LDUs. TBOOT loads DFMTR into memory and executes it after you enter 2 at the *Tape file number?* prompt.

(continued)

Table 2–4 AOS/VS System Tape File Organization

Tape File Number	Tape File Contents	Explanation
3	INSTL	The Installer program installs a Disk Bootstrap, a System Bootstrap, and an AOS/VS system from a system tape. TBOOT loads INSTL into memory and executes it after you enter 3 at the *Tape file number?* prompt.
4	SYSBOOT	The system bootstrap program loads an AOS/VS system or other program into memory *from disk*, then executes the program. The Installer installs SYSBOOT on an LDU.
5	AOS/VS system	On the Data General–supplied system tape, this file contains the AOS/VS starter system, SYS.PR. Use the Installer program to install the starter system on an LDU. On a system tape you build yourself, this file contains your tailored AOS/VS system. Use the Technical Maintenance Menu to make the tailored system the default system.
6	First Dump File	The first dump file includes the CLI and other system program files—the system Agent, peripheral manager (PMGR), LOAD_II program, and copies of programs in tape files 0 though 4. AOS/VS copies the contents of this tape file into the LDU root directory when you specify *Initial load.*
7	Second Dump File	The second dump file includes the remaining AOS/VS system programs. Copy the contents of this file onto disk using the LOAD_II program. Contents of the file include: • CONTEST system exerciser • Disk File Editor (FED) • DISPLAY file display • Error message (ERMES) and message object (.OBs) files • EXEC and PREDITOR • HELP directory and files • LABEL tape labeler • Library File Editor • Link • Macroassembler (MASM) • Process Environment Display (PED) • Release Notice • SED and SPEED text editors • System macros • Utility program symbol table files (.ST) • SYSGEN directory with VSGEN system generation program and libraries

NOTE: If AOS/VS is supplied on more than one tape, files 0–6 are duplicated on all tapes, while the AOS/VS programs on file 7 are divided among the tapes (but always on file 7).

(concluded)

Step Summary

Running the Disk Formatter

1. Insert the correct AOS/VS medium (first diskette or tape) in its unit.
2. *SCP–CLI>* RESET ↵

   With AOS/VS on tape, skip to step 7. With AOS/VS on diskette, continue.
3. BOOT 64 ↵

   Operating System Load Menu
4. *Enter choice [1]:* 2 ↵

   Technical Maintenance Menu
5. *Enter choice [1]:* 6 ↵
6. *Pathname?* DFMTR ↵

   Skip to step 9.
7. With tape, make sure the tape READY light is on. Then bootstrap by typing BOOT 22 (or 23) and pressing NEW LINE.
8. *Tape file number?* 2 ↵

   AOS/VS Disk Formatter REV n

   . . .
9. *Full (F) or Partial (P or NEW LINE)?* F ↵
10. *Disk unit name?* DPJ0 ↵
11. *Device code [24]?* ↵ (Press NEW LINE)
12. *Disk unit name?* ↵
13. *Do you want to allocate a diagnostic area? [Y]*

    Unless you want to allot 8,000 blocks for later installation of the Advanced Diagnostic Executive system, enter N and skip to step 15. To allot an area, press NEW LINE.
14. *Enter the number of blocks (1750 to 35230) required [23420]?* 17500 ↵

    Disk number 1: 00000000000 through n

Figure 2–1 Bringing Up the Starter System on a Blank Disk, MV/4000 DC, MV/4000 SC, and DS/4000–Series Computers (continued)

15. *LDU unique I.D. (1 to 6 characters) []?* 1 ↵ (Type valid disk ID)

16. *LDU name (1 to 31 characters) []?* ROOT ↵ (Type valid LDU name)

17. *Username or template (1 to 15 characters)?* + ↵

18. *Access (O, W, A, R, E, or NEW LINE)?* E ↵

19. *Username or template (1 to 15 characters)?* ↵

20. *Surface analysis? [N]* Y ↵

21. *Disk number?* ↵

22. *You may run up to five (5) patterns. How many would you like to run?* 5 ↵

    -- Running pattern n (Takes 8 to 24 minutes per pattern)

    If it found no bad blocks, go to 24.

    n bad disk blocks

23. *Display bad block statistics? [N]* Y ↵

    Note bad blocks.

24. *Additional bad block number (press NEW LINE when done):* ↵

25. *Display bad block statistics? [N]* ↵

26. *Bitmap size: n*
    Bitmap address? [default] ↵

27. *System LDU? [Y]* ↵ (Skipped if you answered yes to question 13.)

28. *Overlay area size? [default]* ↵

29. *Overlay area address? [default]* ↵

30. *Disk number n remap area size? [default]* ↵

31. *Disk number n remap area address? [default]* ↵

    -- LDU created
    Done!

    SCP-CLI>

    If you have another hard disk, enter CONTINUE and return to step 9.
    For *Disk unit name,* enter DPJ1, and for *System disk?* enter N; all other answers are the same.

Figure 2-1 Bringing Up the Starter System on a Blank Disk, MV/4000 DC, MV/4000 SC, and DS/4000-Series Computers (continued)

Installing the AOS/VS Starter System

Proceed to the appropriate section, "Installing the Starter System from Diskettes" (next) or "Installing the Starter System from Tape" (step 48).

Installing the Starter System from Diskettes

32. *SCP–CLI>* RESET ↵

33. *SCP–CLI>* BOOT 64 ↵

    Operating System Load Menu

34. *Enter choice [1]:* 2 ↵

    Technical Maintenance Menu

35. *Enter choice [1]:* 6 ↵

36. *Pathname?* INSTL ↵

    AOS/VS Installer Rev n
    . . .
    Disk unit name?

37. From diskette unit 0, remove diskette 1, and insert diskette 2.

38. DPJ0 ↵

39. *Device code [24]?* ↵
    –– Disk bootstrap installed

40. *Do you want to install a System Bootstrap [Y]?* ↵

41. *Install from which unit [MTC0]?* DPJ10 ↵

42. *Device code [64]?* ↵

    –– System Bootstrap installed
    Do you want to install a System [Y]?

43. From diskette unit 0, remove diskette 2 and insert diskette 3.

44. *Do you want to install a System [Y]?* ↵

45. *Install from which unit [DPJ10]?* ↵

46. *Device code [64]?* ↵

    –– System installed
    Done!

47. Remove the diskette from unit 0.

Figure 2–1 Bringing Up the Starter System on a Blank Disk, MV/4000 DC, MV/4000 SC, and DS/4000–Series Computers (continued)

Installing the Starter System from Tape

48. *SCP–CLI>* RESET ↵

49. *SCP–CLI>* BOOT 22 ↵ (Or 23 for MTJ unit)

50. *Tape file number?* 3 ↵

AOS/VS Installer Rev n
...

51. *Disk unit name?* DPJ0 ↵

52. *Device code [24]?* ↵

–– Disk bootstrap installed

53. *Do you want to install a System Bootstrap [Y]?* ↵

54. *Install from which unit [MTC0]?* ↵

55. *Device code [22]?* ↵ (Or *23*)

56. *File number [4]?* ↵

–– System Bootstrap installed

57. *Do you want to install a System [Y]?* ↵

58. *Install from which unit [MTC0]?* ↵ (Or *MTJ0*)

59. *Device code [22]?* ↵ (Or *23*)

60. *File number [5]?* ↵

(Delay)

–– System installed
Done!
...

SCP–CLI>

Bringing Up the AOS/VS Starter System

61. *SCP–CLI>* RESET ↵

62. BOOT 24 ↵

Operating System Load Menu
...

Figure 2–1 Bringing Up the Starter System on a Blank Disk, MV/4000 DC, MV/4000 SC, and DS/4000–Series Computers (continued)

63. *Enter choice [1]:* ↵

    AOS/VS Rev n

64. *Date (MM/DD/YY)?* 11 22 92 ↵ (Type current date)

65. *Time (HH:MM:SS)?* 14 30 ↵ (Type current time)

66. *Offset from universal time [+00:00]?* ↵

67. *Override default specs [N]?* Y ↵

68. *Automatic reboot [N]?* ↵

69. *Number of buffers in cache [default]?* ↵

70. *Swap directory definition [default]?* ↵

71. *Page directory definition [default]?* ↵

72. *Initial load [N]?* Y ↵ (Be sure to enter Y)
    Filename [@MTC0:6]?

73. If installing AOS/VS from cartridge tape, skip to step 78. For AOS/VS supplied on diskettes, get the fourth AOS/VS diskette and insert it in unit 0.

74. Type

    @LFD:VOL1:FIRST_DUMP_FILE ↵

    PLEASE INSERT A DISKETTE IF NOT ALREADY INSERTED

75. *UNIT [@DPJ10] VOLUME ID [VOL1]? [Y]* ↵

    (2-minute delay while the starter system copies files to disk)

    PLEASE INSERT NEXT DISKETTE
    UNIT [@DPJ10] VOLUME ID [VOL1]? [Y] ↵

76. Get the next diskette in the AOS/VS set. Remove the diskette from unit 0, and insert the next diskette. Press NEW LINE.

    (Delay while the starter system copies files)

    PLEASE REMOVE THE DISKETTE
    AOS/VS CLI Rev n *date* *time*
)

77. The CLI is running. Remove diskette from unit 0. Skip to step 79.

Figure 2-1 Bringing Up the Starter System on a Blank Disk, MV/4000 DC, MV/4000 SC, and DS/4000-Series Computers (continued)

78. For tape, press NEW LINE to specify the default, file 6.

    (Delay while the CLI copies files)

    AOS/VS CLI Rev n date time
)

    The CLI is running. To load system files from tape, skip to step 91.

Loading AOS/VS System Files from Diskette

79.) SUPERUSER ON ↵

80. Su) OPERATOR ON ↵
    Su)

81. Type

    Su) LOAD/V/R @LFD:VOL1:SECOND_DUMP_FILE ↵

    PLEASE INSERT A DISKETTE IF NOT ALREADY INSERTED

82. *UNIT [@DPJ10] VOLUME ID [VOL1]? [Y]* ↵

    ... (CLI copies and verifies files) ...

    PLEASE INSERT NEXT DISKETTE
    UNIT [@DPJ10] VOLUME ID [VOLn]? [Y]

83. Remove the diskette from unit 0. Insert the next diskette in the AOS/VS diskette set.

84. Press NEW LINE.

    ... (CLI loads and verifies files) ...

85. Return to step 83 and repeat sequence until you see

    PLEASE REMOVE THE DISKETTE
    AOS/VS CLI REV n date time
    Su)

Loading the Microcode File from Diskette

86. Remove any diskette from unit 0. Get the *second* diskette in the system media set (with "AOS FMT" on the last line of its paper label). Insert this diskette in unit 0.

87. Su) LOAD/V/R @DPJ10 ↵

    ... (CLI verifies load) ...

    Su)

Figure 2–1 Bringing Up the Starter System on a Blank Disk, MV/4000 DC, MV/4000 SC, and DS/4000–Series Computers (continued)

88. Remove the diskette from unit 0.

89. If your computer doesn't have hardware floating point or GIS, you're done. If you *do* have hardware floating point or GKS, choose the microcode filename as shown in step 97.

Loading AOS/VS System Files from Tape

90.) SUPERUSER ON ↵
Su)

91. Su) XEQ LOAD_II/V/R/BUFF=8192 @MTC0:7 ↵

... (CLI displays file and directory names loaded.) ...

If using multiple tapes, repeat for each tape.

92. Su) REWIND @MTC0 ↵

Loading the Microcode File from Tape

93. Get the system media tape (used earlier) and insert it in the tape unit.

94. Type

Su) DIR : ↵
Su) LOAD/V/R @MTC0:1 ↵
... (CLI verifies microcode filename(s).) ...

95. Su) REWIND @MTC0 ↵

96. Remove tape from unit and store tape.

Changing the Default Microcode Filename

97. To choose a microcode filename other than the default, type

Su) BYE ↵

98. *Do you really want to shut the system down?* Y ↵

System shutdown
SCP–CLI>

99. Turn computer POWER switch off and on.

MV4000 READY
. . .
@

Figure 2–1 Bringing Up the Starter System on a Blank Disk, MV/4000 DC, MV/4000 SC, and DS/4000–Series Computers (continued)

or

MV4000 READY

...

Operating System Load Menu

...

100. *Enter choice [1]:* 2 ↵
Continue with step 102.

101. If you see the @ prompt (not Operating System Load Menu), type 24L.
Then type 2 and press NEW LINE.

Technical Maintenance Menu

...

102. *Enter choice [1]:* 9 ↵

103. *Default microcode filename [default]:*

Type the name of the *correct microcode file* as follows:

Without hardware floating point, without GIS, filename is MV4000.MCF
With hardware floating point, without GIS, filename is MV4000FP.MCF
Without hardware floating point, with GIS, filename is MV4000G.MCF
With both hardware floating point and GIS, filename is MV4000GFP.MCF

For example, with an MV/4000 DC with hardware floating point, without the GIS, you'd enter MV4000FP.MCF.

104. Now, choose option 1 to load the default operating system *and* the new microcode file:

Enter choice [1]: ↵

AOS/VS Rev n

105. *Date (MM/DD/YY)?* 11 22 92 ↵ (Current date)

106. *Time (HH:MM:SS)?* 15 10 ↵ (Current time)

107. *Offset from universal time [+00:00]?* ↵

108. *Override default specs [N]?* ↵ (Press NEW LINE to say no)

AOS/VS CLI Rev n *date* *time*
)

You're done!

Figure 2–1 Bringing Up the Starter System on a Blank Disk, MV/4000 DC, MV/4000 SC, and DS/4000–Series Computers (concluded)

What Next?

Your next step is to generate a tailored AOS/VS system. If you want to do this now, go to Chapter 4. (Chapter 3 covers the same information as this chapter, only for different systems—so if your system is covered by this chapter you can skip Chapter 3.)

If you are rebuilding and restoring a tailored system, the next steps are to start EXEC (Chapter 5) and load user and application directories and files from backup media.

If you want to stop for a while, fine. To shut down AOS/VS, you can type BYE, then press NEW LINE, then confirm with Y, and press NEW LINE again. To bring AOS/VS up again, type BOOT 24, press NEW LINE, and wait for the time out. Choose the default value for each prompt except *Date, Time,* and *Offset from universal time*.

End of Chapter

Chapter 3
Bringing Up the Starter System on Blank Disks — All Computers Except ECLIPSE MV/4000 DC, MV 4000 SC, and Data General DS/4000–Series

Read this chapter

- When your computer system hardware has just been installed and you want to bring up AOS/VS on it.
- Whenever you want to format a new disk, install an AOS/VS system on it, load system files onto it, and bring up the AOS/VS system.

This chapter tells you how to execute all steps needed before you run the VSGEN program to generate your first tailored system on all systems except ECLIPSE MV/4000 DC, MV 4000 SC, and Data General DS/4000–Series computers. For information about ECLIPSE MV/4000 DC, MV 4000 SC, and Data General DS/4000–Series computers, see Chapter 2.

The major sections in this chapter are

- Note to Deskside ECLIPSE System Users
- About Your Media
- First–Time Powerup
- Running the Disk Formatter
- Installing the AOS/VS Starter System
- Bringing Up the AOS/VS Starter System
- Step Summary

Note to Deskside ECLIPSE System Users

If you have a Data General DS/7500–series or ECLIPSE MV/1000 DC, MV/1400 DC, MV/2000 DC, MV/2500 DC, MV/3000 DC–series, or MV/5000 DC series computer with AOS/VS, don't continue with this chapter! Your system arrived with an easy–to–use model of AOS/VS already installed on the disk. The manuals *Starting and Updating Preinstalled AOS/VS* and *Starting and Updating Preinstalled AOS/VS on ECLIPSE MV/3500™ DC and MV/5000™ DC Series Systems* contain information about using preinstalled AOS/VS on these systems.

About Your Media

You must install several tapes to bring up your first system. The tapes are

- The MV/n SCP SYSTEM MEDIA tape (for example, the MV/20000 SCP SYSTEM MEDIA tape) shipped with the computer. This tape contains firmware that's independent of the operating system: a diagnostic program, diagnostic operating system (SCP–ADEX), CPU diagnostics, CPU microcode, and the SCP operating system. This tape is required for first–time powerup (described in Appendix D). You will need this tape later later to install the microcode file on your system disk.
- The AOS/VS release tapes. These tapes contain all AOS/VS system software. Beginning with Revision 7.67, there is no practical difference between an AOS/VS *revision* and an *update*. In either case, a complete system tape (or set of tapes) is provided and installed according to the instructions in this manual for installing a revision.

There will also be tapes with other Data General software, but these additional tapes must wait until AOS/VS is up and running.

Identify the tapes. You'll need them soon.

First–Time Powerup

To power up your system for the first time, follow the procedures explained in the "First–Time Powerup" section of the *Starting* manual supplied with your computer. If there is no such manual or section, use Appendix D of this manual for powerup instructions; then return here. The steps explained here assume that the SCP CLI prompt (*SCP–CLI*>) appears on the system console. If this prompt is displayed, first–time powerup steps have already been executed.

NOTE: The AOS/VS starter system (SYS.PR) supports tape and disk units on the following device codes only. The starter system does not recognize devices other than these, nor will the starter system work with a nonstandard device that uses a reserved device code.

Unit Type	Device Code	Device Name
MTB tape	22	MTC0
MTC tape	22	MTC0
MTD tape	62	MTD10
MTJ tape	23	MTJ0
DPF disk	27	DPF0
DPI disk	33	DPI0
DPJ disk	24	DPJ0

Running the Disk Formatter

The Disk Formatter makes physical disks into logical disk units (LDUs). The Disk Formatter writes disk identifiers so AOS/VS will know which disk and LDU it is accessing. The Disk Formatter can also examine the disk surface for *bad blocks* (flawed areas that won't hold information).

Running the Disk Formatter is relatively easy, but because it examines each bit on the disk, the Disk Formatter takes more time than other system generation procedures.

Mistakes and Errors

If you type an incorrect response to a Disk Formatter question, and have not yet pressed NEW LINE to enter the response, press the DEL key or CTRL–U to delete the wrong characters.

If you have pressed NEW LINE and want to abort formatting, press CTRL–C CTRL–A and go to step 5. If CTRL–C CTRL–A doesn't abort formatting, type the break sequence (Table 1–2) and return to step 2.

If you abort formatting by either method during surface analysis, be sure the run the entire FULL format again.

If the Disk Formatter reports a disk error or other error, *make sure the disk unit is write–enabled;* if it is write–enabled, refer to the error message table near the end of Chapter 8.

Disk Formatter Dialog

1. Get the *AOS/VS* release tape and mount it on unit 0. (Remove the plastic write–enable ring first, if any.) Make sure the tape DENSITY switch (if there is one) is on HIGH DENSITY or 1600 b/pi. Put the tape unit on line.

2. When you start, the SCP CLI prompt should be displayed on the system console. Reset the computer by typing

   SCP–CLI> RESET↵

3. Read in the tape bootstrap (TBOOT) from tape by typing

   SCP–CLI> BOOT 22↵ (BOOT 62 if tape is on an MTD unit; BOOT 23 if tape is on an MTJ unit.)

   Tape file number?

4. TBOOT is asking for a file number. Type 2, the number of the Disk Formatter file, and press NEW LINE.

   Tape file number? 2↵

TBOOT moves the tape forward to file 2, then loads and executes the Disk Formatter. The Disk Formatter prompts

AOS/VS Disk Formatter Rev n

Full format destroys any AOS/VS file structure, Partial retains it.

Full (F) or Partial (P or NEW LINE)?

5. Type F and press NEW LINE.

Full (F) or Partial (P or NEW LINE)? F↵

Full format

Specify each disk in the LDU (press NEW LINE when done)

Disk unit name?

6. The *Disk unit name* prompt starts a sequence of questions to identify this LDU.

Each AOS/VS disk unit name has the form DPx0, as shown in Table 3–1. Find the unit name of the first disk on the controller and type it. For example,

Disk unit name? DPJ0↵ (Or DPF0)

Device code [default]?

7. The default device code appears in square brackets. For any system, unless you *know* that this disk controller is connected to a nonstandard device code, press NEW LINE to accept the default:

Device code [default]?↵

Disk unit name?

8. The Disk Formatter will repeat the *Disk unit name?* and *Device code?* questions until you respond by pressing NEW LINE to the *Disk unit name?* prompt. The repetition of these prompts allows you to create an LDU that includes more than one disk.

Because you want a single–disk LDU, press NEW LINE.

Disk unit name?↵

Table 3–1 Common AOS/VS Disks, Default Device Codes, and Unit Names

Disk Model Number and Description	Device Type	Controller Default Device Code	Unit Number	Default Disk Unit Name
6236, 6237, 6239, 6240, 6290, 6297, 6298, 6299, 6446, 6491, 6492, 6539, 6554, 6578, 6579, 6581, 6582, 6584, 6621, 6622, 6624, 6627, 6631, 6632, 6634, 6662, 6685, 6716, 6718, 6740, 6796, 6799. Models 6236 through 6299 are 14–inch disks. A controller can run four units. Model 6236 (354 Mbytes); 6239 (592 Mbytes). Model 6290/6240 has two or three 6239 disks in one cabinet. Model 6297 (862 Mbytes). Model 6298/6299 is two or three 6297 units in one cabinet. Models 6446, 6491, 6539, 6554, 6662, 6685, 6716, 6718, and 6740 are 5.25–inch disks in a Combined Storage Subsystem (CSS), a CSS/2, or a Peripheral Housing Unit (PHU). A controller can run seven units. Models hold 234 Mbytes, 322 Mbytes, 179 Mbytes, 662 Mbytes, 332 Mbytes, 1 Gbyte, 1.4 Gbyte, 1.4 Gbyte, and 1 Gbyte respectively. Models 6796 and 6799 are 3.5–inch disks that hold 520 Mbytes. Models 6492, 6578, and 6579 are 8–inch disks; one disk holds 727 Mbytes. A 6492 has one disk; 6578 two disks; and 6579 four disks. A controller can run seven units. Models 6581, 6582, 6584, 6621, 6622, 6624, 6631, 6632, and 6634 are Rapid Access Mass Storage (R.A.M.S.) disks. Model 6581 holds one 500–Mbyte disk; 6582 holds two 500–Mbyte disks; and 6584 holds four 500–Mbyte disks. A controller can run eight units. Model 6621 has one 1.2–Gbyte disk; a controller can run four units; Model 6622 holds two 1.2 Gbyte disks; Model 6624 holds four 1.2 Gbyte disks. Models 6631, 6632, and 6634 hold one, two, and four 600–Mbyte disks, respectively.	DPJ	First / 24	First Second ... Eighth	DPJ0 DPJ1 DPJ7
		Second / 64	First Second ... Eighth	DPJ10 DPJ11 DPJ17
		Third / none	First Second ... Eighth	DPJ20 DPJ21 DPJ27
		Fourth / none	First Second ... Eighth	DPJ30 DPJ31 DPJ37
		Fifth through sixteenth / none	First Second ... Eighth	DPJn0 DPJn1 DPJn7 Disk unit names use hexadecimal numbering–n is 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F
6060, 6061, 6067, 6122, 6160, 6161, 6214 The 6060, 6061, 6067, and 6122 units use removable packs; a controller can run four units. The 6160 and 6161 disks are non–removable. A Model 6060 holds 96 Mbytes; a 6061 holds 190 Mbytes; a 6067 holds 50 Mbytes; a 6122 holds 277 Mbytes. A 6160 holds 73 Mbytes and a 6161 holds 147 Mbytes. A 6214 unit holds 602 Mbytes.	DPF	First / 27	First Second Third Fourth	DPF0 DPF1 DPF2 DPF3
		Second / 67	First Second Third Fourth	DPF10 DPF11 DPF12 DPF13

Do you want to allocate a diagnostic area? [Y]

9. This question lets you allot an area on disk for later installation of Data General's Advanced Diagnostic Executive System (ADEX). ADEX can run from a medium other than disk, but it runs much faster from disk; also, diagnostics are easier to run remotely if ADEX is on disk. To use ADEX, you must purchase it and have it installed on the disk by a Data General field engineer. ADEX for MV/Family machines requires a minimum of 8,000 disk blocks, or 4.1 Mbytes. The disk space used by ADEX is lost for AOS/VS file storage.

If you don't want to install ADEX and run it from disk, answer No by typing N and pressing NEW LINE. ADEX runs only from the system disk, which means you should *always* say No if the disk you are formatting isn't the system disk (DPF0, DPJ0, etc.). If you say no, skip to step 11.

If you want to reserve an area for ADEX, press NEW LINE to accept the default. Then, the Disk Formatter asks

Enter the number of blocks (1750 to 35230) required. [23420]

10. The figures displayed in the prompt are octal values. ADEX needs at least 8,000 blocks (17500 octal) to run. The default, 23420, is 10,000 blocks. Decide on the number of disk blocks needed for the diagnostics you want installed; then type this number *in octal format* and press NEW LINE. The Disk Formatter will now assume that this disk is a system disk. After you type the number of blocks, the system displays the following.

Disk number 1: 00000000000 through n

LDU unique I.D. (1 to 6 characters) [ ]?

The numbers 0 through n are the first and last logical addresses on the disk, in octal.

11. The *LDU unique I.D. (...)* prompt indicates that the Disk Formatter wants a unique means to identify the disk. The ID must be between 1 and 6 characters long. Any AOS/VS filename character is legal: A through Z (uppercase and lowercase are treated the same), 0 through 9, period (.), dollar sign ($), question mark (?), and underscore (_).

Generally, use an ID that is as close as possible to the name (filename) you will give the LDU. For example, you could use an ID of ROOT:

LDU unique I.D. (1 to 6 characters) [ ]? ROOT↵

LDU name (1 to 31 characters) [ ]?

12. Later, when you start up AOS/VS (or initialize this LDU), the name you type at the *LDU name* prompt will be displayed.

The first disk you format will be the system root directory (:). For the root disk, the name you type is not important in terms of file access.

If you are formatting a second hard disk, the name you type here becomes the filename of the LDU. Users can use this name just as any other directory filename. For example, you might use the name UDD. You can always change an LDU name later with a Disk Formatter Partial format (refer to Chapter 8).

For your first LDU, we suggest the name ROOT. So, for example, type

LDU name (1 to 31 characters) [ ]? ROOT↵

If you're formatting a second hard disk, write the disk name down so you will remember it later.

Access Control List

Username or template (1 to 15 characters)?

13. A user, identified by a username, or a group of users, identified by a template, can have different kinds of access to an LDU. A good general–purpose username template is +, which specifies all users. So type

Username or template (1 to 15 characters)? +↵

Access (O, W, A, R, E, or NEW LINE)?

14. The Disk Formatter wants to know which privileges to give the username(s) you just specified. There are five types of privileges: Owner, Write, Append, Read, and Execute, abbreviated O, W, A, R, and E. Execute (E) access will suffice for most LDUs. So type E and press NEW LINE.

Access (O, W, A, R, E, or NEW LINE)? E↵

Username or template (1 to 15 characters)?

15. The Disk Formatter will repeat the *Username* and *Access* questions, allowing you to give very specific user and access information, until you respond to the *Username* ... prompt by pressing NEW LINE. Later, if needed, you can change access to the LDU. So for now press NEW LINE.

Username or template (1 to 15 characters)?↵

Surface analysis? [N]

16. This step starts a surface analysis for this LDU. (The value in brackets is the value that the Disk Formatter will use if you respond by pressing NEW LINE.)

Table 3–2 Surface Analysis Times per Disk

Disk Model	Capacity (Megabytes)	Approximate Time per Test Pattern (Minutes)
6060	96	13
6061	190	17
6122	277	26
6160	73	11
6161	147	22
6214	602	52
6236*, 6237*	354	35
6239*, 6290*, 6240*	592	50–60
6297*, 6298*, 6299*	862	70–85
6357*, 6398*, 6399*	862	70–85
6446 or 6491	234 or 322	20–40
6492	737	80–100
6581*, 6582*, 6584*	500	30–60
6621*, 6622*, 6624*	1.2 Gbytes	60–90
6631*, 6632*, 6634*	600	30–60
6716*, 6718*	1.4 Gbytes	80–100
6796*, 6799*	520	50–60

* Even though these disk controllers can detect and remap bad blocks, we suggest that you run three patterns on these disks and never less than one. Capacity and time are for single units of these disk controllers.

The controllers of many disk models can detect and bypass bad blocks without notifying the operating system. Unless these disks are brand new, however, we suggest that you run a surface analysis on these disks, choosing to run three patterns and never less than one. Table 3–2 shows disks whose controllers can detect and bypass bad blocks by marking them with asterisks.

Other disk controllers (not marked by asterisks in Table 3–2) cannot detect bad blocks. For these disk(s), we *strongly* suggest that you run a surface analysis on these disks, choosing to run five patterns and never less than three.

If you decide not to run surface analysis, respond by pressing NEW LINE to accept the default answer, No. The system then reports *0 bad disk blocks* for disk #1. Skip to step 20. Otherwise, type Y and press NEW LINE to begin surface analysis.

Surface analysis? [N] Y↵

During surface analysis, the Formatter writes a pattern to each 16–bit word on the disk and reads it back. This destroys all existing information on the disk—but a new disk has no information.

Disk number?

17. The Disk Formatter wants you to supply the number of the disk to analyze. For a single–disk LDU, press NEW LINE.

You may run up to five (5) patterns. How many would you like to run?

18. The Disk Formatter can run one through five bit patterns on the disk. For disks not marked by an asterisk, we strongly recommend that you run all five patterns on each disk you format, and never fewer than three patterns. For disks marked by an asterisk, we recommend that you run three patterns, and never less than one pattern.

Each pattern takes between 11 and 100 minutes, depending on the disk model, as shown in Table 3–2.

Five patterns may take a while. To run five patterns, type

You may run up to five (5) patterns. How many would you like to run? 5↵

Analyzing disk #n
–– Running pattern n

The Disk Formatter runs the number of patterns you specified, one at a time. (If it finds too many bad blocks, either because the disk is badly deteriorated or because the disk heads are misaligned, the Disk Formatter aborts.)

When the Formatter has finished running the patterns, it describes the bad blocks on the disk.

19. If the Formatter found no bad blocks, it displays the message *0 bad disk blocks.* Go to the next step.

If the Disk Formatter found any bad blocks, it displays the following information, where *n* is the number of bad disk blocks.

n bad disk blocks
Display bad block statistics? [N]

The Disk Formatter is asking if you want to see the bad block statistics. These statistics may be useful, so answer yes.

Display bad block statistics? [N] Y↵

The Disk Formatter now displays the bad block statistics on the system console.

Additional bad block number (press NEW LINE when done):

20. You have no additional bad blocks to enter, so press NEW LINE.

Additional bad block number (press NEW LINE when done):↵

n bad disk blocks

Display bad block statistics? [N]

21. Press NEW LINE to accept the default value, No, after the prompt.

Display bad block statistics [N]↵

n bad disk blocks

Bitmap size: n
Bitmap address? [default]

The bitmap is a system table that describes which blocks are in use and which are free for data storage.

22. Select the default bitmap address by pressing NEW LINE.

Bitmap address? [default]↵

System LDU? [Y]

23. This step starts a series that determines whether and where an AOS/VS system will reside on the disk. The Disk Formatter skips this question if you allocated a diagnostic area earlier, in step 9.

Your first LDU must be a system disk, so press NEW LINE to accept the default. For your *second* LDU, you would type N and press NEW LINE.

System LDU? [Y]↵

Overlay area size? [default]

24. Choose the default area size by pressing NEW LINE.

Overlay area size? [default]↵

Overlay area address? [default]

25. Choose the default address by pressing NEW LINE.

Overlay area address? [default]↵

Disk number n remap area size? [default]

26. Choose the default remap area size by pressing NEW LINE.

Disk number n remap area size? [default]↵

Disk number n remap area address? [default]

27. Choose the default remap area address by pressing NEW LINE.

Disk number n remap area address? [default]↵

-- LDU created
Done!
CPU HALTED
...
SCP-CLI>

Congratulations! You've formatted an LDU as a system disk. It will rarely—if ever—need full formatting again. If this LDU may be run as a nonmaster LDU, we suggest that you note the date, LDU ID and unit name, and any bad block information and attach this information to the computer cabinet.

The Disk Formatter is done, and the SCP CLI has control. If you have other new disks, someone must format them into LDUs before they can be used. You might want to create the LDU(s) now, while you're familiar with the procedure. To format the disk(s) now, type CONTINUE at the SCP CLI prompt to return to step 5. To format a disk *not* described in this chapter, refer to Chapter 8.

If you don't want to format other disks now, install the AOS/VS starter system.

Installing the AOS/VS Starter System

The Installer program installs an AOS/VS system from a system tape onto an LDU. (AOS/VS must reside on disk before it can run.)

Mistakes and Errors

If you make a mistake, handle it the same way as with the Disk Formatter.

If the Installer reports a disk error or other error, refer to the error message table near the end of Chapter 9.

If the Installer stops with an *ABORT* message, return to step 28 and run the Installer again.

Running the Installer

28. The SCP CLI prompt appears on the system console. Reset the CPU:

SCP–CLI> RESET↵

SCP–CLI>

29. Boot the tape bootstrap (TBOOT) into memory:

SCP–CLI> BOOT 22↵ (BOOT 62 if tape is on an MTD unit; BOOT 23 if tape is on an MTJ unit.)

Tape file number?

30. The Installer program is in tape file 3, so type

Tape file number? 3↵

TBOOT moves the tape forward to file 3, reads the Installer into memory, rewinds the tape, then executes the Installer. The Installer displays the following information.

AOS/VS Installer Rev n

Specify each disk in the LDU
Disk unit name?

31. Type the name of the unit that holds your newly–created LDU. This is the same unit name you gave to the Disk Formatter earlier, in step 6. For example,

DPJ0↵ (Or DPF0)

Device code [default]?

32. Press NEW LINE to select the default device code.

Device code [default]?↵

–– Disk bootstrap installed
Do you want to install a System Bootstrap [Y]?

33. You must install the system bootstrap program, SYSBOOT, on the LDU, so press NEW LINE.

Do you want to install a System Bootstrap [Y]?↵

Install from which unit [MTC0]?

34. Press NEW LINE if the tape is on the default device, MTB or MTC. If the tape is on an MTD unit or an MTJ unit, type the correct unit name and press NEW LINE.

Install from which unit [MTC0]?↵ (Or *MTD0,* or *MTJ0*)

Device code [default]?

35. Press NEW LINE to accept the default device code.

Device code [default]?↵

File number [4]?

36. The system bootstrap program, SYSBOOT, is in tape file 4. Press NEW LINE to accept the default.

File number [4]?↵

-- System Bootstrap installed
Do you want to install a System [Y]?

37. You want to install a system, so press NEW LINE.

Do you want to install a System [Y]?↵

Install from which unit [MTC0]? (Or *MTD0,* or *MTJ0*)

38. Press NEW LINE to accept the default value.

Install from which unit [MTC0]?↵

Device code [22]? (Or *62,* or *23*)

39. Press NEW LINE to accept the default value.

Device code [22]?↵ (Or *62,* or *23*)

File number [5]?

40. The AOS/VS system is always in file 5 of a system tape, so press NEW LINE.

File number [5]?↵

-- System Installed
Done!
...
SCP-CLI>

You've installed the needed bootstraps and an AOS/VS system on your LDU. Now you can bring up the AOS/VS system.

Bringing Up the AOS/VS Starter System

41. The SCP CLI has control. Use it to reset the computer:

SCP–CLI> RESET↵

SCP–CLI>

42. Boot again, this time from *disk.* Use device code 24 for DPJ disks and device code 27 for DPF disks.

SCP–CLI> BOOT 24↵ (Or 27)

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu

Loading will continue automatically unless you respond within 45 seconds.

. . .

The default system pathname is INSTALLED SYSTEM
. . .

Enter choice [1]:

43. Press NEW LINE to accept the default value.

Enter choice [1]:↵

AOS/VS Rev n

Master LDU: ROOT (Name you specified to the Disk Formatter)

Date (MM/DD/YY)? (Skipped on computers with a boot clock)

44. Type the date as numbers for month, day, and year. Spaces or slashes can separate each number. For example, for November 22, 1992, you'd type

Date (MM/DD/YY)? 11 22 92↵

Time (HH:MM:SS)? (Skipped on computers with a boot clock)

45. Type the time, based on a 24–hour clock, in hours, minutes, and seconds. (Minutes and seconds are optional. If you omit them, the system sets each to 0.) Use spaces or colons to separate items. For example, for 2:30 p.m., you'd type

Time (HH:MM:SS)? 14 30↵

Offset from universal time [+00:00]?

46. Setting the offset from universal or Greenwich mean time is not important now, so press NEW LINE to accept the default.

Offset from universal time [+00:00]?↵

Override default specs [N]?
AOS/VS will continue automatically with defaults
unless you respond within 00:00:30

47. Specs are the parameters in the system specification file created during VSGEN. For your first system, you must answer yes, so type Y and press NEW LINE.

Override default specs [N]? Y↵

Automatic reboot [N]?

48. Press NEW LINE to accept the default value.

Automatic reboot [N]?↵

Number of buffers in cache [default]?

49. Press NEW LINE to accept the default value.

Number of buffers in cache [default]?↵

Swap directory definition [default]?

50. Press NEW LINE to accept the default value.

Swap directory definition [default]?↵

Page directory definition [default]?

51. Press NEW LINE to accept the default value.

Page directory definition [default]?↵

Initial load [N]?

52. In an *Initial load,* the system loads the CLI and other needed files onto the LDU. These files must be loaded the first time you bring up the starter system. They need not be loaded again unless—later on—you want to load a new AOS/VS revision. Answer yes by typing Y and pressing NEW LINE.

Initial load [N]? Y↵

Filename [@MTC0:6]? (Or *@MTD0:6*, or *@MTJ0:6*)

53. Press NEW LINE to specify the default, tape file 6:

Filename [@MTC0:6]?↵

The starter system now copies files from tape to the LDU. This procedure takes a while. Then the starter system displays the following.

AOS/VS CLI Rev n *date* *time*
)

Congratulations! You've brought up AOS/VS and its CLI. The) prompt means that the CLI is ready for a command.

54. The next steps include loading all the system programs and files that are part of the AOS/VS system. These programs and files are in tape file 7. If AOS/VS was provided on more than one tape, these files are divided among the file 7's of each tape. First, turn on Superuser to provide Write access.

) SUPERUSER ON↵
Su)

55. Load the files in tape file 7 by typing

Su) XEQ LOAD_II/V/BUFF=8192 @MTC0:7↵ (Or @MTD0:7, or @MTJ0:7)

Even if the tape is mounted on an MTB unit, you must specify MTC to the starter system. If the tape is on an MTD unit or an MTJ unit, type the correct unit name and press NEW LINE.

The LOAD_II program verifies (/V switch) the filenames loaded from tape by displaying their names. (Don't be surprised to see warning messages about files already loaded; some files in tape file 7 also exist in tape file 6.) The whole directory structure on the tape is copied, creating directory :UTIL (with utilities), directory :SYSGEN (for system generation), and directory :HELP (for help).

AOS/VS Models 3900H (1600 b/in reel–to–reel tape), 3900C (15.2 Mbyte cartridge tape) and 3900B (21 Mbyte cartridge tape) are delivered on two tapes. For these models, remove the first tape, insert tape number 2, and retype the LOAD_II command; continue until all files are loaded.

After all the files have been loaded, the CLI Superuser prompt returns.

Su)

56. Rewind the tape by typing

Su) REWIND @MTC0↵ (Or @MTD0, or @MTJ0)

57. Remove the AOS/VS release tape. Get the MV/n system tape that you used to start up the computer, and mount it on the tape unit. (For ECLIPSE MV/8000, skip this step.) Load the microcode/SCP–OS file from tape file 1 into the LDU root directory by typing the following:

Su) DIR :↵
Su) LOAD/V/R/NACL @MTC0:1↵ (Or @MTD0:1, or @MTJ0:1)
MVn.MCF
Su)

The CLI verifies the load of the microcode file; for example *MV33000.MCF.* With some computers, there are two files: one with floating–point microcode and one without. For example, you might see the names MV4000.MCF and MV4000FP.MCF.

This puts the microcode/SCP–OS file(s) on the LDU. In future, SYSBOOT will load the correct file automatically as needed.

58. Rewind the tape by typing

Su) REWIND @MTC0↵ (Or @MTD0, or @MTJ0)

59. You've completed loading the Data General–supplied system tapes. Remove the tape from the unit, put the cover on it, and store it safely. You may need it again if you want to run CPU diagnostics. Put the covers on all Data General–supplied tapes and store them safely too.

60. Turn Superuser off by typing

Su) SUPERUSER OFF↵
)

61. For any computer *except* an ECLIPSE MV/4000 with hardware floating point, skip to step 72.

For an ECLIPSE MV/4000 computer with hardware floating point, you should identify the correct microcode file to SYSBOOT so that SYSBOOT can load the microcode in the future. (SYSBOOT can identify the proper microcode file for all computers except MV/4000s with hardware floating point.) To do this, shut the system down and bring it up again as follows.

To shut the system down, type BYE at the CLI prompt:

) BYE↵

Do you really want to shut the system down?

62. Type Y and press NEW LINE to shut the system down:

Do you really want to shut the system down? Y↵
System shutdown
. . .
SCP–CLI>

63. Press the computer panel POWER switch to OFF. If there is a LOCK switch, press the LOCK switch to ON. Press the POWER switch to ON. This sequence program loads from the primary disk device code.

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu

. . .

Enter choice [1]:

64. You want to enter SYSBOOT's Technical Maintenance Menu, so type 2 and press NEW LINE.

Enter choice [1]: 2↵

Technical Maintenance Menu

. . .

9 View or change the microcode filename

. . .

Enter choice [1]:

65. You want option 9, so type 9 and press NEW LINE.

Enter choice [1]: 9↵

SYSBOOT prompts

Default microcode filename [default]:

66. Type the name of the *floating-point microcode file,* which is MV4000FP.MCF:

Default microcode filename [default]: MV4000FP.MCF↵

Technical Maintenance Menu

. . .

Enter choice [1]:

67. Now, press NEW LINE to choose option 1, *Load and start the default operating system*, to load the default operating system *and* the new microcode file:

Enter choice [1]:↵

AOS/VS Rev n

Date (MM/DD/YY)? (Skipped on computers with a boot clock.)

68. Type the current date.

Date (MM/DD/YY)? 11 22 92↵

Time (HH:MM:SS)? (Skipped on computers with a boot clock.)

69. Type the current time.

Time (HH:MM:SS)? 15 10↵

Offset from universal time [+00:00]?

70. If your system is part of a network that spans time zones, you should set the offset from universal or Greenwich mean time now. If so, enter a number representing the number of hours difference between local time and Greenwich mean time. Precede the number by a minus sign for locations west of Greenwich. For example, for Eastern Standard Time, enter −5. Then press NEW LINE. If not, press NEW LINE to accept the default.

Offset from universal time [+00:00]?↵

Override default specs [N]?
AOS/VS will continue automatically with defaults
unless you respond within 00:00:30

71. You don't want to change the default specs, so press NEW LINE.

Override default specs [N]?↵

AOS/VS CLI Rev n.n date time
)

Using SYSBOOT's Technical Maintenance Menu, you chose the floating−point microcode file as the default to be loaded automatically. The new default filename has been recorded on disk. The file's name will be displayed as the default microcode filename from now on, and the file will be loaded automatically when you bring up AOS/VS.

72. On the computer front panel, if there is a LOCK switch, press the LOCK switch to the ON (or LOCK) position.

You've powered up, formatted at least one LDU, installed an AOS/VS system on it, brought up AOS/VS, and loaded all files you need to generate your tailored system.

If you're interested in the files on the system tape, see Table 3–3. All of these files are now on your LDU. If you loaded an update tape, the LDU also contains directory :UPDATE, which holds the current patch files. Also, the LDU contains the microcode file, MVn.MCF.

Figure 3–1, after Table 3–3, is a summary of all the steps you've taken—from turning on the system console to locking the computer.

Table 3–3 AOS/VS System Tape File Organization

Tape File Number	Tape File Contents	Explanation
0	TBOOT	The Tape bootstrap program is a short program that can load files 1, 2, and 3 from this tape.
1	FIXUP	The Disk Fixer program finds and can correct (fix) disk file errors if an abnormal AOS/VS shutdown occurs. TBOOT loads this program into memory and executes it after you enter 1 at the *Tape file number?* prompt.
2	DFMTR	The Disk Formatter program formats physical disks into LDUs. TBOOT loads DFMTR into memory and executes it after you enter 2 at the *Tape file number?* prompt.
3	INSTL	The Installer program installs a Disk Bootstrap, a System Bootstrap, and an AOS/VS system from a system tape. TBOOT loads INSTL into memory and executes it after you enter 3 at the *Tape file number?* prompt.
4	SYSBOOT	The system bootstrap program loads an AOS/VS system or other program into memory *from disk*, then executes the program. The Installer installs SYSBOOT on an LDU.
5	AOS/VS system	On the Data General–supplied system tape, this file contains the AOS/VS starter system, SYS.PR. Use the Installer program to install the starter system on an LDU. On a system tape you build yourself, this file contains your tailored AOS/VS system. Use the Technical Maintenance Menu to make the tailored system the default system.
6	First Dump File	The first dump file includes the CLI and other system program files—the system Agent, peripheral manager (PMGR), LOAD_II program, and copies of programs in tape files 0 though 4. AOS/VS copies the contents of this tape file into the LDU root directory when you specify *Initial load*.

(continued)

Table 3–3 AOS/VS System Tape File Organization

Tape File Number	Tape File Contents	Explanation
7	Second Dump File	The second dump file includes the remaining AOS/VS system programs. Copy the contents of this file onto disk using the LOAD_II program. Contents of the file include: • CONTEST system exerciser • Disk File Editor (FED) • DISPLAY file display • Error message (ERMES) and message object (.OBs) files • EXEC and PREDITOR • HELP directory and files • LABEL tape labeler • Library File Editor • Link • Macroassembler (MASM) • Process Environment Display (PED) • Release Notice • SED and SPEED text editors • System macros • Utility program symbol table files (.ST) • SYSGEN directory with VSGEN system generation programs and libraries

NOTE: If AOS/VS is supplied on more than one tape, files 0–6 are duplicated on all tapes, while the AOS/VS programs on file 7 are divided among the tapes (but always on file 7).

(concluded)

Step Summary

Running the Disk Formatter

1. Mount the AOS/VS release tape; put the tape unit on line.
2. *SCP–CLI>* RESET↵
3. *SCP–CLI>* BOOT 22 ↵ (Or 62 for an MTD unit; or 23 for an MTJ unit.)
4. *Tape file number?* 2 ↵

   AOS/VS Disk Formatter Rev n

   Full format destroys any AOS/VS file structure, Partial retains it.
5. *Full (F) or Partial (P or NEW LINE)?* F ↵

   Full format

   Specify each disk in the LDU (press NEW LINE when done)
6. *Disk unit name?* DPJ0 ↵ (Or DPF0 or other disk unit name)
7. *Device code [default]?* ↵
8. *Disk unit name?* ↵
9. *Do you want to allocate a diagnostic area? [Y]*

   If you don't want to install and run the Advanced Diagnostic Executive System from the disk, type N and press NEW LINE and skip to step 11. To allot the space (system disk only), press NEW LINE.
10. *Enter the number of blocks (1750 to 35230) required [23420]?* ↵

    Disk number 1: 00000000000 through n
11. *LDU unique I.D. (1 to 6 characters)? []* ROOT ↵
12. *LDU name (1 to 31 characters)? [ ]* ROOT ↵
13. *Username or template (1 to 15 characters)?* + ↵
14. *Access (O, W, A, R, E, or NEW LINE)?* E ↵
15. *Username or template (1 to 15 characters)?* ↵
16. *Surface analysis? [N]* Y ↵
17. *Disk number?* ↵
18. *You may run up to five (5) patterns. How many would you like to run?* 5 ↵

Figure 3–1 Bringing Up AOS/VS on Blank Disk(s), Systems Other than MV/4000 DC, MV/4000 SC and Data General DS/4000–series (continued)

-- Running pattern n (Takes 11 to 100 minutes per pattern)

19. If the Disk Formatter found no bad blocks, go to step 20.

    n bad disk blocks

    Display bad block statistics? [N] Y ↵

    Note bad blocks.

20. *Additional bad block number (press NEW LINE when done):* ↵

21. *Display bad block statistics? [N]* ↵

    Bitmap size: n

22. *Bitmap address? [default]* ↵

23. *System LDU? [Y]* (Skipped if you answered Y to question 9)

24. *Overlay area size? [default]* ↵

25. *Overlay area address? [default]* ↵

26. *Disk number n remap area size? [default]* ↵

27. *Disk number n remap area address? [default]* ↵

    -- LDU created
    Done!
    . . .
    SCP-CLI>

    To format other disks, type CONTINUE, press NEW LINE and return to step 5.

Running the Installer

28. *SCP-CLI>* RESET ↵

29. *SCP-CLI>* BOOT 22 ↵ (Or 62, or 23)

30. *Tape file number?* 3 ↵

    AOS/VS Installer Rev n

    Specify each disk in the LDU

31. *Disk unit name?* DPJ0 ↵ (Or DPF0 or other disk unit name)

32. *Device code [default]?* ↵

    -- Disk bootstrap installed

Figure 3-1 Bringing Up AOS/VS on Blank Disk(s), Systems Other than MV/4000 DC, MV/4000 SC and Data General DS/4000-series (continued)

33. *Do you want to install a System Bootstrap?* Y ↵

34. *Install from which unit [MTC0]?* ↵ (Or MTD0, or MTJ0)

35. *Device code [22]?* ↵ (Or 62, or 23)

36. *File number [4]?* ↵

-- System Bootstrap installed

37. *Do you want to install a System [Y]?* ↵

38. *Install from which unit [MTC0]?* ↵ (Or MTD0, or MTJ0)

39. *Device code [22]?* ↵ (Or 62, or 23)

40. *File number [5]?* ↵

-- System installed
Done!
...
SCP-CLI>

Bringing Up the AOS/VS Starter System

41. *SCP-CLI>* RESET ↵

42. *SCP-CLI>* BOOT 24 ↵ (Or BOOT 27 for a DPF disk)

Operating System Load Menu
...

43. Enter choice [1]: ↵

AOS/VS Rev n
Master LDU: ROOT (Name you gave to the Disk Formatter)

44. *Date (MM/DD/YY)?* 11 22 92 ↵ (Current date. Skipped if you have a boot clock.)

45. *Time (HH:MM:SS)?* 14 30 ↵ (Current time, 24 hour clock. Skipped if you have a boot clock.)

46. *Offset from universal time [+00:00]?* ↵

47. *Override default specs [N]?* Y ↵

48. *Automatic reboot [N]?* ↵

49. *Number of buffers in cache [default]?* ↵

50. *Swap directory definition [default]?* ↵

Figure 3-1 Bringing Up AOS/VS on Blank Disk(s), Systems Other than MV/4000 DC, MV/4000 SC and Data General DS/4000-series (continued)

51. *Page directory definition [default]?* ↵

52. *Initial load [N]?* Y ↵

53. *Filename [@MTC0:6]?* ↵ (Or @MTD0:6, or @MTJ0:6)

    (Tape file 6 is loaded)

    AOS/VS CLI Rev n date time
)

54.) SUPERUSER ON ↵

55. Su) XEQ LOAD_II/V/BUFF=8192 @MTC0:7 ↵ (Or @MTD0:7, or @MTJ0:7)

    ... (CLI displays file and directory names loaded.) ...

    If AOS/VS is on multiple tapes, repeat for each additional tape.

56. Su) REWIND @MTC0 ↵ (Or @MTD0, or @MTJ0)

57. Remove the AOS/VS release tape. Mount the MV/n system tape (skip for MV/8000). Type

    Su) DIR : ↵
    Su) LOAD/V/R/NACL @MTC0:1 ↵ (Or @MTD0:1, or @MTJ0:1)

    MVn.MCF (CLI verifies file name(s).)

58. Su) REWIND @MTC0 ↵ (Or @MTD0, or @MTJ0)

59. Dismount tape; store all tapes safely.

60. Su) SUPERUSER OFF ↵
)

61. For any computer *except* MV/4000 with hardware floating point, go to step 69.

) BYE ↵

62. *Do you really want to shut the system down?* Y ↵

    System shutdown
    . . .
    SCP–CLI>

63. Press computer POWER switch OFF. If there is a LOCK switch, press LOCK switch ON. Press POWER switch ON.

    Operating System Load Menu
    . . .

Figure 3–1 Bringing Up AOS/VS on Blank Disk(s), Systems Other than MV/4000 DC, MV/4000 SC and Data General DS/4000–series (continued)

64. *Enter choice [1]:* 2 ↵

Technical Maintenance Menu

. . .

65. *Enter choice [1]:* 9 ↵

66. Default microcode filename [default]: MV4000FP.MCF ↵

Technical Maintenance Menu

. . .

67. *Enter choice [1]:* ↵ (Loads and starts the starter system *and* the new microcode file)

AOS/VS Rev n

68. *Date (MM/DD/YY)?* 11 22 92 ↵ (Current date. Skipped if you have a boot clock.)

69. *Time (HH:MM:SS)?* 15 10 ↵ (Current time. Skipped if you have a boot clock.)

70. *Offset from universal time [+00:00]?* ↵

71. *Override default specs [N]* ↵
AOS/VS CLI Rev n *date* *time*
)

72. On computer front panel, if there is a LOCK switch, press LOCK switch to ON or LOCK position.

You're done!

Figure 3–1 Bringing Up AOS/VS on Blank Disk(s), Systems Other than MV/4000 DC, MV/4000 SC and Data General DS/4000–series (concluded)

What Next?

If you want to stop for a while, fine. To shut down AOS/VS, you can type BYE, press NEW LINE, and confirm with Y, then NEW LINE.

To bring it up again, type the BOOT command, using the form BOOT n (n is the device code—24 or 27). To load the operating system immediately, press NEW LINE; then accept the default values for each question (except *Date, Time*, and *Offset from universal time*, if asked) by pressing NEW LINE.

If this is your first system, and you want to generate a tailored system now, go to Chapter 4. If you are rebuilding and restoring a tailored system, the next steps are to start EXEC (Chapter 5) and load user and application directories and files from backup media.

End of Chapter

Chapter 4
Generating a Tailored AOS/VS System

Read this chapter

- When you want to generate your first tailored AOS/VS system;
- Whenever you want to generate a new AOS/VS system.

This chapter tells how to run VSGEN, the AOS/VS system generation program. First, it explains choosing a terminal. Then it describes system startup (in case you shut down AOS/VS earlier). Next it explains VSGEN choices for devices, parameters, and shows how to build the system. Finally, it shows how to test the tailored system and make it the default system.

This chapter is very long because it gives all details you need to generate a system from scratch. But usually you won't be working from scratch; you'll have a VSGEN specification file from an earlier release of AOS/VS.

The major sections in this chapter are as follows:

- Choosing a Terminal for VSGEN
- System Startup (with Power On)
- About the VSGEN Program
- Specifying System Devices
- Specifying System Parameters
- Building the System and Finishing Up
- Updating the New System
- Testing the New System
- Making a Tailored System Tape
- Making the Tailored System the Default System
- Generating Other AOS/VS Systems
- Supporting Synchronous Devices

Running VSGEN is easy—the only tricky part is specifying console (terminal) lines. Other VSGEN settings you may want to examine (and perhaps change) are parameters, disk controllers and units, tape controllers and units, and line printer controllers. The session may take only a few minutes.

In practically all cases, you won't start from scratch; a specification file describing the system you want will serve as input to VSGEN.

There must be an AOS/VS system running before you can run VSGEN. This can be either the Data General–supplied starter system (SYS.PR) or your own previously generated tailored system. If AOS/VS is not running, read the section on system startup.

Choosing a Terminal for VSGEN

You can run VSGEN interactively (answering its questions one by one) or in batch mode (telling it to generate a system without asking questions). Using batch mode is far easier, but requires an accurate specification file (one that correctly reflects your particular system configuration) created in a previous VSGEN run.

If you can't use batch, as when you want to verify settings or create or change a tailored system, you must run VSGEN interactively. Interactive mode involves a lot of dialog and is easier if you use a CRT instead of a hardcopy terminal. With the starter system (SYS.PR), however, you cannot use a CRT that's connected to an asynchronous controller.

To use a CRT instead of a hardcopy terminal, disconnect the DB−25 cable from the hardcopy terminal and attach it to a CRT. Set the baud rate, parity and stop bit settings on the CRT to match those of the hardcopy terminal. The manual for the CRT explains how to set these values.

If you need to run VSGEN interactively and must use a hardcopy terminal, go ahead. Use the DEL key and CTRL−U sequence (to delete the current line of text) as needed.

System Startup (with Power On)

Read this section only if AOS/VS is not running. If it is running—shown by the CLI prompt—skip to the next section.

The SCP CLI prompt should be showing. Next to the SCP CLI prompt, type your response, as follows:

SCP−CLI> RESET↵
SCP−CLI> BOOT 24↵ (Type 27 for DPF−type disks; or 33 for Model 6234 disks)

The system console displays the following.

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu
3 Load and verify microcode
...
Enter choice [1]:

Type 1 and press NEW LINE, or wait for the time−out period to expire. The computer displays "Loading" messages. It may then ask date and time questions or skip them, as follows:

Date (MM/DD/YY)? 11 22 92↵ (Enter the date.)
Time (HH:MM:SS)? 15 20↵ (Enter the current time.)
Offset from universal time [+00:00]↵ (Use default offset.)
Override default specs [N]?↵

... (A pause occurs here) ...

AOS/VS CLI Rev n date time
)

The master CLI process is running. Now you can run VSGEN to generate a tailored system.

About the VSGEN Program

VSGEN is a utility program that creates an operating system tailored for the peripheral devices and parameters you specify. You can list the current configuration to your terminal or a disk file, edit or add devices and parameters, create a specification file (a file from which VSGEN can build a system), or build a system (instruct VSGEN to build an operating system to the specifications in the specification file).

After building a system, you'll have a tailored VSGEN specification file; you can use this file, as is or with minor changes, to build future systems.

The first time you run VSGEN, you'll be starting with a default specification. You will edit and add devices as needed. Later, you'll probably use an existing VSGEN specification file for a base, and you'll edit or add only a few devices. If you don't want to change any settings in your AOS/VS system, you can run VSGEN non-interactively using your old specification filename, as follows.

) SUPERUSER ON↵
Su) DIR :SYSGEN↵
Su) SEARCHLIST :UTIL↵
Su) XEQ VSGEN/BATCH=*filename-of-specification-from-previous-session*↵

To run VSGEN, Superuser privilege must be turned on if :SYSGEN is the working directory, or :SYSGEN must be in the search list. In addition, :UTIL must be in the search list because VSGEN uses the macroassembler and Link programs, which are in :UTIL. (A search list is a list of directories the system scans when it can't find a file in the working directory.)

Running VSGEN interactively, which is the default, will tie up your terminal until the new system is built. When you run it interactively, you can get help from VSGEN at any point by typing ? and pressing NEW LINE. If EXEC is running, you can run VSGEN in batch mode by inserting the QBATCH command before XEQ VSGEN.

Whenever you run VSGEN and build a system, it creates a new system and symbol table file with the name and settings given in the specification file and two new specification files with the name filename-of-specification and the suffixes .CSF and .SSF (for example, MSIS_01.PR, MSIS_01.ST, MSIS_01.CSF, and MSIS_01.SSF).

VSGEN Switches

A *switch* modifies the meaning of a command. It is a slash followed by a value.
If this is your first system, omit switches. If it is not your first system, you have a specification file and will probably want to use the /BATCH=sys or /DEFAULT=sys switch.

You can include the following switches in the X VSGEN command.

/BATCH=sys	Do not run an interactive session: build a system using specifications in file sys.SSF, which must already exist. Omit the suffix .SSF when you type the system name. This switch is useful when you have received a new revision of AOS/VS and want to build a tailored system with all the specifications of the old system. You cannot use this switch for your first system because there is no valid .SSF file. But you can use it for later systems.
/DEFAULT=sys	Run an interactive session, but use specifications in file sys.SSF for default values (displayed in brackets). File sys.SSF must already exist. This switch is handy when you have a tailored system and want to generate another one; often you need to add or edit only one or two devices.
/SAVE	Save temporary files. When you use the /BATCH switch, VSGEN will delete the temporary files—unless you also use this switch.

If you use a switch, put it next to the VSGEN command, without a space. For example,

```
Su) X VSGEN/DEFAULT=OLD_SYSTEM⏎
```

If you omit switches, VSGEN uses its default specification of DPJ and DPF disk controllers, MTB tape controller, CRT3 system console, and battery backup unit (BBU). If you have different controllers, edit the default controllers or delete and replace them. If you don't have battery backup, delete that option.

Files VSGEN Creates

VSGEN creates several files, including temporary files if you ask for them, in your working directory, usually :SYSGEN. (The macroassembler and Link programs also create a number of temporary files, but the system deletes them.) The temporary files carry a .TMP filename suffix. Table 4–1 lists all files that VSGEN creates. In the table, sys is the name you give the system with the Name command.

Table 4–1 Files VSGEN Creates

Filename	Comments
sys.PR	The tailored operating system file, ready to run. VSGEN creates it after you issue the Build command.
sys.ST	The operating system symbol table file, used by the Update tool for updates to the system .PR file. VSGEN creates it along with the tailored system file.
sys.CSF	The Customer Specification (spec) File. It describes the system's hardware and software parameters. This file is in ASCII so you can print or type it. VSGEN creates this specification file in response to your S (create specification) or B (build a system) command.
sys.SSF	The System Specification File. It describes system software and hardware in a form VSGEN can read. VSGEN creates this file in response to your S (create specification) or B (build a system) command.
?pid.VSGEN.CURR.TMP	A temporary file where VSGEN keeps data during a VSGEN session. The pid is the numeric VSGEN process ID; e.g., 003. VSGEN deletes this file when it terminates normally. If VSGEN aborts, this file can remain.
sys.CONFIG.pid.TMP	A temporary configuration file, in a format designed for a system build. The pid is the numeric process ID.
sys.KS_IN.pid.TMP	A temporary input file that contains the CLI commands VSGEN needs to build a system.
sys.KS_OUT.pid.TMP	A temporary output file. If the new system does not run properly, you should type this file and look for error messages. When you run VSGEN interactively, VSGEN asks if you want to save this and the two preceding .TMP files.

Using an Existing VSGEN Specification File

The easiest way to generate a tailored AOS/VS system is to use an existing specification file (filename sys.SSF) as a default base. (If you have no specification file, having never generated a tailored system, you must start from scratch; skip the rest of this section.)

To use an existing specification file, start VSGEN using the /DEFAULT=sys or /BATCH=sys switch to specify the old specification file, omitting the .SSF extension. The /DEFAULT=sys switch runs VSGEN interactively; use it if you want to change any setting in the system. The /BATCH=sys switch tells VSGEN to generate a system without asking questions; use /BATCH=sys when you don't want to change a setting in the system. When you use /BATCH=sys, the new specification file and system files replace the old ones.

Often, when you bring up a new revision, you may want to add or edit a device or use a new software parameter; if so, you must use the /DEFAULT=sys switch.

In the VSGEN session, update all devices and parameters as desired, give a new specification filename if you want to save the old specification, and generate a system with the new values. You can also use the new specification file as a default base for other systems as needed.

The specification files provided with your AOS/VS system media, named MV2000.CSF and MV2000.CSF, MV2000_SMI.CSF and MV2000_SMI.CSF, MV55000.CSF and MV55000.CSF, and MV5500_SMI.CSF and MV5500_SMI.CSF are used to create preinstalled AOS/VS systems.

VSGEN Commands

The following are legal commands to VSGEN:

A — Add a system device
B — Build a system
C — List current configuration
D — Delete a system device
E — Edit a system device
L — List a system device
M — Change system model
N — Change system name
P — Change system parameters
Q — Quit this session
S — Create a specification file
T — Modify default terminals.
V — Verify current configuration

You can enter these commands in upper- or lowercase.

VSGEN Default Answers

VSGEN displays default responses in brackets after each prompt. The default values depend on whether you omitted or included a default specification filename in the VSGEN command line.

- When you omit a specification filename, or add a new device, the bracketed defaults are values that Data General established for a general–purpose AOS/VS installation.
- When you include a specification filename with the VSGEN /DEFAULT=sys switch, the bracketed defaults are those specified in the specification file.

To answer a VSGEN question with a default value, press NEW LINE. For example,

Enter a command: A↵
Device to be added: DPJ↵
Device code [24]:↵

Here, pressing NEW LINE selects the default device code for a DPJ type disk: 24. To change the default response, type the value you want and press NEW LINE.

VSGEN default device codes assume only one IOC (I/O controller), and have only two significant digits. On MV/10000, MV/20000, and MV/40000 computers, AOS/VS supports multiple I/O controllers (IOCs), and three–digit device codes. In a three–digit code, a leading 1 is the channel number selected for the second IOC; a leading 2 is the channel number of the third IOC. The second and third digits indicate the device controller. Under some circumstances, if a computer supports them, it's advantageous to have a group of devices (like disks or IACs) on the second or third IOC. If you have controller(s) on the second or third IOC, *you must type the device code specifically to VSGEN;* for example, type 165 and press NEW LINE for an IAC.

Correcting Mistakes

VSGEN lets you correct mistakes when entering commands or answering questions in a VSGEN routine.

If You Enter the Wrong Command

If you enter the wrong VSGEN command, press NEW LINE when VSGEN asks for a device name. VSGEN will then return to the *Enter a command:* prompt. For example,

Enter a command: D↵
Name of device to be deleted:↵
Enter a command:

Pressing the NEW LINE key lets you back out, but only from the first question after you enter a command. If you are beyond the first question, finish the routine as described below.

If you want to abandon the VSGEN session and start over, use the Quit command. Or, if you're desperate to stop, you can press CTRL–C CTRL–B to abort VSGEN. (CTRL–C CTRL–B aborts *any* program running under AOS/VS, but it's extreme; use it only when you must.)

If You Make a Mistake in a VSGEN Routine

Beginning with AOS/VS Revision 7.70, VSGEN separates the routine for adding or editing line groups of a system device from other VSGEN routines. If you make a mistake in the VSGEN line group editing routine, new features let you easily correct mistakes in a specific set of line groups without having to edit or delete the entire VSGEN routine. You can correct line group editing mistakes both during and after you finish the line group editing routine.

To fix a mistake during the line group editing routine, you can press the uparrow key to redisplay a previous prompt and then fix the mistake. You can also press ESCAPE to abort the line group editing routine, and then add the line group again with the C (Create a line group) command.

To fix a mistake once you finish the line group editing routine, type the E (Edit a system device) command. Accept defaults for all the questions you can until your system displays the *Do you wish to add lines to this group?* question. Answer Yes to this question, then re-enter the line group editing routine with the E (Edit the characteristics of a line group) command. If this method doesn't work, delete the line group with the D (Delete lines from a line group) command, and add the line group again with the C (Create a line group) command.

If you make a mistake in a VSGEN routine for procedures other than adding or editing line groups for a device, finish the routine, accepting defaults for all the questions you can until the final question in the routine, *Do you wish to add lines to this group?*. Answer No to this question. Re-enter the routine, with the E (Edit) or P (Parameter) command, and fix the mistake. If this method doesn't work, delete the device with the D (Delete) command and add it again with the A (Add) command.

Getting Help

To receive further information about any command, type H *X*, where *X* is any of the above commands. For example, to get help on the Add command type

Enter a command: H A↵

A -- ADD A CONTROLLER TO THE CURRENT SYSTEM

> *Routine asks for the name of the controller you wish to add. You will be questioned about values that pertain to that controller.*

Typing ? in response to any question will list possible responses. For example, when you give the A (Add) command, VSGEN responds

Name of device to be added?

If you then respond by typing ? and pressing NEW LINE, VSGEN lists all the possible devices.

For a description of any device, type the List command, then the device name; for example,

Enter a command: L↵

Name of device to be listed: BBU↵

VSGEN displays the current (or default) device specifications. It also shows how many data channel slots on the A or B map the device is using (these are used by tapes, line printers, DPI disk units, and some other disk units).

The peripheral names used by VSGEN are *controller* names. For example, if you have two disk units on the first DPJ controller, their unit names are DPJ0 and DPJ1—but the controller name is DPJ. This list of devices reflects the VSGEN default system, which includes a DPF, a DPJ, and an MTB controller, a system console (CON0), and battery backup (BBU). Since the system already includes these controllers, they can't be added, so their names are not shown in this Add list. The controller names and meanings are explained in the following sections.

Devices You Don't Have

During VSGEN, you may want to specify devices you don't have—perhaps if you plan to get them, and want to eliminate the need for a future VSGEN session. Generally, this is a bad idea. It may cause problems later and always costs something in terms of main memory for the operating system. You can, however, specify lines that aren't currently connected to terminals. For example, if you plan to buy terminals for lines 10 through 15 you can specify them to VSGEN before they are connected.

Checking Your Current Configuration (Current Command)

The Current (C) command displays the current system configuration. You may want to use it to check a configuration after you add a controller. For example:

Enter a command: C↵

Current system: MSIS_01 *Default system: MS_IS01*

System parameters:

Model:	*MV/20000*
Swap:	*2147483647*
Page:	*2147483647*
Cache size:	*256*
Minimum number system pageable pages:	*32*
Default file element size:	*4*
Frequency:	*10*
Access enabled:	*YES*
Initial program for PID 2:	*CLI.PR*
Initial IPC message for PID 2:	
Max program load pages −noncontention:	*0*
Max program load pages −contention:	*0*
Fault time prepaging maximum:	*0*
Variable swapfiles enabled:	*N*
Maximum swapfile size:	*126*
Default swapfile size:	*126*
Truncate swap files after use:	*N*
Truncate page files after use:	*Y*
Size above which truncation will occur:	*2048*
Lowest priority for group 1 processes:	*255*
Lowest priority for group 2 processes:	*258*
Soft tape errors suppressed:	*N*
System dump device:	*MTB*
Maximum number of processes:	*255*
System Management Interface:	*N*
Default GMT offset:	*0:00*
Auto boot:	*Y*
Auto boot timer:	*30*
Auto re−boot:	*N*
Auto re−boot timer:	*0*
Auto dump−bypass:	*N*
Auto dump−bypass timer:	*0*
Auto dump:	*N*
Auto dump timer:	*0*

Current system devices:
... (all current devices) ...

Optional system devices:
... (all devices not part of configuration) ...

Number of data channel A map slots available: n
Number of data channel B map slots available: n

Enter a command:

The new system has no name yet, but its parameters and devices are shown. If, at any point, you want to change a device specification, use the Edit command. You can verify the system—to see if it is valid—with the Verify command.

There are five data channel maps, but VSGEN describes only the A and B maps. The A and B maps have 32 2–Kbyte slots each. Usually, each line printer takes two slots on the A map. Each disk controller not on the burst multiplexor channel (for example, a DPI controller) takes five slots on the A map. Each MTB or MTC tape controller takes five slots on the B map (but an MTB or MTC will use more B slots if it has a larger maximum byte transfer buffer than the VSGEN default).

Verifying the Configuration (Verify Command)

VSGEN looks for and displays some, but not all obvious errors as you type each value. For example, if you enter the line group editing routine, with the A (ADD lines to a line group) command and specify line 1 when line 1 is already assigned, VSGEN gives you the *Line 1 is already defined in group 0–7* error. However, VSGEN doesn't verify all specifications as you enter them. For example, if you mistakenly specify the same base line numbers for more than one asynchronous controller, VSGEN does not report an error until you attempt to build the system.

You can use the Verify command to detect and resolve many errors that VSGEN otherwise does not display until you build the system. A good time to use the Verify command is just after you specify each device. In the following example, you erroneously assigned the same base line twice by specifying an IAC device with 16 lines, and then specifying another IAC device with a base line number of 8. The Verify command displays this error.

Enter a command: A↵
Name of device to be added: IAC↵
Device code [65]:↵
Base line number [0]↵
IAC device type [??] 16↵
... (Dialog continues.)

Enter a command: A↵
Name of device to be added: IAC1↵
Device code [50]:↵
Base line number [0] 8↵
... (Dialog continues.)

Enter a command: V↵
IAC1 base line overlaps with another asynchronous device

Enter a command:

You can then edit the device (see the "Specifying Lines on Multiple Controllers" section) to fix the errors that VSGEN reports with the Verify command.

Specifying System Devices

This section leads you through a VSGEN session in which you create a system tailored for your

- Model of CPU
- Disks
- Tapes
- System console
- Asynchronous controllers (for user terminals)
- Line printers
- Communications hardware
- Battery backup unit

Specifying system parameters (as opposed to devices) is explained later in this chapter. VSGEN summaries are shown in Figures 4–8 and 4–9, later in the chapter.

If you are working with an existing tailored system (/DEFAULT=sys switch), simply list the current specifications with the VSGEN command Current or List; then edit or add the devices or parameters you want.

First, type

```
) SEARCHLIST :UTIL⤶
) SUPERUSER ON⤶
Su) DIR :SYSGEN⤶
Su)
```

The SEARCHLIST command puts directory :UTIL on your search list. (A search list is a list of directories the system scans when it can't find a file in the working directory.) The DIR (DIRECTORY) command makes :SYSGEN the working directory. You need to turn Superuser privilege on in order to execute VSGEN and create files in this directory.

Execute VSGEN as follows for your first system, or with the switches of your choice for subsequent systems:

```
Su) X VSGEN⤶
Welcome to VSGEN -- Type H for help

Enter a command:
```

Specifying CPU Model (Model Command)

To specify the model of CPU, use the Model (M) command:

Enter a command: M↵
Enter new model [MV/8000]:

Type the model of the computer on which the new system will run. Or, for an MV/8000 II, MV/8000 C, or MV/8000, press NEW LINE to select the default. For an MV/40000, type MV/40000. For any model of MV/20000, type MV/20000 and press NEW LINE; for any model of MV/15000, type MV/15000 and press NEW LINE; for any model of MV/7800, type MV/7800 and press NEW LINE; and so on. For example,

Enter new model [MV/8000]: MV/20000↵
Enter a command:

Having described the computer model, you can add or edit devices. The default system has a DPF and a DPJ controller, an MTB tape controller, the system console (CON0), and a battery backup unit (BBU). You may have one of these disk controllers and this tape controller, and/or other device controllers.

Most systems also have asynchronous controllers to handle user terminals. There may be one or more line printers. And there are system parameters you may want to tailor. Each of these is described in its own section.

You can add or edit devices in any order, but let's do the disks first.

Specifying Disks

An AOS/VS system can support up to 16 DPJ controllers, and eight of any other type. All the controller types and models are shown in Table 4–2.

The default AOS/VS system supports a DPJ controller on device code 24 and a DPF disk controller on device code 27. Disk unit names on the first DPJ controller are DPJ0, DPJ1, DPJ2, and DPJ3. Likewise, disk unit names on the first DPF controller are DPF0, DPF1, DPF2, and DPF3. But if you are using a specification file (/DEFAULT=sys or /BATCH=sys switch), the controllers named in the specification file are the defaults. If you're using one of the Data General–supplied specification files described earlier (for example, MV2000.CSF), it already describes the correct controllers for your system.

If you want DPJ or DPF disk controller support, you need not add this controller to the original default system. Check the definition of the one you want by typing L and pressing NEW LINE and the controller name (for example, DPJ); then verify the device code (and any other settings) displayed. If these settings are correct (as they usually will be), you needn't edit the device; if the settings aren't correct, edit the device and fix the wrong setting.

If you *don't* want the new system to support a DPF or DPJ controller, delete the one you don't want (type D and press NEW LINE; then DPF or DPJ), then press NEW LINE. For example, if you don't have any DPF disks, type

Enter a command: D↵
Name of device to be deleted: DPF↵
DPF has been deleted
Enter a command:

If you want the new system to run an additional controller, add the controller using the Add command and controller name from Table 4–2. Take the default device code, if any, unless you know the controller is connected to a nonstandard code. For a DPF controller, VSGEN asks about the number of Model 6214 (602 Mbyte) units; respond to this prompt accurately.

Table 4–2 Disk Controller Names and Device Codes

Disk Description	Controller	Default Device Code
Free–standing units with removable packs (Models 6060, 6061, 6067, 6122); or free–standing and sealed (Model 6214); or rack–mounted and sealed (Models 6160, 6161). Capacity ranges from 50 through 602 Mbytes. A 616x or 6214 controller supports two units; others support four units.	DPF (first) DPF1 (second) DPF2 (third) DPF3 (fourth) DPF4 (fifth) DPF5 (sixth) DPF6 (seventh) DPF7 (eighth)	27 67 No default* No default* No default* No default* No default* No default*
Sealed, 14–inch disks with digital display. Model 6236 holds 354 Mbytes. Model 6239 holds 592 Mbytes. Model 6357 holds 862 Mbytes. A controller supports up to four units. Model 6237, 6239, 6240, 6298, and 6299 are multiple–disk units in one cabinet on one controller. Sealed, 8–inch disks, capacity 727 Mbytes per disk. Model 6492 includes one disk, Model 6578 two disks, and Model 6579 four disks. Sealed, 8–inch Rapid Access Mass Storage (R.A.M.S.) disks, capacity 500 Mbytes per disk. Model 6581 includes one disk, Model 6582 two disks, and Model 6584 four disks. Other R.A.M.S. disks are Model 6621 (one 1.2–Gbyte disk (a controller can run up to four units); Model 6622 (two 1.2 Gbyte disks); Model 6624 (four 1.2 Gbyte disks). Models 6631, 6632, and 6634 hold one, two, and four disks, respectively, of 600 Mbytes each.	DPJ (first) DPJ1 (second) DPJ2 (third) DPJ3 (fourth) DPJ4 (fifth) DPJ5 (sixth) DPJ6 (seventh) DPJ7 (eighth) DPJ8 (ninth) DPJ9 (tenth) DPJA (eleventh) DPJB (twelfth) DPJC (thirteenth) DPJD (fourteenth) DPJE (fifteenth) DPJF (sixteenth)	24 64 No default* No default* No default* No default* No default* No default* No default* No default* No default* No default* No default* No default* No default*
Sealed, 5.25 inch media. Both controllers are built into MV/7800 DCX and DC, DS/7500, MV/4000 DC and SC, MV/2000 DC, and MV/1400 DC computers (these are deskside systems). Disk capacity is 120, 71, or 38 Mbytes; diskette capacity is 737,000 bytes. Each controller supports up to two units. Specify both controllers if you have one of the computers mentioned.	DPJ (disk) DPJ1 (diskette)	24 64

* A Data General engineer selects these device codes at installation.

(continued)

Table 4–2 Disk Controller Names and Device Codes

Disk Description	Controller	Default Device Code
Sealed, 5.25 inch disk, capacity 234 Mbytes (Model 6446), 332 Mbytes (Model 6491), 332 Mbytes (Model 6662), 1 Gbyte (Models 6685 and 6740), and 1.4 Gbytes (Models 6716 and 6718), in a Combined Storage Subsystem (CSS) or a Peripheral Housing Unit (PHU). Up to four units fit in a CSS or PHU. Sealed, 3.5 inch disk, capacity 520 Mbytes (Models 6796 and 6799)	DPJ (first) DPJ1 (second)	24 64
Rack–mounted disk, capacity 50 Mbytes down through 5 Mbytes.	DPI (first) DPI1 (second)	33 73
Minidiskette unit, 5.25 inch, 368–Kbyte diskettes, Model 4514, used in DESKTOP GENERATION® systems.	DPM (first) DPM1 (second)	20 60
Diskette (0.3 Mbyte). Model 6030.	DPD (1st) DPD1 (2nd)	33 73
Two–disk, rack–mounted unit; top disk removable, bottom disk sealed, 5 Mbytes per disk; total 10 Mbytes. Controller can also run 0.3–Mbyte diskettes. Models 6045–6050.	DPD (1st) DPD1 (2nd)	33 73
Two–disk unit as above but 10 Mbytes per disk; total 20 Mbytes; no diskettes. Model 6070.	DPG (1st) DPG1 (2nd)	33 73

(concluded)

Specifying Tape Unit Controllers

The default system supports an MTB tape controller with default options. If the current specification according to the C command describes the tape controller(s) you want supported, don't change it; you may want to edit a controller to see if its options (described below) are the ones desired.

If you don't want the new system to support the current controller(s), delete it (them); then add the controller(s) and options desired. AOS/VS supports up to eight of the following controllers.

Table 4–3 lists approximate capacities of tapes and diskettes. Table 4–4 shows several types of tape controller.

Table 4–3 Approximate Capacities of Tapes and Diskettes

Description	Model Number	/BUFFER-SIZE*	Approximate capacity	
			Mbytes or Gbytes	Disk Blocks
1600–b/in 1200 feet	6026	8192	19 Mbytes	38, 912
1600–b/in 2400 feet	6125,6231, 6311	8192	38 Mbytes	77, 824
6250–b/in 2400 feet	6299,6300, 6588, 6589	32768	154 Mbytes	315, 392
21–Mbyte cartridge	6351/6444	16384	20 Mbytes	40, 960
130–Mbyte cartridge	6426	16384	74 Mbytes (start–stop) or 130 Mbytes (streaming)	151, 552 266, 240
150–Mbyte QIC	6577	16384	139 Mbytes	284, 672
320–Mbyte QIC	6677	16384	296 Mbytes	606, 208
525–Mbyte QIC	6677	16384	486 Mbytes	995, 328
2–Gbyte 8mm cartridge	6590	32768	2 Gbytes	4, 194, 304
5–Gbyte 4mm DAT	6762	32768	5 Gbytes. This drive uses data compression, so actual capacity varies depending on data.	10, 485, 760

* Data General DS/7500 and ECLIPSE MV/1000 DC, MV/1400 DC, MV/2000 DC, and MV/2500 DC systems allow a maximum buffer size of 16384.

Table 4–4 Tape Controller Types and Names

Model Number	Type	Default Device Code		Comments
		Primary	Secondary	
6026	MTB	22	62	An MTB unit has a panel DENSITY switch; density can be 1600 or 800 bits per inch (b/in). A controller can handle up to eight units. On the first controller, default unit names are MTB0, MTB1, MTB2, ..., MTB7.
6125 6231 6311	MTC	22	62	Model 6125 has reels side by side, with density of 1600 b/in; other models are cartridge tapes with density of 6400 b/in. A controller can handle one unit, default name MTC0.
4307 6299 6300	MTD	62	none	Model 4307 has switches at the top; Models 6299/6300 have touch–sensitive switches. Both offer densities of 6250 or 1600 b/in. A controller can handle up to four units. On the first controller, default device names of units are MTD0, MTD1, MTD2, and MTD3.
6340 6341 6351 6352 6536 6577 6590 6591 6656 6679 6588 6589	MTJ	23	63	Models 6340 and 6341 have reels side by side and use 1600 b/in. Model 6352 (cartridge) holds up to 120 Mbytes at 6400 b/in. A controller can handle up to four units. On the first controller, default device names of units are MTJ0, MTJ1, MTJ2, and MTJ3. On the second controller, the names are MTJ10, MTJ11, MTJ12, and MTJ13. Model 6351 uses specially formatted cartridge tape that holds up to 21 Mbytes. (Model 6351 has just one read/write head; consequently, you should verify writes by rewinding the tape and loading with the /N switch to the LOAD command.) Model 6536 is a quarter–inch cartridge (QIC) drive, with a data storage capacity of 150 Mbytes and a data density of 10,000 b/in. Models 6577, 6590, 6591, 6656 and 6679 are cartridge tape units. Model 6577 is a 1/4 inch unit for deskside systems; Models 6656 and 6679 are also 1/4 inch units; Models 6590 and 6591 are 8mm cartridge units. Models 6588 and 6589 are reel–to–reel, 6250 b/in units.

Be sure to type the correct controller name to VSGEN. The starter system recognizes type MTC (includes MTB), MTD, or MTJ. But for a *tailored* system to support any type well, you must specify the proper type. For example,

Device to be added: MTJ↵	(Or MTC or MTD or MTB)
Device code [23]:	(Default code is 62 for MTD, 22 for MTB and MTC.)

Press NEW LINE to specify the default device code. And for an MTC controller, skip to the *Max byte transfer:* prompt.

Device code [default]:↵
Default density [ADM]:

For default density, you can select ADM (the default), a valid bits per inch (b/in) number, or NC. The meanings are explained below.

ADM	Automatic Density Matching. When a unit on this controller reads a tape, the new system will try to match controller density to tape density—regardless of the DENSITY switch setting (if any). When a unit writes to tape, an MTB will use the tape panel DENSITY switch setting (800 or 1600 b/in); an MTD will use the last density that it read or wrote. Users can override the write default by specifying a valid density with the /DENSITY= switch on CLI commands.
n	where *n* is 1600, 800, or 6250 (b/in). Use density n as default. This selection overrides the tape unit's DENSITY switch, if any. Automatic density matching will not occur, but users can override the default *n* via software with the /DENSITY= switch in CLI commands.
LOW	Tells VSGEN to select the lowest density supported by this unit as the default.
MEDIUM	On tri–density drives (800/1600/6250 b/in), tells VSGEN to select the middle density, 1600 b/in. On dual–density drives (800/1600 or 1600/6250 b/in), tells VSGEN to select the lower of the supported densities.
HIGH	Tells VSGEN to select the highest density supported by this unit as the default.
NC	No change from current density. (The current density is the density last specified with the /DENSITY= switch in a CLI command. But on an MTB, if no one has used the /DENSITY= switch, the current density is that selected with the DENSITY= *panel* switch. If no density has been specified on an MTD, the current density is 6250 b/in.) On reads or writes, only the current density will be used. Users can override the current density with the /DENSITY= switch in CLI commands.

The default answer (ADM or 6250) is the best general–purpose choice for its type of controller. We recommend it unless you know that you want another choice. To take it, press NEW LINE:

Default density [ADM]:↵
Max byte transfer [nK]:

Your answer to this question selects the maximum size of the buffer used for tape I/O. Valid answers are 2K (2,048 bytes), 4K, 6K, and so on, through 32K. For MTB or MTC types, the 8K default is a good general–purpose choice; it's big enough for efficient reads and writes, yet not so big that it may slow down the program doing the I/O. For a Model 6125 reel–to–reel tape attached to an MV/4000 DC and for cartridge tape models 6231 and 6311, the default (8K) is *required.* For an MTD unit at 6250 b/in, 32K is also a good general–purpose choice. For an MTJ tape, 16K is required. For all tapes, the buffer size affects the amount of data a tape can hold. (A larger buffer size increases the amount of data a tape can hold by producing fewer gaps between records.)

A user can select any buffer size up to the maximum with a /BUFFERSIZE= switch on a LOAD or DUMP command; or the user can take the default size by omitting the /BUFFERSIZE= switch. The same buffer size used to write a tape must be used to read it back. The LOAD_II (and optional LOAD_3) programs match the dump buffer size when they read a tape, if the unit allows automatic density matching. (Before AOS/VS Revision 7.67, the LOAD command required the user to specify the correct buffer size to read a tape written at a nondefault buffer size. With AOS/VS Revision 7.67, when using the 32–bit CLI, typing LOAD uses the LOAD.CLI macro, which invokes the LOAD_II program. Therefore, concern about specifying buffer size need not be an issue.)

Unless you have a good reason for doing otherwise, take the default transfer size by pressing NEW LINE. VSGEN responds with the prompt:

Enter a command:

If you want the new system to support another magnetic tape controller, type A and press NEW LINE. Then type the controller name: MTB1, MTJ1, MTC1, or MTD1, and press NEW LINE; in most cases, take the default device code. Unit names on the second controller are MTx10, MTx11, MTx12, and so on.

After adding the last tape controller, you might review the current system again with the Current command; then proceed.

Specifying the System Console

You specify the system console by itself. (This is different from user terminals, which you do not specify directly. Rather, you specify an asynchronous line controller that is in turn connected to terminals.) The system console name is CON0. CON0 is included in the default system as a CRT3 (DASHER® D2, D200, D410, D411, or other D200–compatible CRT). If this is the kind of console you want supported, skip to the next section.

If you want the the new system to support a *different* type of system console, then you must edit the CON0 spec. The other types of console are hardcopy—type TTY and press NEW LINE—and CRT6 (graphics terminal, DASHER D400, D410, D450, D460, or D470). For example, to specify a hardcopy system console, you'd type

Enter a command: E↵

Name of device to edit: CON0↵
Default terminal [CRT3]: TTY↵
Warning: Changing the default terminal can alter the default values of several of the ensuing prompts!
Do you want to change those defaults? [NO]: Y↵
Terminal type [HARDCOPY]:↵
Terminal description [TTY or hardcopy (printing) terminal]:↵
Input buffer length [256]:↵
Output buffer length 256]:↵
Lines per page [30]:↵
Characters per line [72]:↵
Break key function [BINARY]:↵
Data Bits [8]:↵
Stop bits [1]:↵
Parity [NONE]:↵
Baud rate [600]:↵
These characteristics are selected: EOC, NAS, ST, ULC, WRP↵
Enter choices (or NEWLINE when done):↵

Enter a command:

The *buffer length* prompts relate to buffers used by the system to communicate with the device; you can accept the default value. For the system console, you will usually want to accept the default values for the *Lines per page* prompt, the *Characters per line* prompt, and the *characteristics* prompt. If you *do* want to specify nondefault characteristics values, Table 4–6, later on, describes the mnemonics you can use.

If the System Console Is a Pixel–Mapped Terminal

Some computers, like the DS/7500, support pixel–mapped (graphics) terminals. If the system console is a pixel–mapped terminal, you don't have to edit the CON0 specification. The reason for this is that it is the peripheral manager, not the AOS/VS system, that contains the code for communicating with this kind of system console. Consequently, you can delete CON0 from the tailored system if your computer has a system console that is a pixel–mapped terminal. See also "Specifying DRT Controllers," later in this chapter.

Asynchronous Line Controllers

You don't specify user terminals directly; instead, you describe the parameters of the device—the asynchronous line controller—that handles them. Then you describe the (terminal) lines connected to the device.

Asynchronous line controllers run lines to user terminals, modems, and some letter-quality and laser printers. AOS/VS supports up to 1,360 asynchronous lines on 64 controllers. You must identify each controller, and the lines connected to it, that you want the new system to support.

The asynchronous controller models and characteristics are as follows in alphabetical order. Table 4-5, following this list, shows the MV/Family computers and the asynchronous devices each supports. (Each asynchronous device is described in detail later on.)

- ATI—a two-board Input/Output Processor (IOP) and one or more 8- or 16-line asynchronous multiplexor boards. Used in an MV/8000 whose model number begins with 93.
- CPI/24 (Computer-PBX-Interface)—a device that connects an MV/Family computer, via Private Branch Exchange switch, to up to 24 telephone lines. You identify a CPI/24 to VSGEN as a CPI.
- DRT (Dual asynchronous Receiver-Transmitter)—a controller that's part of the IOC board on integrated (deskside) systems; supports up to 10 lines. You identify a DRT to VSGEN as a DRT.
- IAC (Intelligent Asynchronous Controller)—available in 24-line, 16-line, or 8-line versions. You identify an IAC to VSGEN as an IAC type 24, 16, or 8.
- ITC (Intelligent TermController)—supports as many as 128 or 64 lines, depending on type, on a LAN. (The 64-line version is called an LTC/64.) The LAN connects in turn to devices called TermServers that handle terminal lines. You identify an ITC or LTC to VSGEN as an IAC type 128 or type 64.
- LAC (Local-bus Asynchronous Controller)—available in a 12-line version on deskside ECLIPSE MV/1400 DC, MV/2000 DC, and MV/2500 DC systems only. A 16-line LAC (LAC-16) is available on deskside ECLIPSE MV/1400, MV/2000, MV/2500, and MV/5000 DC-series systems. Another 16-line LAC (LAC-16 II) is available on deskside ECLIPSE MV/1000 DC and MV/3000 DC-series computers.
  A 32-line LAC (LAC-32) is available on deskside ECLIPSE MV/2000 DC, MV/2500 DC, and MV/5000 DC-series computers. These computers are shipped with a tailored AOS/VS system already installed. Except for a LAC-12, identified as an IAC-12, each of these asynchronous line controllers is identified as a UAC. See "Specifying Local-Bus Asynchronous Controllers (LACs)," later in the chapter, for more information. Also see UAC later in this section.
- LMC-8 (Local-bus Modem Controller)—supports 8 modem or nonmodem lines, on deskside ECLIPSE MV/1400 DC, MV/2000 DC, MV/2500 DC, and MV/5000 DC-series systems only. LMC-8 II is available on deskside ECLIPSE MV/1000 DC and MV/3000 DC-series systems. As with the LAC, these computers are shipped with a tailored AOS/VS system already installed. Each of these asynchronous line controllers is identified as a UAC. See "Specifying Local-Bus Modem Controllers (LMCs)," later in the chapter, for more information.
- LTC/64 (Local-bus TermController)—supports 64 lines on a LAN. You identify an LTC to VSGEN as an IAC type 64.

- MCP1 (Multicommunications Processor)—one board with three controllers: an 8–line asynchronous controller, a 2–line synchronous controller, and a line printer controller. Each controller has its own device code. You specify the asynchronous controller to VSGEN as an IAC type 8.
- UAC (Unspecified Asynchronous Controller)—controller type that includes only LAC devices. When a controller is defined as a UAC (instead of as an IAC), the new system sizes the device and determines which type it is. Generally, this controller type is used only to create preinstalled AOS/VS systems. For such systems, the system assigns default characteristics (local lines, CRT3 default) for all lines on the LAC.

You'll tell VSGEN which controller(s) you have, choose whether or not to support VT100 terminals or Asian languages (see the next sections), and then describe the lines attached to each device.

NOTE: If the terminals are not labeled, someone should label them—preferably with the terminal's console filename, @CON*n*. You can use adhesive tape for this. If you don't know a terminal's console filename, you can figure it out from the line number, as described in the section for each controller. Labeling the terminals makes it easier to identify their CON, line, and controller assignments.

About VT100 Terminal Support

If your system includes Digital Equipment Corporation's VT100 and VT220 terminals or other non–Data General ANSI–standard terminals, put them on one or more asynchronous controllers and, if asked, answer Yes to the VSGEN prompt *VT100 terminal support*?" For each line, you must also select the appropriate characteristics, explained later in the section "Specifying Terminal Lines."

About Asian Language Support

You can dedicate one or more controllers to supporting terminals for certain Asian languages and character sets. (Asian languages also require special software, and you must also set line characteristics using the CHARACTERISTICS command.)

Currently, Data General offers IKIS (Interactive Kanji Information System) support for Asian languages. If you want a controller to support Asian languages, type IKIS and press the NEW LINE key.

Table 4–5 Asynchronous Controllers

Computer	Asynchronous Controller
MV/40000	CPI/24, IAC, MCP1, and/or ITC/128
MV/20000 (any model) CPI/24,	IAC, MCP1, and/or ITC/128
MV/18000 (any model) CPI/24,	IAC, MCP1, and/or ITC/128
MV/15000 (any model) CPI/24,	IAC, MCP1, and/or ITC/128
MV/10000 (any model)	IAC, MCP1, and/or CPI/24
MV/9300, MV/9500, MV/9600	IAC, MCP1, and/or ITC/128
MV/8000 II, MV/8000 C	IAC, MCP1, and/or CPI/24
MV/8000	IAC (model numbers beginning with 96) or ATI (model numbers beginning with 93)
MV/7800, MV/7800 C, MV/7800 XP	IAC, MCP1, and/or ITC/128
MV/7800 DCX and MV/7800 DC	IAC, MCP1, and/or ITC/128
DS/7500	DRT
MV/6000	IAC
MV/5000 DC series	LAC–16, LAC–32, LTC/64, and/or LMC–8 (IAC–8)
MV/4000	IAC, MCP1, and/or CPI/24
MV/4000 DC	MCP1 or IAC
MV/4000 SC or Data General DS/4000–series	MCP1
MV/3000 DC series	LAC–16 II and/or LMC–8 II (IAC–8)
MV/2500 DC	DRT, LAC–12, LAC–32, LTC/64, and/or LMC–8
MV/2000 DC	DRT, LAC–12, LAC–32, LMC–8, LTC/64, and/or LMC (IAC–8)
MV/1400 DC	LAC–12, LAC–32, LMC–8, and/or DRT
MV/1000 DC	LAC–16 II, LMC–8 II, and/or DRT

Ranges of Console Lines

After you identify an asynchronous controller, VSGEN will ask you to describe its console (terminal) lines—the type of device that will connect to the lines. A console line is usually connected to a terminal, but it can be connected to a modem or printer.

You can describe console lines individually or in groups. VSGEN will ask questions about each entry, so if you specify a group of lines, all lines in the group will be treated the same way, even if the devices attached to them are different. The VSGEN line group editing routine lets you add, edit, or delete line groups in any order.

To specify individual lines in a group, separate the line numbers with commas (VSGEN ignores spaces). To specify a range of lines in a group, separate the first and last number with a hyphen. You can specify a mix of individual lines and a range of lines in a group. For example:

0,7	Specifies lines 0 and 7
0–7	Specifies lines 0 through 7
0, 2, 4–7	Specifies lines 0, 2, 4, 5, 6, and 7

Specifying Lines on Multiple Controllers

If your system has more than one asynchronous controller, you'll establish the sequence of line numbers from board to board during VSGEN. To do this, you specify a base line number for each board. Then you describe the lines from 0 to *n*, where *n* is the number of lines attached to consoles (up to a maximum of 7, 11, 15, 23, 31, and 127, depending on whether the controller has 8, 12, 16, 24, 32, or 128 lines).

For the next controller, after identifying the controller itself, you specify another base line number. To keep your console lines sequential from controller to controller, specify a base line number that's equal to the total number of lines (not consoles) on the first controller. For example, if the first controller has 8 lines (lines 0–7), specify 8 as the base line for the second controller.

For the third and each subsequent controller, you can use a base line that equals

base–line–of–preceding–controller
+
total–number–of–lines–on–preceding–controller
(8, 12, 16, 24, 32, or 128)

For example, if the base line of the preceding IAC is 24 and it can support 8 lines, type 32 and press NEW LINE.

You need not make the base lines sequential. For example, you might choose to make your modem base line 80. But each base line must be larger than the preceding controller's base line and each must be divisible by 2. (VSGEN imposes this to ensure unique console names, so that your multiuser system will work properly.)

When the new system runs, each terminal line on the asynchronous controller will have the console filename based on the formula

@CON(base–line–number + line–number–on–this–controller + 2)

For example, assume that the first controller has 24 lines and you specify its base−line number as 0. The terminal on the third line (line 2) will have the console filename of @CON(0+2+2), or @CON4. Further assume you give the second asynchronous controller a base−line number of 24. Line 7 on the second controller will have the console filename of @CON(24+7+2) or @CON33.

About Input and Output Buffers

For each line group you specify, VSGEN asks questions about the input and output buffer length. Your answers set the asynchronous controller's memory buffer size for each line in the group. An input buffer holds data from a keyboard or communications line until the system is ready for it. An output buffer holds data to be displayed on a screen or sent to a printer. The default values work fine for most situations. Accept the default by pressing NEW LINE.

For some lines, you may have to specify nondefault sizes. For example, a line used for data communications (via DG/BLAST or similar product) or for a block−oriented terminal may fill an input buffer faster than the system can empty the buffer. If the input buffer overfills, characters will be lost and users of the line will see *Data overrun error* messages. You can eliminate the data overrun by increasing the input buffer length and decreasing the output buffer length by some even number of bytes. (The output buffer size is not crucial in these cases.)

The memory on IACs and other controllers is limited, so be careful not to allot more memory than an IAC has. The controller will not come up if you do this.

Before changing input and output buffer length, read the latest AOS/VS Release Notice or AOS/VS Update Notice, which gives the total space available for input and output buffers (also called ring buffers), and the average space for each buffer. These numbers change from revision to revision.

After you know how much memory is available, you can divide the total space among the lines you are defining. For example, assume the total ring buffer space for an IAC−16 is 4146 bytes. Dividing 4146 by 32 buffers (2 buffers per line), rounding to an even number, gives the default of 128 bytes per buffer. You can adjust the input buffer figures as needed to eliminate data overrun errors, as long as the sum of all buffer lengths doesn't exceed the total ring buffer space. (VSGEN enforces the maximum buffer size, but does not ensure that the total space is valid.)

NOTE: Some asynchronous controllers (newer IAC−8s, IAC−24s, LAC−16s, LAC−32s, LMC−8s, LTC−64s, and ITC/128 TermControllers) allot memory statically. These controllers ignore any input and output buffer sizes you specify.

The following sections describe each asynchronous controller, in the alphabetical order ATI, CPI/24, DRT, IAC, ITC/128−LTC/64, LAC, LMC, and MCP1 give instructions for configuring each one. Find the section for the device you want. Following these sections are sections on various line characteristics.

Specifying ATIs

An ATI (Asynchronous Terminal Interface) is a two–board Input/Output Processor (IOP) and one or more 8– or 16–line asynchronous multiplexor boards. An ATI with an 8–line multiplexor called an AMI–8 (Asynchronous Modem Interface) is included with each MV/8000 that has an ATI. This AMI can handle either local or modem lines; it can be part (or all) of an ATI. The device code for the ATI is 65.

With eight 16–line multiplexors, an ATI can support console lines 0 through 127. Each multiplexor board is hardware strapped to the next, which may or may not provide a contiguous sequence of lines from one board to the next. The sequence is contiguous only if all lines in the preceding board are used. The supplied AMI, with only 8 lines, is often inserted as the last board in the ATI.

ATI Dialog

To add an ATI, add a device, then specify ATI lines:

Enter a command: A

Name of device to be added: ATI

Do you wish to add line groups to this device? [Y]
There are no line groups defined for ATI.
These lines are undefined: 0–127

You may:
(C) CREATE a line group.
(M) MODIFY default terminal types.
(Q) QUIT line group editing for this device.

Enter choice: C

Please specify the following parameters:
Free–form group name: CRT3
Default terminal [CRT3]:
Terminal type [ASCII]:
Terminal description [DGC D200 compatible terminal]:
Input buffer length [128]:
Output buffer length [128]:
Lines per page [24]:
Characters per line [80]:
Break key function [BINARY]:
Data Bits [8]:
Stop bits [1]:
Parity [NONE]:
Clock rate [0]:
These characteristics are selected: 8B, EOC, ST, ULC, XLT, WRP
Enter choices (or NEWLINE when done):
Do you want to add lines to this group? [YES]

Now you need to describe the lines on this ATI—individually or in groups.

For lines attached to the first multiplexor board in the ATI, lines are numbered 0 through n, where n is the number of consoles up to a maximum of 15 or 7 (depending on the multiplexor board). For lines attached to the second and subsequent boards, lines are numbered from the total number of lines in preceding boards.

For example, if the first mulitplexor has 16 lines (even if only 12 are used), the number of the first line on the second multiplexor board is 16.

ATI Console Names

When the new system runs, each console on the ATI will have the console name of

CON (line−number + 2)

For example, the name of the console on line 5 will be CON7, and the name of the console on line 17 will be CON19.

From multiplexor board to multiplexor board, the console names will not be contiguous unless you have consoles attached to all previous multiplexor lines. For example, even if you have only 12 consoles attached to the first multiplexor (producing the console names CON2 through CON14), the name of the console attached to the first line on the second multiplexor will be CON18.

ATI Console Lines Example

The following example shows you how to handle all common ATI line–console configurations. It assumes that your ATI has a 16–line multiplexor followed by an 8–line multiplexor.

It also assumes that the ATI lines are connected as follows:

- Lines 0 – 2 are attached to local CRTs
- Line 3 is attached to a local TTY
- Lines 4 – 12 are attached to local graphics CRTs
- Line 13 is attached to a letter–quality printer
- Lines 16 – 17 (lines 0 and 1 on second multiplexor) are attached to modems.

```
Enter a command: A ↵

        Name of device to be added: ATI ↵

        Do you wish to add line groups to this device? [Y] ↵
There are no line groups defined for ATI. ↵
These lines are undefined: 0–127 ↵

You may: (C) CREATE a line group. ↵
         (M) MODIFY default terminal types. ↵
         (Q) QUIT line group editing for this device. ↵

         Enter choice: C ↵

Please specify the following parameters:
         Free–form group name: CRT3.01 ↵
         Default terminal [CRT3]: ↵
         Terminal type [ASCII]: ↵
         Terminal description [DGC D200 compatible terminal]: ↵
         Input buffer length [128]: ↵
         Output buffer length [128]: ↵
         Lines per page [24]: ↵
         Characters per line [80]: ↵
         Break key function [BINARY]: ↵
         Data Bits [8]: ↵
         Stop bits [1]: ↵
         Parity [NONE]: ↵
         Clock rate [0]: ↵
         These characteristics are selected: 8B, EOC, ST, ULC, XLT, WRP
         Enter choices (or NEWLINE when done): ↵
         Do you want to add lines to this group? [YES] ↵
```

Figure 4–1 Sample ATI Dialog, with AMI–16 and AMI–8 (continued)

```
        Specify lines to add to group {CRT3.01}: 0-2 ↵
        Lines 0-2 were added to group {CRT3.01} producing 0-2. ↵

This line group is defined for ATI: 0-2
These lines are undefined: 3-127

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵

Please specify the following parameters:
         Free-form group name: TTY.01 ↵
         Default terminal [CRT3]: TTY ↵
         Terminal type [HARDCOPY]: ↵
         Terminal description [TTY or hardcopy (printing) terminal]: ↵
         Input buffer length [256]: ↵
         Output buffer length [256]: ↵
         Lines per page [30]: ↵
         Characters per line [72]: ↵
         Break key function [BINARY]: ↵
         Data Bits [8]: ↵
         Stop bits [1]: ↵
         Parity [NONE]: ↵
         Clock rate [0]: ↵
         These characteristics are selected: 8B, EOC, NAS, ST, XLT
         Enter choices (or NEWLINE when done): ↵
         Do you want to add lines to this group? [YES] ↵
         Specify lines to add to group {TTY.01}: 3 ↵
         Line 3 was added to group {TTY.01} producing 3.

These line groups are defined for ATI: 0-2, 3
These lines are undefined: 4-127

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (M) MODIFY default terminal types.
         (S) SHOW all line groups for this device.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵
```

Figure 4-1 Sample ATI Dialog, with AMI-16 and AMI-8 (continued)

```
Please specify the following parameters:
        Free-form group name: CRT6 ↵
        Default terminal [CRT3]: CRT6 ↵
        Terminal type [GRAPHICS]: ↵
        Terminal description [DGC D470 compatible graphics terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Clock rate [0]: ↵
        These characteristics are selected: 8B, EOC, ST, ULC, XLT, WRP
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES] ↵
        Specify lines to add to group {CRT6}: 4-12 ↵
        Lines 4-12 were added to group {CRT6} producing 4-12. ↵

These line groups are defined for ATI: 0-2, 3, 4-12.
These lines are undefined: 13-127

You may: (C) CREATE or (K) KILL a line group.
        (L) LIST or (E) EDIT the characteristics of a line group.
        (A) ADD lines to, of (D) DELETE lines from a line group.
        (S) SHOW all line groups for this device.
        (M) MODIFY default terminal types.
        (Q) QUIT line group editing for this device.

        Enter choice: C ↵

Please specify the following parameters:
        Free-form group name: TTY.02 ↵
        Default terminal [CRT3]: TTY ↵
        Terminal type [HARDCOPY]: ↵
        Terminal description[TTY or hardcopy (printing) terminal]: ↵
        Input buffer length [256]: ↵
        Output buffer length [256]: ↵
        Lines per page [30]: ↵
        Characters per line [72]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Clock rate [0]: 1 ↵
```

Figure 4-1 Sample ATI Dialog, with AMI-16 and AMI-8 (continued)

```
        These characteristics are selected: 8B, EOC, NAS, ST, XLT
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES]: Y ↵
        Specify lines to add to group {TTY.02}: 13 ↵
        Line 13 was added to group {TTY.02} producing 13.

These line groups are defined for ATI: 0-2, 3, 4-12, 13
These lines are undefined: 14-127

You may: (C) CREATE or (K) KILL a line group.
        (L) LIST or (E) EDIT the characteristics of a line group.
        (A) ADD lines to, of (D) DELETE lines from a line group.
        (S) SHOW all line groups for this device.
        (M) MODIFY default terminal types.
        (Q) QUIT line group editing for this device.

        Enter choice: C ↵

Please specify the following parameters:
        Free-form group name: CRT3.02 ↵
        Default terminal [CRT3]: ↵
        Terminal type [ASCII]: ↵
        Terminal description [DGC D200 compatible terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Clock rate [0]: 3 ↵
        These characteristics are selected: 8B, EOC, ST, ULC, XLT, WRP
        Enter choices (or NEWLINE when done): MOD ↵
        These characteristics are selected: 8B, EOC, MOD, ST, ULC, XLT, WRP
        Enter choices (or NEWLINE when done): ↵
        TCC timer value [40000]: ↵
        TCD timer value [5000]: ↵
        TDW timer value [1000]: ↵
        THC timer value [2000]: ↵
        TLT timer value [2000]: ↵
        Do you want to add lines to this group? [YES] ↵
        Specify lines to add to group {CRT3.02}: 16, 17 ↵
        Lines 16-17 were added to group {CRT3.02} producing 16-17.

This line group is defined for ATI: 0-2, 13, 16-17, 3, 4-12
These lines are undefined: 14-15 & 18-127
```

Figure 4–1 Sample ATI Dialog, with AMI–16 and AMI–8 (continued)

```
You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: Q )

Do you want to save your changes? [YES]: Y )
         Saved.

Enter a command:
```

Figure 4–1 Sample ATI Dialog, with AMI–16 and AMI–8 (concluded)

In Figure 4–1, for ATI, we described the CRTs connected to lines 0 – 2, the hardcopy console on line 3, the graphics terminals on lines 4–12, and the letter–quality printer on line 13 (with 1200 baud; on our system, Clock 1 is jumpered to 1200 baud). Next we specified the modem lines: lines 16 and 17 (0 and 1 on the second ATI multiplexor). We added the characteristic MOD for the modems lines to the to default characteristics.

We specified Clock 3 (which, in our system, is jumpered to 300 baud) for the modem lines; and we gave the standard other characteristics. Then we chose to add no more lines.

When the new system runs, the console names on lines 0–2 will be CON2– CON4; on line 3 the name will be CON5; on lines 4–12, CON6–CON14; on line 13, the letter–quality printer, CON15; and lines 16 and 17 will be CON18 and CON19.

Specifying CPI/24 Controllers

A CPI/24 (Computer–PBX–Interface controller) is a board that connects an MV/Family computer to a Private Branch Exchange (PBX) telephone switch. Telephone lines from the PBX, instead of computer–to–terminal cables, can then connect to user terminals. The CPI/24 device is named for the CPI software interface, T1/DS–1 version.

PBX line configurations are arranged by the PBX manufacturer—a telecommunications manufacturer like Northern Telecom. Each line is set up for dialing in (users make the connection) or direct outward calling (the computer makes the connection).

Most PBX lines connected to a computer are dial–in lines. After EXEC has enabled the console filename (as with any terminal), a user dials the computer's number, the connection is made, and the user logs on. (A device called a data–access module, DAM, is needed at the user's phone set.) To VSGEN, you specify a PBX dial–in line as a standard console line.

Direct outward calling is useful for a line without a human dialer; for example, a line connected to a printer. (A DAM is also needed for outward calling.) If a printer/DAM is attached to a PBX line set up for outward calling, and this line has been specified to VSGEN, the printer can be enabled by EXEC just as if it were on cables—users can access it through QPRINT commands just like any other printer. To VSGEN, you specify a PBX direct outward line as standard, except that you must specify CALLOUT (and any other desired settings) in characteristic word 3.

For a PBX dial–in or direct–outward line to work, the DAM, terminal, and VSGEN line specifications should match. (The host computer will try to match the baud rate, number of data bits, and the number of stop bits set in the DAM if these settings differ from the VSGEN settings.)

You specify a CPI/24 to VSGEN as a CPI. CPIs have the following requirements:

- Each CPI/24 requires two sequential device codes. VSGEN asks for only one—the even–numbered code. It then tries to assign the device code you type, and the next one, to the CPI/24. For example, if you type 30 and press NEW LINE, VSGEN tries to assign code 30 and 31 to the CPI.
- A CPI can support up to 24 PBX lines—dial–in or call–out, in any combination.
- CPIs don't offer modem support.
- For a call–out line, you must specify CALLOUT (and any other characteristics desired) in characteristics word 3.

CPI/24 Example

The following example, Figure 4–2, shows how to handle all common CPI/24 line configurations. It assumes that there are 40 PBX lines, arranged as follows:

- CPI lines 0 through 15 are attached to dial–in lines for local CRTs.
- CPI lines 16 and 17 are attached to dial–in lines for local graphics CRTs.
- CPI lines 18 through 21 are attached to lines for outward calling, for local letter–quality printers.
- CPI lines 22 and 23 are unused.
- CPI1 lines 0 through 15 are attached to local CRTs.

```
Enter a command: A ↵

        Name of device to be added: CPI ↵
        Device code [??]: 30 ↵
        Base line number [0]: ↵
        VT100 terminal support? [Y]: N ↵
        Asian language support? [NONE]: ↵
        Do you want to add lines to this group? [YES] ↵

You may: (C) CREATE a line group.
        (M) MODIFY default terminal types.
        (Q) QUIT line group editing for this device.

        Enter choice: C ↵

Please specify the following parameters:
        Free–form group name: CRT3 ↵
        Default terminal [CRT3]: ↵
        Terminal type [ASCII]: ↵
        Terminal description [DGC D200 compatible terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Baud rate [9600]: ↵
        These characteristics are selected: EOC, ST, ULC, WRP
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES]: Y ↵
        Specify lines to add to group {CRT3}: 0–15 ↵
        Lines 0–15 were added to group {CRT3} producing 0–15.
```

Figure 4–2 Sample CPI/24 Dialog, with Two CPI/24s (continued)

```
This line group is defined for CPI: 0-15
These lines are undefined: 16-23

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵

Please specify the following parameters:
         Free-form group name: CRT6 ↵
         Default terminal [CRT3]: CRT6 ↵
         Terminal type [GRAPHICS]: ↵
         Terminal description [DGC D470 compatible graphics terminal]: ↵
         Input buffer length [128]: ↵
         Output buffer length [128]: ↵
         Lines per page [24]: ↵
         Characters per line [80]: ↵
         Break key function [BINARY]: ↵
         Data Bits [8]: ↵
         Stop bits [1]: ↵
         Parity [NONE]: ↵
         Clock rate [0]: ↵
         These characteristics are selected: EOC ST ULC, WRP
         Enter choices (or NEWLINE when done): ↵
         Do you want to add lines to this group? [YES] ↵
         Specify lines to add to group {CRT6}: 16, 17 ↵
         Lines 16-17 were added to group {CRT6} producing 16-17.

These line groups are defined for CPI: 0-15, 16-17.
These lines are undefined: 18-23

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵
```

Figure 4-2 Sample CPI/24 Dialog, with Two CPI/24s (continued)

```
Please specify the following parameters:
        Free-form group name: TTY ↵
        Default terminal [CRT3]: TTY ↵
        Terminal type [HARDCOPY]: ↵
        Terminal description [TTY or hardcopy (printing) terminal]: ↵
        Input buffer length [256]: ↵
        Output buffer length [256]: ↵
        Lines per page [30]: ↵
        Characters per line [72]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Baud rate [600]: 1200 ↵
        These characteristics are selected: EOC, NAS, ST
        Enter choices (or NEWLINE when done): CALLOUT, OFC ↵
        These characteristics are selected: CALLOUT, EOC, NAS, OFC, ST
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES] ↵
        Specify lines to add to group {TTY}: 18-21 ↵
        Lines 18-21 were added to group {TTY} producing 18-21.

These line groups are defined for CPI: 0-15, 16-17, 18-21.
These lines are undefined: 22-23.

You may: (C) CREATE or (K) KILL a line group.
        (L) LIST or (E) EDIT the characteristics of a line group.
        (A) ADD lines to, of (D) DELETE lines from a line group.
        (S) SHOW all line groups for this device.
        (M) MODIFY default terminal types.
        (Q) QUIT line group editing for this device.

        Enter choice: Q ↵

Do you want to save your changes? [YES]: Y ↵
        Saved.

Enter a command: A ↵

        Name of device to be added: CPI1 ↵
        Device code [??]: 34 ↵
        Base line number [0]: 24 ↵
        VT100 terminal support? [Y]: N ↵
        Asian language support? [NONE]: ↵
```

Figure 4-2 Sample CPI/24 Dialog, with Two CPI/24s (continued)

```
You may: (C) CREATE a line group.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵

Please specify the following parameters:
         Free-form group name: CRT3 ↵
         Default terminal [CRT3]: ↵
         Terminal type [ASCII]: ↵
         Terminal description [DGC D200 compatible terminal]: ↵
         Input buffer length [128]: ↵
         Output buffer length [128]: ↵
         Lines per page [24]: ↵
         Characters per line [80]: ↵
         Break key function [BINARY]: ↵
         Data Bits [8]: ↵
         Stop bits [1]: ↵
         Parity [NONE]: ↵
         Baud rate [9600]: ↵
         These characteristics are selected: EOC, ST, ULC, WRP
         Enter choices (or NEWLINE when done): ↵
         Do you want to add lines to this group? [YES]: Y ↵
         Specify lines to add to group {CRT3}: 0-15 ↵
         Lines 0-15 were added to group {CRT3} producing 0-15.

This line group is defined for CPI1: 0-15
These lines are undefined: 6-23

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: Q ↵

Do you want to save your changes? [YES]: Y ↵
         Saved.

         Enter choice:
```

Figure 4-2 Sample CPI/24 Dialog, with Two CPI/24s (concluded)

In Figure 4-2, for CPI, we specified the device code 30 (also including code 31). Then we took the defaults for the base-line number, and described the CRTs connected via the PBX to CPI lines 0 through 15 and graphics terminals connected via lines 16 and 17. Then we described lines 18 through 21, configured as direct call-out lines. These will be connected to printers, so we specified them as TTY. We added the characteristic CALLOUT and selected a baud rate of 1200 and other pertinent characteristics (all described in Table 4-4). We had then finished with this CPI.

Next we added CPI1, with device code 34 (and 35). The base line number is 24. We specified that CPI lines 0 through 15 be connected through the PBX to standard CRTs.

Since the CRTs were standard, and the lines are dial–in lines, we could take defaults for all questions about this group of lines. Then we chose not to add more lines; and we were finished with the CPIs.

NOTE: If a terminal is uppercase only, be sure to specify lower– to uppercase conversion (UCO, from Table 4–6) for its line. If you don't, the terminal may not print any lowercase letters sent to it.

When the new system runs, the terminal console filenames on lines 0 through 15 will be @CON2 through @CON17; on lines 16 and 17 the names will be @CON18 and @CON19; and on lines 18 through 21, the letter–quality printer names will be @CON20 through @CON23. On the CPI, lines 0 through 15 will be @CON26 through @CON41.

Specifying DRT Controllers

A Dual asynchronous Receiver/Transmitter (DRT) is part of each DS/7500, MV/4000 DC, MV/4000 SC, DS/4000–series, MV/2000 DC, and MV/1400 computer, on the system board or multifunction I/O controller board (IOC). The DRT is on device code 34.

On DS/4000–series computers, a DRT has one asynchronous line that can support a local terminal or modem. On DS/7500 and MV/2000 DC computers, a DRT has four asynchronous lines; line 0 can support a modem, line 1 is attached to the system console, and lines 2 and 3 can support user consoles. On MV/1400 DC systems, a DRT has 10 lines; the first 4 are similar to those on an MV/2000 DC, and lines 2–9 can support terminals. On an MV/7500, you can use an inexpensive terminal as the system console and attach a more expensive pixel–mapped (graphics) terminal to line 2 or 3.

If you have an IAC or an MCP1, use it to handle console and/or modem lines; do *not* identify the DRT to VSGEN. If you don't have an IAC or MCP1, you can identify the DRT to VSGEN.

DRT Example

To add a DRT, add a device; then specify DRT and the lines. For example, Figure 4–3 shows how to add a DRT with modem support (line 0) and printer support (line 1).

```
Enter a command: A ↵

        Name of device to be added: DRT ↵
        Device code [34]: ↵
        Base line number [0]: ↵
        Asian language support? [NONE]: ↵

        Do you wish to add line groups to this device? [Y] ↵
There are no line groups defined for DRT.
These lines are undefined: 0–9
```

Figure 4–3 Sample DRT Dialog (continued)

```
You may: (C) CREATE a line group.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵

Please specify the following parameters:
         Free-form group name: MOD ↵
         Default terminal [CRT3]: ↵
         Terminal type [ASCII]: ↵
         Terminal description [DGC D200 compatible terminal]: ↵
         Input buffer length [128]: ↵
         Output buffer length [128]: ↵
         Lines per page [24]: ↵
         Characters per line [80]: ↵
         Break key function [BINARY]: ↵
         Data Bits [8]: ↵
         Stop bits [1]: ↵
         Parity [NONE]: ↵
         Baud rate [9600]: ↵
         These characteristics are selected: EOC, ST, ULC, WRP
         Enter choices (or NEWLINE when done): MOD, MRI ↵
         These characteristics are selected: EOC, MOD, MRI, ST, ULC, WRP
         Enter choices (or NEWLINE when done): ↵
         TTC timer value [40000]: ↵
         TTD timer value [5000]: ↵
         TDW timer value [1000]: ↵
         THC timer value [2000]: ↵
         TLT timer value [2000]: ↵
         Do you want to add lines to this group? [YES] ↵
         Specify lines to add to group {MOD}: 0 ↵
         Line 0 was added to group {MOD} producing 0.

This line group is defined for DRT: 0.
These lines are undefined: 1-9.

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device

         Enter choice: C ↵
```

Figure 4-3 Sample DRT Dialog (continued)

```
Please specify the following parameters:
        Free-form group name: PRNTR ↵
        Default terminal [CRT3]: ↵
        Terminal type [ASCII]: ↵
        Terminal description [DGC D200 compatible terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Baud rate [9600]: ↵
        These characteristics are selected: EOC, ST, ULC, WRP
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES] ↵
        Specify lines to add to group {PRNTR}: 1 ↵
        Line 1 was added to group {PRNTR} producing 1.
These line groups are defined for DRT: 0, 1.
These lines are undefined: 2-9.

You may: (C) CREATE or (K) KILL a line group.
        (L) LIST or (E) EDIT the characteristics of a line group.
        (A) ADD lines to, of (D) DELETE lines from a line group.
        (S) SHOW all line groups for this device.
        (M) MODIFY default terminal types.
        (Q) QUIT line group editing for this device

        Enter choice: Q ↵

Do you want to save your changes? [YES]: Y ↵
        Saved.

Enter a command:
```

Figure 4-3 Sample DRT Dialog (concluded)

In Figure 4-3, we specified a modem on DRT line 0. When the new system runs, the modem device name will be on CON2. The mnemonics used are described in Table 4-3 (characteristics) and Table 4-4 later on.

Specifying Intelligent Asynchronous Controllers (IACs)

There are several types of IACs (aside from CPIs, ITCs, LMCs, LTCs, MCP1s, and ITC/128 TermControllers, which you *specify* as IACs).

IAC Models 4622/4623 and 4624/4625 are newer designs that support RS−422 and RS−232−C signals. Model 4622 and 4623 are IAC−24s (they support 24 lines); Models 4624/4625 are IAC−8s (they support 8 lines). IAC models 4367 through 4370 are older designs that support 20 milliamp lines. Models 4368 and 4370 are IAC−16s (they support 16 lines); Model 4367 and 4369 are IAC−8s (they support 8 lines).

An IAC−24 or IAC−16 can support lines attached to terminals and printers, but not modems. IAC−24s and IAC−16s aren't designed to support modems; a modem connected to one of them may not work or may open security risks by allowing users to log on into other users' sessions. Do not connect a modem to an IAC−24 or IAC−16 line.

An IAC−8 (any model) can handle a total of 8 lines, which can be attached to terminals, printers, *and* modems. (IAC Model 5916G can handle up to 16 terminal, printer, and modem lines, but this is actually two IAC−8s, each with its own device code, on a single board. If you have a Model 5916G, specify it as two IAC−8s to VSGEN.)

To add any model of IAC, add a device, and then specify IAC:

Enter a command: A↵

Name of device to be added: IAC↵
Device code [65]:

The default device code for the first IAC is 65; for IAC1 it is 50; for IAC2 it is 51, and so on. Unless you know that this IAC is connected to a nonstandard device code, press NEW LINE to select the default:

Device code [65]:↵
Base line number [0]:

You can select any valid base line number for this IAC. The number must be 0 or a multiple of 2. The console filenames of this IAC's terminals will depend on the number, as described below. For the first IAC, you might choose the default:

Base line number [0]:↵

and go on to the next question.

For the second IAC and each subsequent IAC, the base line number must be at least as large as the result of the formula

base−line−of−preceding−IAC
+
total−number−of−lines−on−preceding−IAC
(8, 12, 16, 24, 32, 64, or 128)

For example, if the base line of the preceding IAC is 0 and it can support 24 lines, you could specify a base line of 24. Rules for specifying IAC lines are given earlier and illustrated in the IAC example in Figure 4–4.

IAC device type [??]:

If this is a 12–line IAC, type 12 and press NEW LINE; if it's a 24–line IAC, type 24 and press NEW LINE; if it's a 16–line IAC, type 16 and press NEW LINE. If it's an ITC, type 128; if it's an LTC, type 64.

If this is an IAC with 8 lines, type 8 and press NEW LINE. For an IAC–8, VSGEN asks about split baud rates. If there is a terminal with an attached slave printer on this line, or if you know you want split baud rate, answer Y. Generally, take the default, N, by pressing NEW LINE.

For a CPI/24 and for all IAC devices, VSGEN asks

VT100 terminal support? [Y]:

If you have a VT 100 or VT 200 terminal attached to the controller, or if you are adding an IAC–16, answer No by typing N. Otherwise, press NEW LINE to accept the default answer, Yes. See "About VT100 Terminal Support," earlier in this chapter.

Asian language support? [NONE]:

If this controller will support Asian–language keyboards, type IKIS and press the NEW LINE key. Otherwise, accept the default, NONE, by pressing the NEW LINE key. See "About Asian Language Support" earlier in this chapter.

If you are adding an IAC–64 (LTC) or an IAC–128 (ITC), VSGEN asks

TERMANAGER download? [YES] *x*

This question determines which transport protocol file will be loaded into the ITC/LTC at system startup. If you have a TermManager processor and want it to load the default protocol file (XNS protocol), answer Yes. If you have a TermManager and want to use a different protocol (like TCP/IP, to communicate with systems that run UNIX®), answer No. By answering No, you can specify a user–defined protocol (in a file named as shown below). If you do not have a TermManager, answer No. If you answer No to the TERMANAGER question, VSGEN asks

Transport protocol: *x* (*x* is the default, initially XNS)

The transport protocols are as follows.

For This Transport Protocol	Specify This to VSGEN	Pathname That System Will Load into ITC or LTC at Startup
XNS	XNS	:XNS_ITC_IMAGE.PR (for an ITC) or :XNS_LTC_IMAGE.PR (for an LTC)
TCPIP	TCPIP	:TCPIP_ITC_IMAGE.PR (for an ITC) or :TCPIP_LTC_IMAGE.PR (for an LTC)
xxx (user-defined protocol)	xxx	:xxx_ITC_IMAGE.PR (for an ITC) or :xxx_LTC_IMAGE.PR (for an LTC)

Specify the protocol you want. For example,

TCPIP↵

Then VSGEN asks

Do you wish to add line groups to this device? [Y]

Now you need to describe the line configuration on this IAC. You can do this individually by line, or by groups of lines. The line numbers you enter are specific to this IAC; they range from 0 through 191, 0 through 127, 0 through 63, 0 through 31, 0 through 23, 0 through 15, or 0 through 7, depending on the IAC controller type.

When the new system runs, each terminal on an IAC will have the console filename of

@CON(base-line-number + line-number-on-this-IAC + 2)

For example, assume that the first IAC is an IAC-24, for which you specified base line number 0 and lines 0-20. The terminal console filenames on these lines will be @CON2 through @CON22. The second IAC, IAC1, is an IAC-8. You give IAC1 the base line number of 24; then you describe line 1 of IAC1. The console on line 1 (second line) of IAC1 will be @CON(24+1+2), or @CON27.

IAC Example

The following example, Figure 4–4, shows you how to handle all common line configurations. It assumes that your first IAC is an IAC–24 and your second IAC (IAC1) is an IAC–8.

And it assumes that the lines are arranged as follows:

- IAC lines 0 – 2 are attached to CRTs.
- IAC line 3 is attached to a hardcopy terminal.
- IAC lines 4 – 16 are attached to local graphics CRTs.
- IAC line 17 is attached to a letter–quality printer.
- IAC lines 18 – 23 are not used.
- IAC1 lines 0 and 1 are attached to modems.

```
Enter a command: A ↵

        Name of device to be added: IAC ↵
        Device code [65]: ↵
        Base line number [0]: ↵
        IAC device type [??]: 24 ↵
        VT100 terminal support? [Y]: N ↵
        Asian language support? [NONE]: ↵

        Do you wish to add line groups to this device? [Y]: ↵

There are no line groups defined for IAC.
These lines are undefined: 0–23

You may: (C) CREATE a line group.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵

Please specify the following parameters:
         Free–form group name: CRT3.01 ↵
         Default terminal [CRT3]: ↵
         Terminal type [ASCII]: ↵
         Terminal description [DGC D200 compatible terminal]: ↵
         Input buffer length [128]: ↵
         Output buffer length [128]: ↵
```

Figure 4–4 Sample IAC Dialog, with an IAC–24 and an IAC–8 (continued)

```
        Lines per page [24]:
        Characters per line [80]:
        Break key function [BINARY]:
        Data Bits [8]:
        Stop bits [1]:
        Parity [NONE]:
        Clock rate [0]:
        These characteristics are selected:  EOC, ST, ULC, WRP
        Enter choices (or NEWLINE when done):
        Do you want to add lines to this group? [YES]: Y
        Specify lines to add to group {CRT3.01}: 0-2
        Lines 0-2 were added to group {CRT3.01} producing 0-2.

This line group is defined for IAC: 0-2.
These lines are undefined: 3-23.

You may:  (C) CREATE or (K) KILL a line group.
          (L) LIST or (E) EDIT the characteristics of a line group.
          (A) ADD lines to, of (D) DELETE lines from a line group.
          (S) SHOW all line groups for this device.
          (M) MODIFY default terminal types.
          (Q) QUIT line group editing for this device.

          Enter choice: C

Please specify the following parameters:
          Free-form group name: TTY.01
          Default terminal [CRT3]: TTY
          Terminal type [HARDCOPY]:
          Terminal description [TTY or hardcopy (printing) terminal]:
          Input buffer length [256]:
          Output buffer length [256]:
          Lines per page [30]:
          Characters per line [72]:
          Break key function [BINARY]:
          Data Bits [8]:
          Stop bits [1]:
          Parity [NONE]:
          Clock rate [0]:
          These characteristics are selected:  EOC, NAS, ST
          Enter choices (or NEWLINE when done):
          Do you want to add lines to this group? [YES]: Y
          Specify lines to add to group {TTY.01}: 3
          Line 3 was added to group {TTY.01} producing 3.

These line groups are defined for IAC: 0-2, 3
These lines are undefined: 4-23
```

Figure 4-4 Sample IAC Dialog, with an IAC-24 and an IAC-8 (continued)

```
You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵

Please specify the following parameters:
         Free-form group name: CRT6 ↵
         Default terminal [CRT3]: CRT6 ↵
         Terminal type [GRAPHICS]: ↵
         Terminal description [DGC D470 compatible graphics terminal]: ↵
         Input buffer length [128]: ↵
         Output buffer length [128]: ↵
         Lines per page [24]: ↵
         Characters per line [80]: ↵
         Break key function [BINARY]: ↵
         Data Bits [8]: ↵
         Stop bits [1]: ↵
         Parity [NONE]: ↵
         Baud rate [9600]: ↵
         These characteristics are selected: EOC, ST, ULC, WRP
         Enter choices (or NEWLINE when done): ↵
         Do you want to add lines to this group? [YES]: Y ↵
         Specify lines to add to group {CRT6}: 4-16 ↵
         Lines 4-16 were added to group {CRT6} producing 4-16.

These line groups are defined for IAC: 0-2, 3, 4-16.
These lines are undefined: 17-23

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵

Please specify the following parameters:
         Free-form group name: TTY.02
         Default terminal [CRT3]: TTY
```

Figure 4-4 Sample IAC Dialog, with an IAC-24 and an IAC-8 (continued)

```
Terminal type [HARDCOPY]: ↵
Terminal description [TTY or hardcopy (printing) terminal]: ↵
Input buffer length [256]: 32 ↵
Output buffer length [256]: ↵
Lines per page [30]: ↵
Characters per line [72]: ↵
Break key function [BINARY]: ↵
Data Bits [8]: ↵
Stop bits [1]: ↵
Parity [NONE]: ↵
Baud rate [600]: 1200 ↵
These characteristics are selected: EOC, NAS, ST
Enter choices (or NEWLINE when done): ↵
Do you want to add lines to this group? [YES]: Y ↵
Specify lines to add to group {TTY.02}: 17 ↵
Line 17 was added to group {TTY.02} producing 17.

These line groups are defined for IAC: 0-2, 3, 4-16, 17
These lines are undefined: 18-23

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device

         Enter choice: S ↵

These are defined groups:

         0-2 (CRT3)
         17 (TTY.02)
         3 (TTY.01)
         4-16 (CRT6)

These lines are undefined: 18-23.

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device

         Enter choice: Q ↵
```

Figure 4-4 Sample IAC Dialog, with an IAC-24 and an IAC-8 (continued)

```
Do you want to save your changes? [YES]: Y ↵
        Saved.

Enter a command: L ↵

        Name of device to be listed: IAC

Device Name:                    IAC
Description:                    Intelligent asynchronous controller
Device code:                    65
Iac type:                       24
Base line number:               0
VT100 terminal support:         N
Asian terminal support:         NONE

        Group: 0-2 (CRT3)
                Terminal: CRT3
                Terminal type: ASCII
                Terminal description: DGC D200 compatible terminal
                Input buffer length: 128
                Output buffer length: 128
                Lines per page: 24
                Characters per line: 80
                Break key function: BINARY
                Stop bits: 1
                Parity: NONE
                Baud rate: 9600
                Characteristics: EOC, ST, ULC, WRP

        Press NewLine to continue

        Group: 17 (TTY)
                Terminal: TTY
                Terminal type: HARDCOPY
                Terminal description: TTY or hardcopy (printing) terminal
                Input buffer length: 32
                Output buffer length: 256
                Lines per page: 30
                Characters per line: 72
                Break key function: BINARY
                Date bits: 8
                Stop bits: 1
                Parity: NONE
                Baud rate: 1200
                Characteristics: EOC, NAS, ST

        Press NewLine to continue
```

Figure 4–4 Sample IAC Dialog, with an IAC–24 and an IAC–8 (continued)

```
        Group: 3 (TTY)
                Terminal: TTY
                Terminal type: HARDCOPY
                Terminal description: TTY or hardcopy (printing) terminal
                Input buffer length: 256
                Output buffer length: 256
                Lines per page: 30
                Characters per line: 72
                Break key function: BINARY
                Date bits: 8
                Stop bits: 1
                Parity: NONE
                Baud rate: 600
                Characteristics: EOC, NAS, ST

        Press NewLine to continue

        Group: 4-12 (CRT6)
                Terminal: CRT6
                Terminal type: GRAPHICS
                Terminal description: DGC D470 compatible graphics terminal
                Input buffer length: 128
                Output buffer length: 128
                Lines per page: 24
                Characters per line: 80
                Break key function: BINARY
                Date bits: 8
                Stop bits: 1
                Parity: NONE
                Baud rate: 9600
                Characteristics: EOC, ST, ULC, WRP

        Press NewLine to continue

Enter a command: A ↵

        Name of device to be added: IAC1 ↵
        Device code [50]: ↵
        Base line number [0]: 24 ↵
        IAC device type [??]: 8 ↵
        IAC split baud rate [NONE]: ↵
        VT100 terminal support? [Y]: N ↵
        Asian language support? [NONE]: ↵

        Do you wish to add line groups to this device? {Y}: Y ↵
```

Figure 4–4 Sample IAC Dialog, with an IAC–24 and an IAC–8 (continued)

```
There are no line groups defined for IAC1.
These lines are undefined: 0-7.

You may: (C) CREATE a line group.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵

Please specify the following parameters:
         Free-form group name: CRT3 ↵
         Default terminal [CRT3]: ↵
         Terminal type [ASCII]: ↵
         Terminal description [DGC D200 compatible terminal]: ↵
         Input buffer length [128]: ↵
         Output buffer length [128]: ↵
         Lines per page [24]: ↵
         Characters per line [80]: ↵
         Break key function [BINARY]: ↵
         Data Bits [8]: ↵
         Stop bits [1]: ↵
         Parity [NONE]: ↵
         Baud rate [9600]: 1200 ↵
         These characteristics are selected: EOC, ST, ULC, WRP
         Enter choices (or NEWLINE when done): MOD, MRI, SFF, RAF, RAC, NAS,
           EOL, RAT, UCO, FF, EOS, FKT, ESC, PBN, TSP, TO, NRM, PM ↵
         PBN ignored.
         TSP ignored.
         These characteristics are selected: EOC, EOS, EOL, ESC, FF, FKT, MOD, MRI
           NAS, NRM, PM, RAC, RAF, RAT, SFF, ST, TO, UCO, ULC, WRP
         Enter choices (or NEWLINE when done): ↵
         TCC timer value [40000]: ↵
         TCD timer value [5000]: ↵
         TDW timer value [1000]: ↵
         THC timer value [2000]: ↵
         TLT timer value [2000]: ↵
         Do you want to add lines to this group? [YES]: Y ↵
         Specify lines to add to group {CRT3}: 0-1 ↵
         Lines 0-1 were added to group {CRT3} producing 0-1.
This line group is defined for IAC1: 0-1
These lines are undefined: 2-7

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.
```

Figure 4-4 Sample IAC Dialog, with an IAC-24 and an IAC-8 (continued)

```
        Enter choice: Q ↵

Do you want to save your changes? [YES]: Y ↵
        Saved.

Enter a command: L ↵

        Name of device to be listed: IAC1

Device Name:                    IAC1
Description:                    Intelligent asynchronous controller
Device code:                    50
Iac type:                       8
Base line number:               24
Split Baud rate:                NONE
VT100 terminal support:         N
Asian terminal support:         NONE

        Group: 0-2 (CRT3)
                Terminal: CRT3
                Terminal type: ASCII
                Terminal description: DGC D200 compatible terminal
                Input buffer length: 128
                Output buffer length: 128
                Lines per page: 24
                Characters per line: 80
                Break key function: BINARY
        Data Bits [8]:
                Stop bits: 1
                Parity: NONE
                Baud rate: 1200
                Characteristics: EOC, EOS, EOL, ESC, FF, FKT, MOD, MRI, NAS, NRM,
                  PBM, PM, RAC, RAF, RAT, SFF, ST, TO, TSP, UCO, ULC, WRP
                TCC timer value [40000]:
                TCD timer value [5000]:
                TDW timer value [1000]:
                THC timer value [2000]:
                TLT timer value [2000]:

        Press NewLine to continue

Enter a command:
```

Figure 4–4 Sample IAC Dialog, with an IAC–24 and an IAC–8 (concluded)

In Figure 4–4, for IAC, we took the defaults for the device code and base line number; and we described it as a 24–line IAC. Then we described the CRTs connected to lines 0 through 2, the hardcopy terminal on line 3, the graphics terminals on lines 4 through 16, and the letter–quality printer on line 17. We entered the Show command to display all the line groups for IAC. We entered the List command to display information on IAC, including information on each of its line groups. If the IAC line configurations we listed were incorrect, we could enter the E command and correct the IAC line–configurations. We had then finished with this IAC.

Next we added IAC1, with default device code and base line number of 24, and described it as an 8-line IAC. We set a baud rate of 1200. We specified the characteristics MOD and MRI for the modems, followed by other desired characteristics. All these characteristics mnemonics are described in Table 4-6, later in the chapter.

When you specify one nondefault characteristic, you must specify *all* the ones you want.

NOTE: If a terminal is uppercase only, be sure to specify a lowercase-to-uppercase conversion characteristic (UCO, from Table 4-6) for its line. If you don't, the terminal may not display lowercase letters sent to it.

We chose not to add more lines. We then listed the system device IAC1 to verify that we entered the correct line configurations. Since the IAC line-configurations are correct as listed, we were finished working with the IACs.

When the new system runs, the terminal console filenames on lines 0 through 2 will be @CON2 through @CON4; on line 3, the filename will be @CON5; on lines 4 through 16, the filenames will be @CON6 through @CON18; on line 17, the letter-quality printer will be @CON19; and on IAC1 lines 0 and 1, they will be @CON26 and @CON27.

The line-specifying procedure is much simpler without modem lines; we'd have simply taken defaults for all the characteristics and initialization words on IAC1.

Specifying ITC/128s and LTC/64s (Intelligent TermControllers)

An ITC/128, Intelligent TermController, Model 4586, is a 128-line controller that works with a LAN and devices called TermServers and TermManagers to provide a pool of console lines. The hardware multiplexes line signals over the LAN, allowing one LAN cable to connect an MV/Family system with hundreds of terminals.

Figure 4-5 illustrates this configuration.

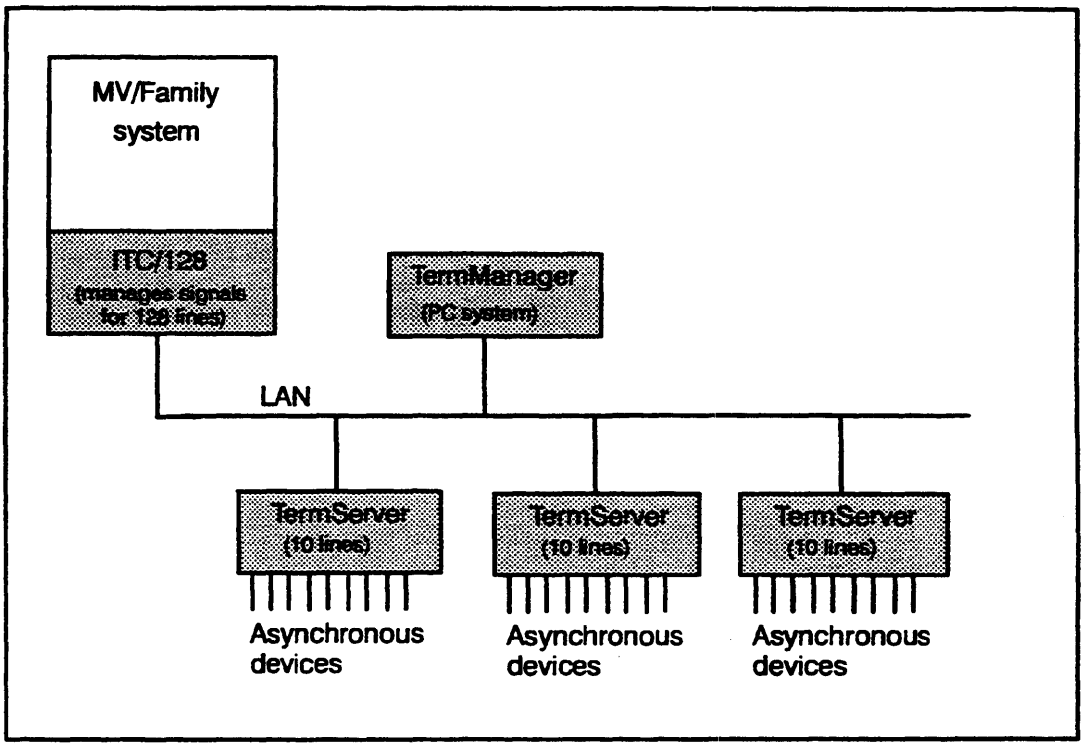

Figure 4-5 An ITC/128 TermController in a TermServer Network

An LTC/64 works the same way, but supports 64 lines and is available on MV/2500 systems.

As you can see, the TermServer is just one part of a Data General product. Configuring the TermServer and other parts of the LAN network is described in *Managing Your TermServer Network*.

To VSGEN you specify an ITC/128 as an IAC, type 128; or an ITC/64 as an IAC type 64. When you specify a TermController to VSGEN, you should take the defaults on all lines that will connect to terminals, and specify type TTY for lines that will connect to printers. By default, lines on an ITC/128 have the port contention characteristic (CTD) set; this characteristic is required for terminal use but will prevent printers from working properly.

For lines that will be connected to printer ports, specify the default terminal as TTY.
- Specify characteristic BBM and take the default characteristics.

If you don't take defaults on ITC/128 or LTC/64 TermController lines, be aware that—regardless of the way you set them—the ITC/128 or LTC/64 ignores the following settings:

Hardware output flow control (VSGEN mnemonic HRDFLC)
Baud rate
Number of stop bits
Parity check type
Input buffer byte length
Output buffer byte length

Terminal console filenames on an ITC/128 TermController are handled the same way as IAC names: the device name is @CON followed by the line number plus 2. For example, the device on line 0 is @CON2; the device on line 1 is @CON3; the device on line 31 is @CON33; and the device on line 127 is @CON129. For a TermServer network, the line–console assignments (line 0 to @CON2, for example) are fixed only at system startup. When a user logs on through a TermServer, he or she may be assigned the next available line (in other words, using the same terminal, a user might log on to console filename @CON102 in the morning and console filename @CON95 in the afternoon).

For a printer attached to an ITC/128 line to operate properly, you'll need to do the following. At VSGEN, specify the printer line as a TTY, with characteristic BBM as described above. In the system UP macro, you must insert CONTROL @EXEC commands to start the printer on this line. Insert these EXEC commands before the EXEC ENABLE/ALL command. And, via TermServer software, you'll need to establish a permanent virtual circuit (PVC) between the line and the TermServer port connected to the printer.

ITC/128 TermController Example

Figure 4–6 shows how you'd add an ITC/128 TermController (IAC–128), configured several different ways, as follows:

- Lines 0 through 20 will be attached to terminals.
- Lines 21 and 22 will be attached to printers.
- Lines 23 through 127 will be attached to terminals.

```
Enter a command: A ↵

        Name of device to be added: IAC ↵
        Device code [65]: ↵
        Base line number [0]: ↵
        IAC device type [??]: 128 ↵
        VT100 terminal support? [Y] ↵
        Asian language support? [NONE]: ↵
        TERMANAGER download? [YES]: ↵

        Do you wish to add line groups to this device? [Y]: Y ↵
```

Figure 4–6 Sample ITC/128 (Intelligent TermController) Dialog (continued)

```
There are no line groups defined for IAC.
These lines are undefined: 0-127

You may: (C) CREATE a line group.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵

Please specify the following parameters:
         Free-form group name: CRT3.01 ↵
         Default terminal [CRT3]: ↵
         Terminal type [ASCII]: ↵
         Terminal description [DGC D200 compatible terminal]: ↵
         Input buffer length [128]: ↵
         Output buffer length [128]: ↵
         Lines per page [24]: ↵
         Characters per line [80]: ↵
         Break key function [BINARY]: ↵
         Data Bits [8]: ↵
         Stop bits [1]: ↵
         Parity [NONE]: ↵
         Baud rate [9600]: ↵
         These characteristics are selected: 8B, EOC, ST, ULC, WRP, XLT
         Enter choices (or NEWLINE when done): ↵
         Do you want to add lines to this group? [YES]: Y ↵
         Specify lines to add to group {CRT3.01}: 0-20 ↵
         Lines 0-20 were added to group {CRT3.01} producing 0-20.

This line group is defined for IAC: 0-20.
These lines are undefined: 21-127.

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵
```

Figure 4-6 Sample ITC/128 (Intelligent TermController) Dialog (continued)

```
Please specify the following parameters:
        Free-form group name: TTY ↵
        Default terminal [CRT3]: TTY ↵
        Terminal type [HARDCOPY]: ↵
        Terminal description [TTY or hardcopy (printing) terminal]: ↵
        Input buffer length [[256]: ↵
        Output buffer length [256]: ↵
        Lines per page [30]: ↵
        Characters per line [72]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Baud rate [600]: ↵
        These characteristics are selected: 8B, EOC, NAS, ST, XLT
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES]: Y ↵
        Specify lines to add to group {TTY}: 21, 22 ↵
        Lines 21-22 were added to group {TTY} producing 21-22.

These line groups are defined for IAC: 0-20, 21-22
These lines are undefined: 23-127

Please specify the following parameters:
        Free-form group name: CRT3.02 ↵
        Default terminal [CRT3]: ↵
        Terminal type [ASCII]: ↵
        Terminal description [DGC D200 compatible terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Baud rate [9600]: ↵
        These characteristics are selected: 8B, EOC, ST, ULC, WRP, XLT
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES]: Y ↵
        Specify lines to add to group {CRT3.01}: 23-127 ↵
        Lines 23-127 were added to group {CRT3.01} producing 23-127.
```

Figure 4–6 Sample ITC/128 (Intelligent TermController) Dialog (continued)

```
These line groups are defined for IAC: 0-20, 21-22, 23-127.
There are no undefined lines.

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: Q )

Do you want to save your changes? [YES]: Y )
         Saved.

Enter a command:
```

Figure 4–6 Sample ITC/128 (Intelligent TermController) Dialog (concluded)

In Figure 4–6, we identified the ITC/128 as an IAC, took the default for the device code, and described it as a 128–line IAC. We then took the TERMANAGER download default (XNS). We then described a group of lines (0 through 20), as standard. Lines 21 and 22 will be connected to printers; we had to identify these as a group, type TTY. Lines 23 through 127 made up the last group. These will be connected to terminals; hence we took default values for them. We had then finished with the VSGEN for the ITC/128. (User profiles and other software will need attention as outlined above.)

Specifying Local–Bus Asynchronous Controllers (LACs)

LACs are available on MV/1000 DC, MV/1400 DC, MV/2000 DC, MV/2500 DC, MV/3000 DC series, and MV/5000 DC series deskside ECLIPSE systems only.

These computers are shipped with AOS/VS Model 31133 *preinstalled.* In a preinstalled system, with the exception of a LAC–12, LACs are generated as type UAC (Unspecified Asynchronous Controller) devices. The UAC device defines all lines as standard. Any nonstandard characteristics (like those needed for modems or printers) are applied via SMI menu options, explained in the manual *Using the AOS/VS System Management Interface (SMI).*

Specifying Local–Bus Modem Controllers (LMCs)

A local–bus modem controller (LMC), supports 8 modem or nonmodem lines, on deskside ECLIPSE MV/1400 DC, MV/2000 DC, MV/2500 DC, and MV/5000 DC series systems. Another version, LMC–8 II, is available on deskside ECLIPSE MV/1000 DC and MV/3000 DC series systems.

These computers are shipped with AOS/VS Model 31133 *preinstalled.* In a preinstalled system, LACs are generated as UACs. You do not need to run VSGEN to change any characteristics. Instead, use an SMI menu option, explained in the manual *Using the AOS/VS System Management Interface (SMI).*

Specifying Multicommunication Processor Asynchronous Controllers (MCP1s)

A Multicommunications Processor (MCP1) has the following features:

- It supports eight asynchronous lines, like an IAC–8, but only the first two lines can be connected to modems. Split baud rate is not available. You specify the asynchronous controller and its lines to VSGEN as if they were an IAC–8. The default device codes are the same as for IACs (first 65, second 50, and so on).

  Terminal console filenames on an MCP1 are numbered the same way as on the first IAC—the device on line 0 is has the filename @CON2; the device on line 1 has the filename @CON3, and so on.

- An MCP1 also supports two synchronous lines. If you want to use these, you must identify them to BSCGEN (later in the chapter) as an ISC–2.

- An MCP1 supports an LPB data channel line printer. If a line printer is connected to the MCP1 printer controller, you must specify it as an LPB on device code 57.

MCP1 Example

The following example, Figure 4–7, tries to show you how to handle all common line configurations. It assumes that the lines are connected as follows:

- Lines 0 and 1 are attached to modems.
- Lines 2 through 4 are attached to nongraphics CRTs.
- Lines 5 and 6 are attached to graphics CRTs.
- Line 7 is not used.

```
Enter a command: A ↵

        Name of device to be added: IAC ↵      (Specify MCP1 asynchronous lines
        Device code [65]: ↵                    as IAC lines)
        Base line number [0]: ↵
        IAC device type [??]: 8 ↵
        IAC split baud rate [NONE]: ↵
        VT100 terminal support? [Y]: ↵
        Asian language support? [NONE]: ↵

        Do you wish to add line groups to this device? [Y]: Y ↵
There are no line groups defined for IAC.
These lines are undefined: 0–7.

You may: (C) CREATE a line group.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵
```

Figure 4–7 Sample Multicommunications Communications Processor (MCP1) Dialog (continued)

```
Please specify the following parameters:
        Free-form group name: CRT3.01 ↵
        Default terminal [CRT3.01]: ↵
        Terminal type [ASCII]: ↵
        Terminal description [DGC D200 compatible terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Baud rate [9600]: 1200 ↵
        These characteristics are selected: 8B, EOC, ST, ULC, WRP, XLT
        Enter choices (or NEWLINE when done): MOD, MRI, SFF, RAF, RAC, NAS,
          EOL, RAT, UCO, FF, EOS, FKT, ESC, PBN, TSP, TO, NRM, PM ↵
        PBN ignored.
        TSP ignored.
        These characteristics are selected: 8B, EOC, EOS, EOL, ESC, FF, FKT, MOD, MRI,
          NAS, NRM, PM, RAC, RAF, RAT, SFF, ST, TO, UCO, ULC, WRP, XLT
        Enter choices (or NEWLINE when done): ↵
        TCC timer value [40000]: ↵
        TCD timer value [5000]: ↵
        TDW timer value [1000]: ↵
        THC timer value [2000]: ↵
        TLT timer value [2000]: ↵
        Do you want to add lines to this group? [YES]: Y ↵
        Specify lines to add to group {CRT3.01}: 0 1 ↵
        Lines 0-1 were added to group {CRT3.01} producing 0-1.

This line group is defined for IAC: 0-1
These lines are undefined: 2-7

You may: (C) CREATE or (K) KILL a line group.
        (L) LIST or (E) EDIT the characteristics of a line group.
        (A) ADD lines to, of (D) DELETE lines from a line group.
        (S) SHOW all line groups for this device.
        (M) MODIFY default terminal types.
        (Q) QUIT line group editing for this device.

        Enter choice: C ↵
```

Figure 4-7 Sample Multicommunications Communications Processor (MCP1) Dialog (continued)

```
Please specify the following parameters:
        Free-form group name: CRT3.02 ↵
        Default terminal [CRT3.02]: ↵
        Terminal type [ASCII]: ↵
        Terminal description [DGC D200 compatible terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Baud rate [9600]: ↵
        These characteristics are selected: 8B, EOC, ST, ULC, WRP, XLT
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES]: Y ↵
        Specify lines to add to group {CRT3.02}: 2-4 ↵
        Lines 2-4 were added to group {CRT3.02} producing 0-1, 2-4.

Theses line groups are defined for IAC: 0-1, 2-4.
These lines are undefined: 5-7.
You may: (C) CREATE or (K) KILL a line group.
        (L) LIST or (E) EDIT the characteristics of a line group.
        (A) ADD lines to, of (D) DELETE lines from a line group.
        (S) SHOW all line groups for this device.
        (M) MODIFY default terminal types.
        (Q) QUIT line group editing for this device.

        Enter choice: C ↵

Please specify the following parameters:
        Free-form group name: CRT6 ↵
        Default terminal [CRT3]: CRT6 ↵
        Terminal type [GRAPHICS]: ↵
        Terminal description [DGC D470 compatible graphics terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Clock rate [0]: ↵
        These characteristics are selected: 8B, EOC, ST, ULC, WRP, XLT
        Enter choices (or NEWLINE when done): ↵
```

Figure 4-7 Sample Multicommunications Communications Processor (MCP1) Dialog (continued)

```
Do you want to add lines to this group? [YES]: Y ↵
Specify lines to add to group {CRT6}: 5-6 ↵
Lines 5-6 were added to group {CRT6} producing 5-6.

These line groups are defined for IAC: 0-1, 2-4, 5-6.
These lines are undefined: 7

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: Q ↵

Do you want to save your changes? [YES]: Y ↵
         Saved.

Enter a command: A ↵

         Name of device to be added: LPB ↵
         Device code [17]: 57 ↵

Enter a command:
```

Figure 4–7 Sample Multicommunications Communications Processor (MCP1) Dialog (concluded)

In Figure 4–7, we identified the MCP1 as an IAC, took the default for the device code, and described it as an 8–line IAC. We identified the modem lines, 0 and 1. Then we specified MOD and MRI for the modems, followed by other desired characteristics. All these mnemonics are described in Table 4–6, later on. When you specify one nondefault characteristic, you must specify *all* the ones you want.

We set a baud rate of 1200 for the modem lines. This ended the description of the modem lines. For lines 2 through 4, connected to standard terminals, we took all the defaults. For lines 5 and 6, we specified CRT6, and then took defaults on all other questions. We had then finished with the MCP1. Finally, because an MCP1 also supports a line printer controller, we add device LPB on device code 57.

Console Line Characteristics

The line characteristics that you specify to VSGEN are not cast in bronze. You can always edit them by running VSGEN again or by changing a terminal's characteristics from PID 2 on the system console.

The VSGEN line group editing features available with AOS/VS Revision 7.70 let you easily add or edit either device parameters or console (terminal) line groups connected to the device. Prior to AOS/VS Revision 7.70, procedures for editing console line groups were more complicated. You could add console line groups, but could edit only a few device types. To make changes in console line groups, you usually had to delete, and then recreate the device and respecify all the line groups and their attributes. Beginning with AOS/VS Revision 7.70, VSGEN line group editing procedures let you correct mistakes in a specific set of line groups without having to edit or delete the entire device. The section "If You Make a Mistake in a VSGEN Routine" in this chapter describes these line group editing procedures.

You can also change any terminal's characteristics from PID 2 on the system console. To do this, use the CHARACTERISTICS command and /DEFAULT switch before the terminal is enabled (perhaps in the UP.CLI macro). For example, the command

```
) CHARACTERISTICS/DEFAULT/ON/PM @CON3↵
```

sets page mode on the terminal whose console filename is CON3. Another way is to have user log-on macros (Chapter 5) set characteristics as users log on (this works only if the characteristics *allow* a user to log on). Or users can set characteristics on their own terminals.

All characteristics you can specify during VSGEN, and their equivalents assignable via the CHARACTERISTICS command, are included in Tables 4-6 and 4-7, later on.

About 8-Bit Character Handling

Data General DASHER D211, D220, D410, and D460 terminals can send and display 8-bit characters. The main advantage of 8-bit character handling is the ability to read and display characters with values above 177 octal—which includes many characters in the international character sets (like the U.K. currency symbol) and other special characters. In 7-bit mode, the high bit is ignored, which means the terminal can't see codes above 177 octal.

One disadvantage of 8-bit character handling is that CLI macros that use the !ASCII pseudomacro may display garbled messages. People often add 200 (octal) to the ASCII value of a character to conceal it from the CLI. For example, to display a comma in a CLI macro, you must use the string [!ASCII 254]. (An [!ASCII 54] would produce a comma, which the CLI would display as a space.) But if 8-bit character handling is enabled on a terminal and someone runs a macro with [!ASCII 254], the system will see the value of code 254, which is *not* a comma. Note that also, on a terminal with a non-U.S. keyboard, some keys send different codes in 7-bit mode from 8-bit mode. For example, on a French keyboard, the C Cedilla key will produce C with a cedilla in 7-bit mode, but will produce ^\ (ASCII 34) in 8-bit mode.

If you want 8–bit character handling, set the 8BT characteristic, or type the CHARACTERISTICS/ON/8BT command. To restore 7–bit handling (on U.S. keyboards), type the CHARACTERISTICS/OFF/8BT command.

The character *mode* is controlled by small dual in–line package (DIP) switches on the back of the terminal (HOST group), as follows.

- For 8–bit mode, which you can enable or disable via software, set the bit mode DIP switch to 8–bit mode; and then set the parity DIP switches to no parity (parity none). For U.S. terminals, 7–bit handling works normally—when set via software—with the DIP switches in these positions.
- For 7–bit mode, which cannot provide 8–bit characters but *does* allow certain non–U.S. characters to display as desired, set the bit mode DIP switch to 7–bit mode and set the parity DIP switches to mark parity.

The master CLI (PID 2) can change the default characteristics (but not the mode) of a terminal, with the /DEFAULT switch and console filename, *before* the terminal is enabled by EXEC. For example, entering the command CHARACTERISTICS/DEFAULT/ON/8BT @CON22 sets characteristics on at the terminal whose console filename is @CON22. If need be, you can put such commands in the system UP macro.

To *print* 8–bit characters on an 8–bit printer, users can use the QPRINT command with the /8BIT switch.

About Output Flow Control

Some programs (notably CEO, and also programs your site may choose to write) use binary mode to handle data on most terminals—including DASHER D210, D211, D220, D400, D410, D450, D460, and G300. If a program that uses binary mode will write to any of these terminals, then output flow control must be selected on the line. You can do this during VSGEN by specifying the mnemonic OFC (software output flow control) in characteristic word 3 (add other mnemonics desired). Or you can do it via the CHARACTERISTICS command switches /ON/OFC in the UP macro or via a user log–on macro (Chapter 5).

Some asynchronous controllers (EIA–RS–232 standard) support output flow control through hardware, not software. Most Data General controllers either always support hardware flow control or never support it. But some controllers *allow* you to choose hardware flow control for certain lines, and modems and some printers *require* that you select it. For example, MCP1 lines 0 and 1, LAC (IAC–12) lines 10 and 11, and DRT line 0 (on MV/2000 DC and DS/7500 computers) allow selecting hardware flow control. If you use an EIA–RS–232 cable and terminal on these lines, we recommend selecting hardware flow control. Note, however, that if you use an EIA–RS–422 cable, you must *not* select hardware flow control (or you must turn it off). You can select hardware flow control during VSGEN by selecting the mnemonic HRDFLC in the line initialization word. Or you can use the CLI CHARACTERISTICS command switches /ON/HOFC or /OFF/HOFC to turn hardware flow control on or off, respectively, in the UP macro or via a user log–on macro (Chapter 5).

About Break Sequence Handling on User Terminals

On the system console, a break sequence gives control to the SCP CLI. On *user terminals*, you can define a break sequence to do *one* of the following things:

- Break binary mode (used by certain programs when they write to the terminal) and restore normal CTRL character handling. In binary mode, the terminal ignores CTRL sequences like CTRL–C CTRL–A. The VSGEN mnemonic to break binary mode is BBM the CHARACTERISTICS switch for it is /BREAK=BMOB Break binary mode is the default effect of a break sequence.
- Terminate the user process on the terminal, log the user off, and cause a modem disconnect. You might use this break definition if you want users to be able to log off quickly and simply, regardless of the process running on their terminals. The VSGEN mnemonic for this is BDS; the CHARACTERISTICS switch for it is /BREAK=DCOB.
- Generate a CTRL–C CTRL–A or CTRL–C CTRL–B sequence. You might use this if you want users to be able to use the break sequence to produce the pertinent kind of interrupt. For CTRL–C CTRL–A, the VSGEN mnemonic is BCA; the CHARACTERISTICS switch is /BREAK=CAOB. For CTRL–C CTRL–B (which aborts the issuing process), the VSGEN mnemonic is BCB and the CHARACTERISTICS switch is /BREAK=CBOB.
- Create a CTRL–C CTRL–F sequence. This sequence has no meaning to AOS/VS, but your site can use it in application programs to redirect control or do anything you like. The program must issue a ?KWAIT system call (or higher level language equivalent) to receive notice that CTRL–C CTRL–F was entered. The VSGEN mnemonic is CFOB; the CHARACTERISTICS switch is /BREAK=CFOB.

Modem Lines

You can specify characteristics for modem lines either at VSGEN or at runtime in the UP macro from PID 2, using CHARACTERISTICS/DEFAULT commands. Generally, for a modem line, you must specify the Monitor Ring Indicator characteristic (in VSGEN, this is MRI and Modem (in VSGEN, this is MOD). Monitor Ring Indicator generally does no harm on any modem line (except for ITC/128s); it is required on CCITT–standard modems used in Europe. Remember, when you specify any nondefault characteristic to VSGEN, specify *all* the characteristics you want, as shown in the examples.

The modem characteristic, MOD, includes two main functions:

1. It tells EXEC to use modem access control on the line, which means that any user must have the *Modem* privilege to log on that line. You can obtain this functionality with characteristic ACC (CHARACTERISTICS /ACC switch).
2. It tells EXEC that this is a contended line—during logon, EXEC will disconnect the terminal if too much time passes during the logon procedure or when the user logs off. You can obtain this functionality with characteristic CTD (CHARACTERISTICS /CTD switch).

These guidelines for MRI and MOD apply to standard modems—popular models that Data General supports without special treatment. For nonstandard modems, you may need to set other, special, characteristics. They are described in the "Modems" appendix to *Managing AOS/VS and AOS/VS II.*

Line Characteristics Table

In Table 4–6, the column headed "CHARACTERISTICS command switch" shows the CHARACTERISTICS command switch that produces the same effect as the bit mnemonic in the "Bit Mnemonic" column.

For example, for CON3, typing

```
CHARACTERISTICS/DEFAULT/ON/PM @CON3↵
```

from the master CLI will produce the same effect as if, while generating a system, you had specified IAC line 1, word 1 as

- PM (followed by the other desired characteristics).

Table 4–6 AOS/VS Line Characteristics

Mnemonic	Default Value	CHARACTERISTICS Command Switch	Description
CSBEN	OFF	N/A	Enables split baud rate (IAC–8 and L/RMSC only). This will work only if split baud rate was enabled for the terminal controller. If you specify CSBEN, the secondary baud rate enabled will be the one specified when the terminal controller was identified to VSGEN.
8BT	OFF	/8BT	Uses 8 data bits to represent each character. Choose this for VT100 or VT220 terminals to use the international VT100 character set. For these terminals you must also use XLT. More details appear earlier.
16B	OFF	/16B	Allows processing of Asian (16–bit) characters. You must also have specified Asian language support for the terminal controller. Setting this characteristic (via VSGEN or the CHARACTERISTICS command) also enables recognition of the KG0, KHW, and NLX characteristics settings.
AUTO–BAUD	OFF	/AUTOBAUD	Automatic baud rate. Tells the system automatically to determine the baud rate of the line when a user logs on. AOS/VS can detect the following baud rates: 45 50 75 110 134 150 300 600 1200 1800 2000 2400 4800 7200 9600 19200 38400 For automatic baud selection to work, the user terminal must be set to either 7 data bits, mark parity, or 8 data bits, no parity. The user must press NEW LINE or CR three or more times (as compared to once if automatic baud selection is not in force) to start log–on.
ACC	OFF	/ACC	Line requires modem access control. EXEC checks for Modem privilege before allowing logon. Details appear in "Modem Lines," earlier.
CALLOUT	OFF	/CALLOUT	PBX call–out line, for CPI/24 lines only. Specifies that the line is for calling out; calls will be initiated by the computer, not a user. Generally used for lines connected to printers.

(continued)

Table 4–6 AOS/VS Line Characteristics

Mnemonic	Default Value	CHARACTERISTICS Command Switch	Description
CTD	OFF (ON for ITC/128)	/CTD	Contended line. EXEC will disconnect if someone doesn't log on within a specified period.
EOC, EOS	ON OFF	/EB0 /OFF/EB1	Echoes control characters (EOC) and escape characters (EOS). If you set EOC and not EOS (the default), all characters will echo as typed, except CTRL will echo as ^ and ESC as $. If you specify both MEOC and EOS, CTRL and ESC won't echo.
EOL	OFF	/EOL	Enforces end of line. Truncates any line longer than the maximum specified in *Characters per line* in the terminal definition. The alternative is WRP.
ESC	OFF	/ESC	ESC character has same interrupt effect as CTRL–C CTRL–A.
FF	OFF	/FF	Form feed. Sends a form feed character to terminal when it is opened for I/O.
FKT	OFF	/FKT	Function keys terminate text input.
HDPX	OFF	/HDPX	Modem half–duplex support. If set, tells system to provide half–duplex support on a modem–controlled line. Also, the line must support RS–232 modem control signals and you must set SMCD (/SMCD). By default, the system provides full–duplex support.
HIFC	OFF	/HIFC	Hardware input flow control. If set, enables hardware input flow control by telling the system to use the RTS (Request to Send) signal to stop input from the device on the line. Specify /HIFC if the device supports RTS/CTS flow control. (CTS means Clear to Send.) If you set /HIFC you cannot also set /HDPX or /MOD. If off, disables hardware input flow control.
HOFC	OFF	/HOFC	Enables hardware flow control (on certain LAC and CP1 lines only). Stops data transmission from the host when the CTS (clear to send) signal is low. Use for modems and some printers. Choose for RS–232–C protocol; omit for RS–422 protocol.

(continued)

Table 4–6 AOS/VS Line Characteristics

Mnemonic	Default Value	CHARACTERISTICS Command Switch	Description
G1G0	OFF	/G1G0 (CLI32 only)	Enables the G1G0 character set (for Taiwanese characters). For the G1G0 character set to work, you must have specified Asian language support for the terminal controller, the 16–bit characteristic (16B or CHARACTERISTICS/16B) must be on, and the 8–bit characteristic (8B or CHARACTERISTICS/8BT) must be on. If off, this disables the G1G0 character set.
DKHW	ON	/DKHW (CLI32 only)	If on, disables half–wide character support. Use this for Chinese, Korean, and Taiwanese character sets. If off, this enables half–wide character support. For the system to support any Asian language, you must have specified Asian language support for the terminal controller, the 16–bit characteristic (16B or CHARACTERISTICS/16B) must be on, and the 8–bit characteristic (8B or CHARACTERISTICS/8BT) must be on.
MKVT	OFF	/KVT (CLI32 only)	In conjunction with MXLT, provides VT100 terminal support with Kanji VT100 terminals.
IFC	OFF	/IFC	Input flow control (X–ON, X–OFF). CTRL–S from host computer tells terminal to stop sending data until the host issues CTRL–Q. Can prevent loss of characters during binary I/O when host computer input buffer is full.
MDUA	OFF	/MDUA	Modem direct user access. If set, allows user programs to directly access a modem in this line group. A program can issue write calls to send data over the line before a connection is established on the line. MDUA allows programs like DG/BLAST to send commands to a modem. MDUA has no effect unless MOD is also set.
MOD	OFF	/MOD	Modem. Line is attached to a modem. Use this for modem lines only. Details are in "Modem Lines," earlier.

(continued)

Table 4–6 AOS/VS Line Characteristics

Mnemonic	Default Value	CHARACTERISTICS Command Switch	Description
MRI	OFF	/MRI	Monitor ring indicator (modem lines). Details are in "Modem Lines," earlier.
NAS	OFF(CRT) ON (TTY or TELNET controller)	/NAS	Non–ANSI–standard terminal. Such terminals have a small LF key and large RETURN key. (ANSI–standard terminals have a large NEW LINE and small CR key.)
NLX	OFF	/NLX (CLI32 only)	Natural language translation for Asian languages; applies primarily to PC connections where the PC provides natural language translation. If on, disables natural language translation. If off, enables natural language translation. For the system to support any Asian language, you must have specified Asian language support for the terminal controller, the 16–bit characteristic (16B or CHARACTERISTICS/16B) must be on, and the 8–bit characteristic (8B or CHARACTERISTICS/8BT) must be on.
NRM	OFF	/NRM	Does not receive messages. Prevents terminal from receiving SEND messages. (Messages from PID 2 override this.)
OFC	OFF	/OFC	Output flow control. CTRL–S interrupts host computer and instructs it to stop sending data until the terminal issues CTRL–Q. Can prevent loss of characters during binary I/O when terminal input buffer is full. Needed on DASHER D210, D211, D220, D400, D410, D450, D460, and G300 terminals.
PM	OFF	/PM	Page mode. Terminal will display the number of lines specified as the *Lines per page* value; then it will wait for CTRL–Q before displaying the next sequence of lines.
RAC	OFF	/RAC	Rubout after CR or NEW LINE. Sends two rubout characters after either delimiter. Use this to prevent loss of characters sent to a slow (hardcopy) terminal. *See also* RAF and RAT.

(continued)

Table 4–6 AOS/VS Line Characteristics

Mnemonic	Default Value	CHARACTERISTICS Command Switch	Description
RAF	OFF	/RAC	Rubout after form feed. Sends 17 rubout characters after each form feed unless the form feed is simulated (SFF). For hardcopy terminals; see comment under RAC.
RAT	OFF	/RAC	Rubout after tab. Sends two rubout characters after each tab, unless the tab is simulated (ST). For hardcopy terminals; see comment under RAC.
RTSCD	OFF	/RTSCD	Holds the request to send signal until carrier detect is off. For half–duplex modem lines only; the system ignores it unless /HDPX is also on.
SFF	OFF	/SFF	Simulates form feed. Sends a carriage return followed by the number of NEW LINE characters that make up a page.
SMCD	OFF	/SMCD	Skip modem carrier detect. If set, the system ignores the CD (carrier detect) signal on modem–controlled lines. You must set this switch if you set HDPX (/HDPX). Also, the system ignores this switch unless you set /MOD (MOD).
ST	ON	/ST	Simulates tabs. Tab key moves cursor right 8 columns.
n	40000	/TCC=n	Answers VSGENs *TTC timer valve:* question. On a modem–controlled line, sets the amount of time the system waits for a CD (carrier detect) signal after the modem is connected. The default is 40000 milliseconds. Specify n in milliseconds.
n	5000	/TCD=n	Answers VSGENs *TTC timer valve:* question.On a modem–controlled line, sets the amount of time the system waits for a CD (carrier detect) signal to return after it drops. The default is 5,000 milliseconds. Specify n in milliseconds.

(continued)

Table 4–6 AOS/VS Line Characteristics

Mnemonic	Default Value	CHARACTERISTICS Command Switch	Description
n	2000	/TDW=n	Answers VSGEN's *TTC timer valve:* question. On a modem–controlled line, sets the amount of delay time the system imposes between a modem connect and the first I/O. The default is 2,000 milliseconds. Specify n in milliseconds.
n	10000	/THC=n	Answers VSGEN's *TTC timer valve:* question. On a modem–controlled line, sets the amount of time the system waits after a modem disconnects to let the modem settle (become stable). The default is 10,000 milliseconds. Specify n in milliseconds.
n	0	/TLT=n	Answers VSGEN's *TTC timer valve:* question. On a half–duplex line, sets the turnaround time. The system ignores this switch unless /HDPX is also set. This is the amount of time that the system waits between sending the last character and dropping the RTS (Request to Send) signal. The default is 0 milliseconds. Specify n in milliseconds. The system ignores this switch unless HDPX (/HDPX) is also set.
TO	OFF	/TO	Time outs. Enables time–out on terminal line(s).
UCO	OFF	/UCO	Uppercase only. Converts lowercase to uppercase. Use with uppercase–only terminals.
ULC	ON (CRT) OFF(TTY)	/ULC	Upper– and lowercase. Accepts both upper– and lowercase characters as input. If you don't specify UCO, ULC is the default. But if you specify UCO, and omit ULC, the system converts lowercase to uppercase.
WRP	ON	/WRP	Wraps text onto next line if line is too long (done in hardware). If you set this off, the system truncates such lines.

(continued)

Table 4–6 AOS/VS Line Characteristics

Mnemonic	Default Value	CHARACTERISTICS Command Switch	Description
XLT	OFF	/XLT	VT100–compatible terminal support. Lets the line group support non–DG terminals that are compatible with Digital Equipment Corporation VT100 terminals. For VT100 or VT220 terminals to use the international VT100 character set, also use 8BT. For VT100 or VT220 terminals to use Kanji, also use KVT. This characteristic also enables Data General ANSI mode for a line on an ITC, IAC–24, or newer IAC–8 controller.

(concluded)

Table 4–6 shows line characteristics, Table 4–7 shows line attributes for DRT's IACs, MCP1s, and MCPI/24s; Table 4–8 shows line characteristics for DRT's IACs, MCP1s, and MCPI/24s;Table 4–9 shows line characteristics for ATIs. If you specify any nondefault characteristic, you must specify *all* the ones you want for the line(s), including the defaults. VSGEN includes only those you actually specify.

Table 4–7 Line Attributes for DRT, IAC, CPI/24, and MCP1 Controllers

Mnemonic	Meaning	CHARACTERISTICS command switch
	Select the number of data bits per character, excluding the parity bit (if any), where n is 5, 6, 7, or 8.	
5	5 bits per character.	/CHARLEN=5
6	6 bits per character.	/CHARLEN=6
7	7 bits per character.	/CHARLEN=7
8	8 bits per character. (default) The controller may generate or ignore parity as specified via the Parity mnemonic. This is standard.	/CHARLEN=8
	Answer to VSGENs *Stop bits*: question	
1	Transmit 1 stop bit per character (default).	/STOPBITS=1
1.5	Transmit 1.5 stop bits per character.	/STOPBITS=1.5
2	Transmit 2 stop bits per character.	/STOPBITS=2
	Answer to VSGENs *Stop bits*: question	
NONE	Disable parity checking; ignore parity bit (default).	/PARITY=NONE
ODD	Odd parity.	/PARITY=ODD
EVEN	Even parity.	/PARITY=EVEN
45, 50, 75, 110, 134, 150, 300 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200, 38400	Select the baud rate for this group of lines. Answer to VSGENs *Baud rate:* question. Values for the CHARACTERISTICS command are: 45, 50, 75, 110, 134, 150, 300, 600, 12H (1200), 18H, 20H, 24H, 36H, 48H, 72H, 96H, 19K (19,200), or 38K (38,400). The default for CRTs is 96H; for TTYs, it is 300.	/BAUD=n

Table 4–8 Line Characteriestcs for DRT, IAC, CPI/24, and MCP1 Controllers

Mnemonic	Meaning	CHARACTERISTICS command switch
CSBEN	Enable split baud rate (IAC–8s only). Receive rate is that given to VSGENs *IAC split baud rate:* question. This is useful for a terminal with attached printer.	n/a
CSBDS	Disable split baud rate (default). You *must* include this with any nondefault characteristic for any IAC–8 line.	n/a
HRDFLC	Enable hardware flow control (on certain LAC and MCP1 lines only). Stops data transmission from the host when the CTS (clear to send) signal is low. Choose for modems and some printers. Use it for RS–232–C protocol; omit it for RS–422 protocol.	/HOFC

Table 4–9 Line Attributes for ATIs

Mnemonic	Meaning
	Select parity. Answers VSGENs *Parity:* question.
NONE	Disable parity checking; ignore parity bit (default).
ODD	Odd parity.
EVEN	Even parity.
	Select the number of data bits per character, excluding the parity bit (if any). Answers VSGENs *Data bits:* question.
5	5 bits per character.
6	6 bits per character.
7	7 bits per character.
8	8 bits per character (default)
	Selects the number of stop bits per character. Answers VSGEN's *Stop bits:* question.
1	Transmit 1 stop bit per character (default).
2	Transmit 2 stop bits per character.
	Each ATI has four clocks with jumper–selectable baud rates. Selects the clock that provides the desired baud rate for this group of lines. Answers VSGENs *Clock rate:* question.
0	Select clock 0 rate (standard).
1	Select clock 1 rate.
2	Select clock 2 rate.
3	Select clock 3 rate.

Terminal Line Configurations and the System UP Macro

On some devices, for terminal lines to operate properly, the system UP macro must provide special treatment, as follows.

ITC/128 and LTC/64 TermController Lines

Terminal console filenames on a TermController work the same way as other asynchronous controller line names: the device name is @CON followed by the line number plus 2. For example, the device on line 0 is @CON2; the device on line 1 is @CON3; the device on line 31 is @CON33; and the device on line 127 is @CON129. For a TermServer network, the line–terminal assignments (line 0 to @CON2, for example) are fixed only at system startup. When a user logs on through a TermServer, he or she will be assigned the next available line. In other words, using the same terminal, a user might log on console filename @CON102 in the morning, and console filename @CON95 in the afternoon.

For a printer attached to a TermController line to operate properly, you'll need to do the following. At VSGEN, specify the printer line as a TTY with break function of BBM, as described earlier. In the system UP macro, you must insert CONTROL @EXEC commands to start the printer on this TTY line. Insert these EXEC commands before the EXEC ENABLE/ALL command. And, via TermServer software, you'll need to establish a permanent virtual circuit (PVC) between the TTY line and the TermServer port connected to the printer.

Proceeding

When you have described the lines for an asynchronous controller, you might want to examine the specification file with the Current command. If there is another controller to describe, return to the appropriate section earlier in the chapter. If you have finished describing your asynchronous controller(s), continue to the next section.

Specifying Line Printers

If a letter–quality printer is attached to an asynchronous line, identify it to VSGEN as a console line, as described earlier in this chapter. If you have one or more line printers (data channel printers), specify them as described in this section.

There are several types of data channel printers that you specify:

LPB — An LPB is a commercial I/O printer, with a vertical forms unit. AOS/VS supports up to eight LPB printers, device names LPB, LPB1, LPB2, ..., LPB7.

LPD — An LPD is a DASHER Model 4325 through 4328 printer. AOS/VS supports up to eight LPD type printers, device names LPD, LPD1...LPD7.

LPE — Type LPE includes laser document printers (Model 4225) and *any data channel printer that doesn't need system initialization* (LPB and LPD do need initialization). AOS/VS can run up to 8 LPE printers, device names LPE, LPE1, ..., LPE7.

LPJ — An LPJ is a printer on a deskside ECLIPSE system. VSGEN shows eight controllers (LPJ, LPJ1...LPJ7), but you can add only LPJ, device code 21, when building a system to run on a deskside ECLIPSE system. The device name of a printer connected to the LPJ controller is LPJ0.

For MV/4000 DC or SC, or DS/4000 systems: If a printer is connected to the MIOC printer controller, specify it as LPE, with device code 17 (default).

If a printer is connected to an MCP1 printer controller, you can specify it as either LPB or LPB1, but must specify its device code as 57. The name you specify (LPB or LPB1) will become the printer device name needed to start and stop queues on the printer via EXEC.

Determine which type your primary printer is. Then, when VSGEN prompts for a command, add it:

Enter a command: A↵

Name of device to be added: LPB↵ (Or LPD, LPE, or LPJ)
Device code [17]:

Generally, take the default device code by pressing NEW LINE unless you know the printer is on a different device code, or the printer is on an MCP1 printer controller (explained above).

If you have a second line printer, add it. If the second printer is the same type as the first, its name is name1 (for example, LPB1). For example

Enter a command: A↵

Name of device to be added: LPB1↵
Device code [57]:↵

Enter a command:

If the type of the second printer *differs* from the first (for example, the first printer is an LPB and the second, an LPE), you can enter the name of the second printer as primary (for example, LPE). But if you do this, be sure to specify the correct device code for the secondary printer. The default secondary printer device code is 57. For example,

Enter a command: A↵

Name of device to be added: LPE↵
Device code [17]: 57↵

Enter a command:

If you want any printer device to handle 8–bit characters, arrange this through EXEC (*Managing AOS/VS and AOS/VS II*, EXEC's START command). VSGEN does not configure AOS/VS for 8–bit characters on printers.

Specifying Laser and Letter–Quality Printers

AOS/VS supports laser and letter–quality printers connected to asynchronous lines the same way it supports user terminals. You specify them to VSGEN the same way you do a terminal.

For each line connected to a laser or letter–quality printer, specify the console type as TTY. Take the default on all characteristic words. In the initialization word, specify a small input buffer and about 256–byte output buffer, an appropriate data rate (usually 9600), eight data bits, and one stop bit. An example of a letter–quality printer specification appears in Figure 4–1 as console line 13.

Supporting a Mouse

If your system has a mouse, do not identify it to VSGEN. Software support for the mouse is provided by the Graphical Kernel System (GKS) software; GKS defines and handles the mouse device.

Specifying a Plotter

AOS/VS supports up to two digital plotters, device names PLA and PLA1. Only MV/8000 systems of the 9300 series can run a plotter as an individual device. Thus you should specify a plotter *only* for a system that will run on an original MV/8000, 9300 series. A different computer *may* be able to handle a plotter (like the model 4435) connected via asynchronous line to an IAC or MCP1; if so, specify the plotter to VSGEN as a console line, like a letter–quality printer (earlier). A slave printer attached to a console is treated as part of the console by the system; do not tell VSGEN that a slave printer is a plotter.

To have the new system support a plotter, Add a device, then specify the name, and, unless the plotter is connected to a device code, default the device code. For example

Enter a command: A↵

Name of device to be added: PLA↵
Device code [15]:↵
Output buffer byte length [64]:↵
Characteristic word 0 [ ]:↵
Characteristic word 1 [ ]:↵

Enter a command:

Plotters have no default characteristics. The characteristics you can specify for plotters are shown in Table 4–10.

Specifying a Card Reader

AOS/VS supports up to 2 model 4016 card readers, device names CRA and CRA1. To have the new system support a card reader, Add a device, then specify the name, and, unless the reader is connected to a device code, default the device code. For example

Enter a command: A↵

Name of device to be added: CRA↵
Device code [16]:↵
Output buffer byte length [164]:↵
Characteristic word 0 [ ]:↵
Characteristic word 1 [ ]:↵

Enter a command:

Card readers have no default characteristics. The default buffer holds the images of two cards. The characteristics you can specify are shown in Table 4–10.

Table 4–10 AOS/VS Plotter and Card Reader Characteristics

Word	Characteristic	Bit Mnemonic	PLA, PLA1	CRA, CRA1
0	None.	--	--	--
1	Upper– and lowercase: accept both upper– and lowercase characters as input. By default, lowercase characters are converted to uppercase.	ULC	n/a	A
	Retain trailing blanks in text mode. By default, the system inserts a NEW LINE after the last nonblank characters and drops trailing blanks.	TSP	n/a	A
	Use packed format for binary mode. This format consists of 4 12–bit columns packed into 3 memory words. By default, the system puts each 12–bit column, right justified, in each memory word and uses the leftmost 4 bits for reader status.	PBN	n/a	A
	Time out: enable time outs on device.	TO	A	A
	Wrap line onto next line if line is too long (done in hardware).	WRP	A	A
	No NEW LINE: do not append NEW LINE character to end of card image. By default, the system appends a NEW LINE to allow for data–sensitive reads later.	NNL	n/a	A

Local Area Networks (LANs)

A Local Area Network (LAN) connects a group of computer systems that are no more than a mile from one another. A LAN can include one vendor's computers (for example, Data General's) or the computers of different vendors. A LAN can be very useful—for intersystem communication, distributed data processing, and transport of software from one system to another. Also, Data General computers running AOS/VS can support IBM®–compatible personal computers (PCs) over a LAN. (A LAN can also connect terminals to a central computer, as described under "Specifying ITC/128s (Intelligent TermControllers)" earlier, but from AOS/VS's point of view, the connections with the LAN appear to be asynchronous lines.)

Data General supports two software protocols for LANs: X.25 and TCP/IP (Ethernet). These protocols are supported by Data General's XTS and TCP/IP network software. XTS and TCP/IP can provide communications with other Data General systems running AOS/VS or the UNIX® operating system; they can also provide communications with IBM–compatible personal computers (PCs). In a PC network, a Data General computer running AOS/VS can support PCs just as if they were user terminals.

Regardless of the network you have, the only network controller you need to identify to VSGEN is a Multiprocessor Communications Adapter (MCA).

Specifying MCA Controllers

An MCA controller is used in small LANs with Data General systems that are no more than 150 feet apart. Each MCA can handle up to 16 asynchronous lines (nodes). AOS/VS supports up to two MCAs—device names MCA and MCA1. Internally, an MCA is two devices: the transmitter, MCAT(1), and the receiver, MCAR(1). MCAT must be on device code 6, and MCAR on device code 7; MCAT1 must be on device code 46, and MCAR1 on device code 47.

VSGEN sees the transmitter and receiver as one device, so the MCA dialog is the shortest of all. Simply add a device and type the name. For example,

Enter a command: A↵

Name of device to be added: MCA↵

Enter a command:

If you have a second MCA, add MCA1 as you did MCA.

Other Communications Controllers

A network controller that's similar to an MCA, but provides LAN communications with systems up to *1 mile* apart, is the Network Bus Adapter (NBA), also called an NBS. NBAs are supported by Data General's X.25–based XODIAC/XTS networking software. If you have one or more NBAs, you specify them to the XODIAC/XTS network generation program, not to VSGEN.

Recently developed alternatives to MCAs and NBAs are ILCs (intelligent LAN controllers, for all Data General systems except deskside ECLIPSE and MV/4000–series systems, and LLCs (local–bus LAN controllers for deskside ECLIPSE and MV/4000–series systems). Some deskside computers (MV/7800 DCX and DC, MV/4000 DC and SC) have LAN controllers built into their IOC boards. If you have one of these controllers, identify the network controller to the network generation program supplied with XODIAC/XTS or TCP/IP software. (But if you want an AOS/VS system to support personal computers through any of these LAN controllers, you must specify this to VSGEN in a software parameter question, described later in this chapter.)

To communicate with an IBM SNA network, you need DG/SNA software and an intelligent synchronous controller (ISC), an MCP1 (synchronous controller portion), a local–bus synchronous controller (LSC), or a DCU controller. Each of these is driven by SNA software, and you identify it to the SNA network generation program, not VSGEN.

For bisynchronous communications with IBM systems, using Data General RJE80, HASP II, or RCX70 communications software, you need one of the synchronous controllers described in the previous paragraph. You also need a bisynchronous specification file; you can create such files with the BSCGEN program. BSCGEN is described in "Supporting Synchronous Devices," near the end of this chapter.

Specifying Battery Backup (BBU) and Auto Restart

Your MV/Family computer may have a battery for full backup or partial backup. Battery backup is part of the default system. If your system has no battery, you can delete BBU. If you do have full backup, but don't want auto restart, edit this choice.

If your computer has either battery, tell VSGEN about it, adding the device named BBU:

Enter a command: A↵

Name of device to be added: BBU↵
Full or partial backup [F]:

If your battery is Model 8746, it provides full backup; press NEW LINE for the default. If the battery provides partial backup, enter P to end the BBU dialog.

If you specify full backup, VSGEN asks

Enable auto restart after powerfail [Y]:

An answer of yes allows AOS/VS to continue normally when power returns after a power failure. We recommend that you answer yes by pressing NEW LINE.

For full backup to work, all of the following must be true:

- The battery must provide full backup.
- Power must return before the battery is exhausted.
- BBU with full backup and auto restart must have been specified to VSGEN (default).
- The computer LOCK switch (if any) must have been in the ON or LOCK position when power went down.

Handling power failures is described near the end of Chapter 6.

Proceeding

Having dealt with the battery backup issue, you're done with the hardware specifications for the new system. The next section explains system software parameters that you can take defaults for or specify.

As always, you can display all current system specifications with the Current command, list device specifications with the List command, or respecify one or more specifications with the Edit command.

Specifying System Parameters

The AOS/VS system parameters you can tailor with VSGEN include performance–related items (like the number of buffers in the cache), the default program to run at system startup, and the number of personal computers to support. VSGEN supplies defaults for every parameter. But—even for your first system—you may want to pick values other than the defaults. In any case, you should at least examine this section before deciding to take the default parameters. To display parameters, use the Current command: enter C.

To change one or more parameters, use the Parameter command: enter P. VSGEN then asks about the following parameters. As usual, it displays the current defaults in brackets.

Enter a command: P↵

Swap [2147483647]

Size or disk unit for SWAP directory. The original default is 2,147,483,647 disk blocks (a block holds 512 bytes). This is more space than AOS/VS can ever use; we recommend taking the default. Details follow this list of parameters.

Page [2147483647]

Size or disk unit for PAGE directory. The default is the same as for *Swap*. As with *Swap*, we recommend taking the default. Details follow this list of parameters.

Cache [128]

Number of 512–byte buffers allotted for the system to do its I/O. The original default is 128, a good general–purpose value for small systems (4 Mbytes of memory). Larger systems may benefit from a higher number. Details follow this list of parameters.

Minimum number system pageable pages [10]

Number of 2,048–byte pages that the system will try to retain in memory during operation. The default is okay. Details follow this list of parameters.

Default file element size [4]

Size of the default file element. A file element is a set of contiguous 512–byte disk blocks. The default of 4 blocks is a good general–purpose choice.

Any user can choose an element size other than the default when he creates a file via the CLI command CREATE. So, in most cases, you will not want to change the default size. Valid responses are pressing NEW LINE, entering 1, or entering a multiple of 4 between 4 and 65,532.

Frequency [10]

The frequency, in cycles per second (Hz), of the CPU real-time clock or architectural clock. This value defines the granularity for AOS/VS timing services, used when programs make delay system calls, run histograms, and the like. (The real time and architectural clocks are different from the boot clock; the boot clock maintains the date and time when AOS/VS isn't running.) The default frequency is 10 Hz. Other choices are 100 Hz, 1000 Hz, or the ac line frequency (which is either 50 or 60 Hz). Several higher level languages, like AOS/VS BASIC, expect the default frequency for their time-oriented statements.

If you want to synchronize with ac line frequency, ask your electric company what the frequency is before choosing (if you choose 50 and your ac runs at 60, the clock will run fast). If the new system *must* make frequent timing checks—as in some kinds of process control—you might enter 1000 (despite the overhead involved in 1000 interrupts per second).

Access [YES]

This parameter enables (if you enter Y or press NEW LINE) or disables (if you enter N) the AOS/VS file access control mechanism. All file security —very important in a multiuser system—depends on access control. If you disable access, the multiuser environment will work, but every user will be able to access, modify, and delete every file in the system. So you will probably want to take the default on this.

Initial program for PID 2 [CLI.PR]

Normally, when AOS/VS starts up, it runs a CLI process (called the master CLI process) as PID 2 on the system console. This question allows you to specify another program for PID 2. If this AOS/VS system will support multiple users, the CLI is your best choice, since it can create the multiuser environment (EXEC) easily.

The default is 16-bit—the same version used in previous revisions. For information on the differences between the two versions, and instructions on choosing the 32-bit version, see the description of the description of the prompt *Program [:CLI.PR] change?* in the section "Creating the Profiles," in Chapter 5.

For a special application, you might want to specify one of your own programs, perhaps one that creates other processes. Or on a single-user system, where PID 2 needn't create any processes, you can choose any program you want (for example, CEO). For any program other than the default, you must specify the full pathname, with the .PR suffix, from the root directory. The file you specify must exist when you try to start up this system; if it doesn't, the system won't run.

Whenever you shut down the PID 2 process, and confirm your intent to shut down, the whole system shuts down.

Initial IPC message for PID 2 [pathname]

This allows you to specify a file of commands to be executed by the PID 2 (master) process when it comes up. The default is no IPC message. If the initial program for PID 2 will be CLI.PR (default), you might want to specify the system UP macro (:UP.CLI) to start EXEC automatically.

You may want to run the System Management Interface (SMI), a friendly, menu–driven program designed to help inexperienced people manage an AOS/VS system. It's described briefly in "System Management Interface (SMI)," later in this chapter, and more extensively in the manual *Using the AOS/VS System Management Interface (SMI)*. If you want to run the SMI, type the pathname of the macro that starts it (:UTIL:UP_EXEC.CLI).

To change the default to none, enter [ ].

Max program load pages –noncontention [n]

This question, and the next one, can enable the system to load multiple pages into memory when a process is created. A nondefault answer doesn't *do* anything. It just enables multiple page loading for a program, if specified by the SPRED utility. Details follow, in the section "Program Load Pages."

Max program load pages –contention [n]

This question, and the previous one, can enable the system to load multiple pages into memory when processes are competing for memory. Details follow, in the section "Program Load Pages."

Fault time prepaging maximum [0]

This allows you to specify the maximum number of pages a process can read from disk. The original default, 0, lets a process read only one pageful (2,048 bytes) at a time. Details follow, in the section "Program Load Pages."

Do you wish to use variable swapfiles [N]

This question enables variable swap files, which may shorten swapping time for large processes. If you enter Y, it asks about maximum and default sizes. Details follow, in the section "Program Load Pages."

Do you wish to truncate swap files after use [N]

Truncating swap files can (temporarily) save disk space by reducing each process's swap file size to 0 when the process terminates. However, the swap file will return to its original size when a process that's using it swaps. Generally, if you have more than 100 Mbytes of disk storage, the answer should be No. With less than 100 Mbytes of storage, enter Y.

Do you wish to truncate page files after use [Y]

Truncating page files can save disk space by reducing a a process's page file size to 0 bytes when the process terminates—if the page file has grown larger than a specific size (next question). The space saved by truncating page files may last for hours or even days, since page files grow only as needed by the process using them. You should enter N only if you have ample disk space and if paging performance is critical. If you have less than 100 Mbytes of disk storage, the answer should always be Yes.

Size above which page files will be truncated [2048]

VSGEN asks this only if you wish to truncate page files (previous question). The answer sets the upper limit of page file size. If, when a process terminates, its page file exceeds *n* bytes, the system will truncate the file to 0 bytes. The original default (2,048 blocks) is a good general–purpose choice.

If you have less than 100 Mbytes of disk storage, enter 0.

With more than 100 Mbytes of disk, if disk space is not a critical issue, take the default (2,048 blocks) by pressing NEW LINE.

If you want to fine–tune page file size, or if disk space *is* a critical issue, try the following. Run the system for a while; then examine the page file size in :PAGE (enter F/AS :PAGE:+). Take the average page file size, divide by 512 to convert bytes to disk blocks, and run VSGEN again to specify this average number.

(Although the default page file limit, 2048 blocks, appears very large, it's deceiving. The F/AS command shows byte length to the *end of file mark*, in the highest block number in the file. Many disk blocks before the end of file are not occupied. A page file that appears to use, say, a megabyte is actually using much less space.)

Lowest priority for group 1 processes [255]

Process groups are independent of process priority. There are three process groups: group 1, high priority; group 2, medium priority (includes user processes); and group 3, low priority. Your answers to this question and the next one determine the group into which a process of a given priority falls. The details of all this are fairly complex. (Process groups are described in *Managing AOS/VS and AOS/VS II.*) In most cases, you don't need to know the details. Things will be simpler if you take the default on this *Lowest priority* question and the next one. The original default for this question is 255.

Lowest priority for group 2 processes [258]

This question sets the range for group 2 processes (between the number in the previous question and this number). All processes with a lower priority than this one will run as group 3 processes. We suggest the default (the original default is 258).

Suppress soft tape error reporting [N]

A soft tape error is an I/O inconsistency that disappeared in fewer than 13 retries. (If it persisted for 13 retries, it would be a hard error.) Normally, soft errors are reported to the system console and AOS/VS error log (:ERROR_LOG). Certain brands of magnetic tape can produce many soft error messages. On a hardcopy terminal, printing these messages can slow system response. And the messages can be quite annoying on any terminal you are trying to use.

To disable soft tape error reporting on the system console (and to the log file), enter Y; otherwise enter N (the original default). A Y response disables *only* soft tape error reporting on the system console. (More than 3 soft tape errors will be reported to the log file.) All disk errors will still be reported on the system console and error log. You can control soft tape error logging at runtime, with SYSLOG commands.

Default system dump device [MTB]

If serious system errors recur, you may want to ask for help from Data General. To get help, you might need to submit a dump of computer memory to Data General. The default device for this dump is MTB, but if you don't have an MTB tape unit, you can specify a different unit. (You can also identify the memory dump device at runtime, should a serious error occur.) You can specify any tape controller you have (for example, MTC, MTD, or MTJ). If you have a diskette unit and want to use diskettes for memory dumps, specify a diskette controller (usually DPJ1).

Maximum number of processes [255]

On most systems, the default of 255 processes is enough. But, on a large system, you might want to specify more than 255. Details follow in the section "Maximum Number of Processes."

Do you wish to use the System Management Interface [N]

The System Management Interface is an easy-to-use, menu-driven program for managing AOS/VS. You can select it (instead of the default, the CLI) by entering Y. If you answer Y, you will also need to specify an initial IPC file for PID 2 (the pathname is :UTIL:UP_EXEC.CLI). Details are in the section "System Management Interface (SMI)," later in this chapter.

Default offset from GMT [0:00]

GMT is Greenwich mean time (universal time). Setting this is useful only if your system will communicate with another computer system in a different time zone. If you specify no offset, files (and documents) created on your system will be sent to other systems using your system's timestamp. This means, for example, that a document sent to Paris from your system at 10:00 a.m. will arrive with the postmark of 10:00 a.m., although it was sent at 4:00 p.m. Paris time.

You can specify this offset either at VSGEN for a tailored system, or for any AOS/VS system at startup (via a bootstrap program or the Technical Maintenance Menu). The offsets are independent; if you specify −4:00 to VSGEN and −4:00 at startup, the offset will remain −4:00 (not −8:00 or 0:00), regardless of the AOS/VS system you run.

To specify no offset—skip the issue—press NEW LINE. Otherwise, find out the number of hours (and fractions of an hour, if this applies) your time zone is from Greenwich mean time. The offset decreases with distance West from Greenwich, England. The 014−series "Starting" manual supplied with your computer includes a table with GMT offsets from different places. Type the number of hours and minutes to add (+ or −) to Greenwich mean time to equal local time.

For example, if the new system will run in New York City during Eastern Standard Time, you would enter −5:00.

System will automatically boot with defaults [Y]

As part of the initialization process for systems not running with the System Management Interface (SMI) enabled, the system would prompt *Override default specs?* and wait indefinitely for someone to answer. The system manager or operator could respond by pressing NEW LINE to accept the default answer, No, or by typing Y and pressing NEW LINE to change specifications. The system would come up after a time−out delay of 45 seconds. This question lets you choose whether the boot sequence will pause at the prompt *Override default specs?* for a predetermined amount of time and then continue automatically, or wait indefinitely for someone to answer the question.

If you want AOS/VS initialization to proceed automatically (that is, bring the system up without operator intervention), press NEW LINE to accept the default answer, Yes. AOS/VS will pause a predetermined amount of time (set by the next question), and then continue the boot sequence. If you want someone present at system initialization to answer the question *Override default specs?*, answer N and press NEW LINE. If you answer Y, the system displays the next prompt.

Specify number of seconds to wait before booting [30]

If you answer Y to the prompt *System will automatically boot with default*, you must set a limit for the time−out delay for the prompt *Override default specs?* before the system completes the boot sequence. Press NEW LINE to accept the default value of 30 seconds. Or, type a number from one second through 32,767 seconds (9.1 hours) and press NEW LINE.

System will automatically re–boot after coming down [N]

If you shut a system down normally it would require someone to start it up manually. This question lets you shut a system down normally *and* have it reboot itself after a predetermined time limit. This option is useful when you want to cycle the system in order to bring up new, modified, or patched system software. This option will not work if the CPU is halted or if there has been a file system panic, which requires running FIXUP.

If you answer No (the default) by pressing NEW LINE, the system will not attempt to reboot automatically and will skip the next two or three questions. If you want the system to reboot itself automatically, type Y and press NEW LINE. If you answer Yes, the system will display the following prompts.

Specify number of seconds to wait before re–booting [30]

If you answer Y to the preceding question, *System will automatically re–boot after coming down*, you must set a limit for the amount of time the system waits before rebooting itself. Press NEW LINE to accept the default value of 30 seconds. Or, type a number from one second through 32,767 seconds (9.1 hours) and press NEW LINE.

System will automatically bypass system memory dump [N]

Before AOS/VS Revision 7.68, following a system failure, AOS/VS would prompt at the system console for a memory dump (for example, to submit a Software Trouble Report or STR). This question, asked only if you choose to have the system reboot itself automatically, lets you skip the dump question entirely or set a limit to the time the system will prompt someone to mount a tape or insert a diskette for a dump.

If you want the system to prompt the operator to mount a tape or insert a diskette for a memory dump, press NEW LINE to accept the default answer, No. Or, if you want the system to wait for someone to mount a tape or insert a diskette, but skip the dump if no one responds in a given amount of time, type Y and press NEW LINE. If you answer Yes, the system displays the next prompt.

Specify number of seconds to wait before bypassing dump [600]

Press NEW LINE to accept the default, 600 seconds (ten minutes), or type a number (one second through 32,767 seconds) and press NEW LINE. Following this interval, AOS/VS will reboot even though no one has taken a memory dump. If you answered

If you answered Yes to the *System will automatically bypass system memory dump* prompt, the system displays the following prompt.

System will automatically dump system memory [N]

VSGEN lets you set up an automatic memory dump to tape that requires no operator intervention (provided you keep a tape mounted on the system dump device). If the system did not come down for a reason that requires FIXUP to run, the system reboots automatically when the dump is finished. On systems running preinstalled AOS/VS, FIXUP runs automatically and the system reboots automatically. If you do not want the system to dump automatically, press NEW LINE. If you want the system to dump automatically, type Y and press NEW LINE. If you answer Yes, the system displays the following prompt.

Specify number of seconds to wait before dumping [30]

Press NEW LINE to accept the default, 30 seconds, or type a number (one second through 32,767 seconds) and press NEW LINE. Following this interval, AOS/VS dumps memory to tape.

Swapping and Paging in AOS/VS

AOS/VS is a *virtual memory, demand–paged* system. Virtual memory means that memory is a composite of main memory and disk memory. Demand–paged means that it adds a page of memory to each process's total memory allotment (called its *working set*) when the process demands another page. A page of memory is 2,048 bytes.

The SWAP and PAGE directories are the disk component of AOS/VS virtual memory. They are critical to its operation.

Processes and Working Sets

AOS/VS runs each program as a *process*, with its own process ID (PID). A process starts with a certain number of pages of virtual memory—its initial working set. When it needs more pages (perhaps to execute a routine that isn't in memory), a *page fault* occurs; AOS/VS then allots an additional page of memory to the process's working set. AOS/VS then reads needed information from disk into the page. The theoretical limit on the number of pages in a process's working set exceeds 1,000,000—providing a limit of 2 billion bytes for a process's logical total size.

There can be many processes—up to 1,024—all running simultaneously.

Memory contention occurs when all currently active processes (including the AOS/VS system and its peripheral manager) desire a working set larger than the computer's main (physical) memory. Memory contention can occur much of the time.

In "light" memory contention, AOS/VS resolves the situation by removing inactive pages from processes and keeping them on disk in directory PAGE. The processes' initial working sets remain in memory. Later, if demanded, the pages are restored to the processes' working sets. Because the number of pages involved varies, the files used to keep the pages vary in size. In directory PAGE, AOS/VS creates a page file for each new process ID as the process is created. Later, it attempts to reuse these files, matching the file's size to the number of pages it expects the process to use.

In "heavy" memory contention, AOS/VS removes whole *processes* (selecting blocked processes first), and keeps them in directory SWAP. Later it restores them to main memory. The file in which it keeps each process is a contiguous file of 512 disk blocks (each disk block is 512 bytes). As with PAGE, AOS/VS creates a swap file for each new process ID as the process is created. The file size is constant unless you enable variable swap files (described below).

AOS/VS creates and manages the SWAP and PAGE directories automatically. They are really part of memory; AOS/VS relies on them and uses them extensively. If AOS/VS runs out of space in either one, it may fail (panic). The default maximum sizes have been made very large to prevent AOS/VS from running out of space. However, the large sizes won't prevent problems if the LDU that *holds* SWAP and PAGE fills up.

Files in SWAP and PAGE can be deleted by superusers to save space; but the system will recreate them as it needs them. After anyone deletes files in these directories, AOS/VS should be shut down and brought up again, so that it can reinitialize the directories.

Generally, you will not want to delete page files. But you might do so in a situation where a very large process (like a batch job) runs at night—requiring a large page file—and where

interactive user processes, which generally need smaller page files, run during the day. You might delete the large page files after the batch job runs to make more room for the smaller daytime page files.

Using an LDU for the SWAP, PAGE, or BOTH Directories

Whenever light memory contention occurs, there is some I/O to the PAGE directory. During heavy contention, there is significant I/O to the SWAP directory. If these directories remain on the system root disk (as is the default), they may produce an I/O bottleneck during memory contention. You can reduce the likelihood of such an I/O bottleneck—if you can afford the disk space—by designating an LDU for both the SWAP and PAGE directories, or by designating an LDU for each one. Ideally, use an LDU whose controller differs from the system disk controller.

To create an LDU for both directories, use the Disk Formatter to format a DPJ or DPF disk with the LDU filename of BOTH (you must use this name), and give this LDU an access control list of +E—as described in Chapter 8. Then, to VSGEN, specify this disk unit name to both the *Swap* and *Page* questions. For example, if your LDU named BOTH is unit DPJ10, you'd say to VSGEN:

Swap [default]: DPJ10⟩
Page [default]: DPJ10⟩

When the new AOS/VS system comes up, it will automatically create and maintain control point directories with pathnames :SWAP and :PAGE on the LDU named BOTH. LDU BOTH is not restricted to the SWAP and PAGE directories; you can put other directories on it as well.

Under some circumstances, you may want to give the SWAP or PAGE directory, or each one, its *own* LDU. To do this, use the Disk Formatter to create an LDU with the LDU name SWAP or PAGE, and give this LDU an access control list of +E. Then, during VSGEN or when you initialize AOS/VS, specify the pertinent disk unit name to the *Swap* and *Page* questions as above.

NOTE: Unlike BOTH, an LDU you use for SWAP or PAGE cannot hold other directories.

You can override the VSGEN default specifications for both SWAP and PAGE when you bring up any AOS/VS system, as shown in Chapter 6.

Cache of Buffers

Your answer to the *Cache* question sets the number of system buffers. These are 512–byte buffers that the system uses for internal I/O. The valid range is 58 through 2048. If your system will have a lot of free memory (as it might if it will run only a few processes), a large number of buffers can help cut down on disk requests. But if there will be a lot of processes, and/or memory contention, swapping will occur anyway; and you might want to specify fewer buffers to free memory for active processes.

For your first system you will generally want to take the default, 128, which is suitable for a system with 4 Mbytes of memory. For a larger system, try 256 or higher—1024 or 2048. The ideal buffer figure will depend on your system load, the kind of things the system does, and your hardware; you can time typical application programs to determine it. Or, you can use the AOS/VS Performance Package to determine optimal values.

As with the Swap and Page specifications, you can override the Cache specification when you bootstrap the system. This makes it easy to alter the buffer cache for testing; simply reboot the system, override default specifications, and enter the new cache size.

System Pageable Pages

AOS/VS uses pages in its own operation. Your answer to the *Minimum number system pageable pages* question sets the number of pages AOS/VS will try to keep resident in main memory (its own working set). The valid range is 4 to 99 pages; the default is 10.

If memory contention will be light, you may want to specify a large number of pages here. This will keep less frequently used system code resident, which may allow processes to run faster.

If memory contention will be moderate or heavy, you may want to specify a lower figure and free the memory for active processes. Ideally, system load will be set up to be consistent, and programs that use similar types of calls will be run simultaneously. But this requires a lot of experience to implement, and generally you can take the default. This specification can't be overridden at system startup.

Program Load Pages

Normally, when a process is created, its working set has only a few pages (nominally 0). Your answers to the *Max program load pages* questions set the *maximum* number of pages that can be loaded as the working set when a process is created. For program loading to occur, someone must run the SPRED (Selective Preamble Editor) utility and describe the page boundaries.

Even if you specify a nonzero answer (say 50), multiple pages won't be loaded before SPRED runs. If you take the default (0), multiple page loads cannot occur even if SPRED specifies them. Regardless of your answer, and what is done with SPRED, existing programs will run. Using SPRED is described in *Managing AOS/VS and AOS/VS II*.

Program loading of multiple pages can be useful in situations where programs use many unshared pages—it's faster to load most (or all) of the needed pages when the process is created than to load the pages in later.

The state of memory contention may influence your choice of maximums. For example, you might want to allow a fairly large maximum when memory is free (noncontention), and allow only a small (or 0) maximum in contention situations.

Multiple Pages on Faults (Fault time prepaging maximum)

Normally, when a process needs information that isn't in memory, it takes a page fault; the system finds a page, adds it to the working set, and reads needed information into the page.

The *Fault time prepaging maximum* question can let the system add multiple pages to a working set when a process takes a page fault. Having a process do this can be useful when you know the process will usually need more than one page when it takes a fault. Like the *Max program load pages* question, this question only *enables* a feature; the actual number of pages to be added must be specified with the SPRED utility.

Variable Swap Files

During memory contention, sometimes a process must be swapped to disk. If the process' working set has grown while the process was running, the swap file might not be large enough to hold the working set. If this happens, the system must strip pages from the working set until it fits in the swap file. Later, when the process swaps back in, it may need the stripped pages back, and take many page faults to get them.

These operations take a lot of time. You can shorten this time by setting up a large swap file for each process that you expect will acquire a large working set, and then get swapped out. Like the two previous questions, this only sets a maximum. For a nondefault swap file size, someone must run SPRED on the program's .PR file.

Neither allowing variable swap files nor specifying a large swap file will prevent or inhibit a program from running. The only negative aspect is the loss of disk space.

The default maximum swap file size is 126 pages. The default swap file size for all processes not given a custom size (with SPRED) is also 126 pages.

Maximum Number of Processes

The default maximum number of processes is 255. Your answer to the *Maximum number of processes* question sets the maximum number of processes the new system can run. As a general rule, CLI users who may also use CEO need an average of three and a half processes. CEO–only users need an average of two and a half processes. So—assuming twenty or so system processes—the default of 255 processes is enough for about 65 CLI users or 90 CEO–only users simultaneously.

On most computers, 255 processes is enough. But on an MV/20000 or MV/10000, you may want to run more—or fewer—than 255 (the allowable range is 16 through 1,024). If so, type the number of processes you want. For example, you might enter 500.

Specifying more than 255 processes doesn't mean you *must* run more than 255—it just allows the system to do so. VSGEN lets you specify up to 1,024 processes.

To allow a process to run with a PID above 255, you may need to edit the pertinent program file(s) with the SPRED editor. Also, there are issues relating to PID size that you should understand. These issues are explained in the performance chapter of *Managing AOS/VS and AOS/VS II*.

System Management Interface (SMI)

The System Management Interface (SMI) is an easy–to–use, menu–driven program that allows you to perform various EXEC and CLI system management functions. Some of these system management functions, such as controlling printers and backing up or restoring personal files, are available to all users on the system. Other functions are restricted to users who have the System Manager privilege in their user profiles.

If you choose (or decide to try) the System Management Interface, you must specify, as an initial IPC file for PID 2, the file :UTIL:UP_EXEC.CLI. (Otherwise, VSGEN will give you an error.) For more information about the SMI, see the manual *Using the AOS/VS System Management Interface (SMI)*.

Continuing

When you have specified the parameters you want, you might want to review the whole system again with the Current command. If any device is wrong, fix it with the Edit command; or, in worst case, delete the device with Delete and add it again.

Then continue.

Building the System and Finishing Up

You have specified your system devices and parameters to VSGEN. Only a few steps remain. At the end of this section, in Figures 4–8 and 4–9, are sample VSGEN sessions.

Naming the System (Name Command)

Having specified the CPU and all your devices and parameters, name the system. The name can be any valid AOS/VS filename, 1 to 32 alphanumeric and special characters: ?, _, $, and period (.). Try to create a descriptive and memorable name, because—until you make it the default system—you'll have to type its full pathname to bring it up.

If the name you choose is the same as the name of any existing system, the new system files will replace the old ones (after VSGEN asks for confirmation). Generally, having the new system files replace the old ones is is a good idea; it keeps the number of system files to a minimum and conserves disk space. (However, if you're generating a system for a special purpose, give it a unique name.)

If you want to retain the old system files, make sure the name of the new system differs in the first 12 characters. (This is needed because VSGEN creates very long temporary filenames, which might conflict with existing names if the first 12 characters are the same).

If your system will be one of a group of systems, you might choose the role it will serve as its name; for example, MSIS_01. Similarly, if it will be part of a network, you can use the hostname it will have in the network.

To name it, use the N command:

Enter a command: N↵

Enter new system name [none]:

Type the new name, for example:

Enter new system name [none]: MSIS_01↵

Enter a command:

NOTE: If you will want this to be the default system, be sure to make it the default system, as explained later under "Making the Tailored System the Default System." This is necessary even if you assign it the same name here as the existing default system.

Creating the Specification File (Spec Command)

Until you type a Spec (or Build) command, the work you've done with VSGEN remains only in computer memory. To save it on disk (in files sys.CSF and sys.SSF), use the Spec command (create a specification file). (The Build command, next, also writes the system to disk, so you need not use Spec if you're going to build immediately.) Enter S to build a specification file:

Enter a command: S↵

Creating specification file

Enter a command:

If the system you've configured has conflicting or invalid parameters, VSGEN will not create the specification file; instead it will display an error message and ask for a command. Fix the specification by adding or editing the appropriate controller; then use the Spec command again.

If a file named sys.CSF already exists in directory :SYSGEN, VSGEN will ask if you want to write over it (delete it and replace it with the new one). To overwrite, enter Y; to save the old file, enter N, use the N command to specify another name for the new system, and use the Spec command again.

At this point, all your efforts are saved on disk. You can leave VSGEN and execute it again later with the X VSGEN/BATCH=*sys* command, and have it build a system.

If you want to build a system now, proceed. To leave VSGEN without building a system, skip to the Quit command. If you have loaded a new AOS/VS revision or update, and need to build a new AOS/VS system to incorporate the changes, quit VSGEN now (using the Q command) and go to the section, "Updating the New System."

Building the System (Build Command)

To build the current specification into a tailored AOS/VS system, use the Build command. VSGEN will verify the configuration and notify you if it isn't valid. If it is valid, VSGEN will try to create a specification file, and then build a system.

If, when you type the B command, a file with the name sys.SSF already exists, VSGEN will ask if you want to write over it. Here, this will occur because you already created the specification file. If you answer Yes, VSGEN will delete system files with the old name and create new ones in their places.

For example:

Enter a command: B↵

A spec file with this name already exists
Shall I write over it? [N] Y↵
Creating specification file
Do you want to save TMP files? [Y]↵

System build in progress

VSGEN invokes first the macroassembler (MASM), and then the Link utility, to build the system. This takes several minutes. (For an explanation of TMP files, see Table 4–1, near the beginning of the chapter.) Soon, you'll see the message

System build completed

Enter a command:

The tailored system is ready. Go to the next section.

If the build doesn't work and you see an error message, leave VSGEN by entering Q. Look at the working directory by entering the the CLI command DIRECTORY; the directory should be :SYSGEN. Then view your search list by entering SEARCHLIST; the search list should include :UTIL. If the working directory and search list are not what they should be, enter the commands SEARCHLIST :UTIL and DIRECTORY :SYSGEN to set them. Then type

Su) X VSGEN/SAVE/BATCH=*sys*↵

to build another system from the specification file. If the working directory or search list is not the problem, type the sys.KS._OUTpid.TMP file (described in Table 4–1) to check for other errors.

Quitting VSGEN (Quit Command)

The new system has been built, but is still waiting in the wings. To try it, you'll need to leave VSGEN, shut down the current system, and bootstrap the new tailored system. To leave VSGEN, type

Enter a command: Q↵
Su)

If you try to quit VSGEN without typing a Spec or Build command, VSGEN warns you, as follows:

You have not created a spec file for the current system
Do you wish to create a spec file? [Y]:

To save the work you've done (if any) during this VSGEN session, press NEW LINE for the default. Then type a specification file name as described under "Creating the Specification File (Spec Command)." To leave VSGEN without creating a specification file, enter N.

You're back in the CLI.

Updating the New System

With your tailored AOS/VS system built, it's time to apply the update (Data General–supplied corrections called patches) to it. The update supplied with AOS/VS must have been installed as described in Chapter 2 or 3 (for your first AOS/VS system) or Chapter 7 (if you have installed an update or new release of AOS/VS).

Updating your tailored system is easy. With Superuser on, make :UPDATE the working directory; and then run the Update tool. Use the form UPDATE/REV=*update–rev system–pathname*. For example, if *update–rev is 7.70* and the *system pathname* is :SYSGEN:MSIS_01.PR, type

```
Su) DIR :UPDATE⏎
Su) UPDATE/REV=7.70 :SYSGEN:MSIS_01.PR⏎
```

If the system filename differs from the configuration filename (as it might if the configuration file contains information for more than one host), you must use the /CONFIG= switch when you run the Update tool. For example, assume configuration file GENERAL.CONFIG defines HOSTA and MSIS_01, the system pathname you want to update is HOSTA.PR, and the update is 7.70. You would type

```
Su) UPDATE/REV=7.70/CONFIG=:SYSGEN:GENERAL.CONFIG :SYSGEN:HOSTA.PR⏎
```

The Update tool now updates the system file (it runs VSGEN and patches the system file). If you receive an error message, see the section "Update Errors" in Chapter 7.

If you don't know which is the latest update, you can list update revisions by entering FILES/ASSORT/S :UPDATE:*.**. The number that appears last (for example, 7.70) is the latest update revision.

You're done. However, the update changes will not take effect until you shut the system down and bring it up again, which is described in the major section "Testing the New System."

VSGEN Example

For a concise summary of a simple VSGEN session with an MV/7800 system, see Figure 4–8. This session creates a system with a DPJ (not DPF) disk controller, a 16–line IAC (with input and output flow control), a line printer, and several nonstandard software parameters.

For a session with an MV/20000 with DPJ disks on the second IOC, two IACs (one with modem lines), and quite a few nonstandard software parameters, see Figure 4–9.

```
) SEARCHLIST :UTIL ↵
) DIR :SYSGEN ↵
) SUPERUSER ON ↵
Su) XEQ VSGEN ↵

Welcome to VSGEN -- Type H for help

Enter a command: H ↵

... (Text of Help message) ...

Enter a command: M ↵
        Enter new model [MV/8000]: MV/7800 ↵

Enter a command: N ↵
        Enter new system name [none]: MSIS_01 ↵

Enter a command: A ↵

        Name of device to be added: LPB ↵
        Device code [17]: ↵

Enter a command: A ↵

        Name of device to be added: DPJ1 ↵
        Device code [64]: ↵

Enter a command: C ↵

... (Text of current system description) ...

Enter a command: D ↵

        Name of device to delete: DPF ↵
        DPF has been deleted

Enter a command: E ↵

        Name of device to edit: CON0 ↵
        Default terminal [CRT3]: TTY ↵
        Warning: Changing the default terminal can alter the default values of
        several of the ensuing prompts!
        Do you want to change those defaults? {NO}: Y ↵
        Terminal type [HARDCOPY]: ↵
```

Figure 4–8 VSGEN Session for an MV/7800 Computer System (continued)

```
        Terminal description [TTY or hardcopy (printing) terminal]: ↵
        Input buffer length [256]: ↵
        Output buffer length [256]: ↵
        Lines per page [30]: ↵
        Characters per line [72]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Clock rate [0]: ↵
        These characteristics are selected: EOC, NAS, ST, ULC, WRP
        Enter choices (or NEWLINE when done): ↵

Enter a command: A ↵

        Name of device to be added: IAC ↵
        Device code [65]: ↵
        Base line number [0]: ↵
        IAC device type [??]: 24 ↵

        Do you wish to add line groups to this device? [Y] ↵

There are no line groups defined for IAC.
These lines are undefined: 0-23

You may:  (C) CREATE a line group.
          (M) MODIFY default terminal types.
          (Q) QUIT line group editing for this device.

          Enter choice: C ↵

Please specify the following parameters:
          Free-form group name: CRT3.01 ↵
          Default terminal [CRT3]: ↵
          Terminal type [ASCII]: ↵
          Terminal description [DGC D200 compatible terminal]: ↵
          Input buffer length [128]: ↵
          Output buffer length [128]: ↵
          Lines per page [24]: ↵
          Characters per line [80]: ↵
          Break key function [BINARY]: ↵
          Data Bits [8]: ↵
          Stop bits [1]: ↵
          Parity [NONE]: ↵
```

Figure 4–8 VSGEN Session for an MV/7800 Computer System (continued)

```
        Clock rate [0]: ↵
        These characteristics are selected: EOC, ST, ULC
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES]: Y ↵

        Specify lines to add to group {CRT3.01}: 0-2 ↵
        Lines 0-2 were added to group {CRT3.01} producing 0-2.

This line group is defined for IAC: 0-2.
These lines are undefined: 3-23.

You may: (C) CREATE or (K) KILL a line group.
        (L) LIST or (E) EDIT the characteristics of a line group.
        (A) ADD lines to, of (D) DELETE lines from a line group.
        (S) SHOW all line groups for this device.
        (M) MODIFY default terminal types.
        (Q) QUIT line group editing for this device.

        Enter choice: Q ↵

Do you want to save your changes? [YES]: Y ↵
        Saved.

Enter a command: P ↵

        Swap [2147483647]: ↵
        Page [2147483647]: ↵
        Cache [128]: ↵
        Minimum number system pageable pages [10]: ↵
        Default file element size [4]: ↵
        Frequency [10]: ↵
        Access [YES]: ↵
        Initial program for PID 2 [CLI.PR]: ↵
        Initial IPC message for PID 2 []: UP.CLI ↵
        Max program load pages -noncontention [0]: 40 ↵
        Max program load pages -contention [0]: ↵
        Fault time prepaging maximum [0]: 20 ↵
        Do you wish to use variable swapfiles [N]: Y ↵
        Maximum swapfile size [126]: 512 ↵
        Default swapfile size [126]: ↵
        Do you wish to truncate swap files after use [N]: ↵
        Do you wish to truncate page files after use [Y]: ↵
        Size above which page files will be truncated [2048]: ↵
        Lowest priority for group 1 processes [255]: ↵
        Lowest priority for group 2 processes [258]: ↵
        Suppress soft tape error reporting [N]: ↵
        Default system dump device [MTB]: ↵
        Maximum number of processes [255]: ↵
```

Figure 4-8 VSGEN Session for an MV/7800 Computer System (continued)

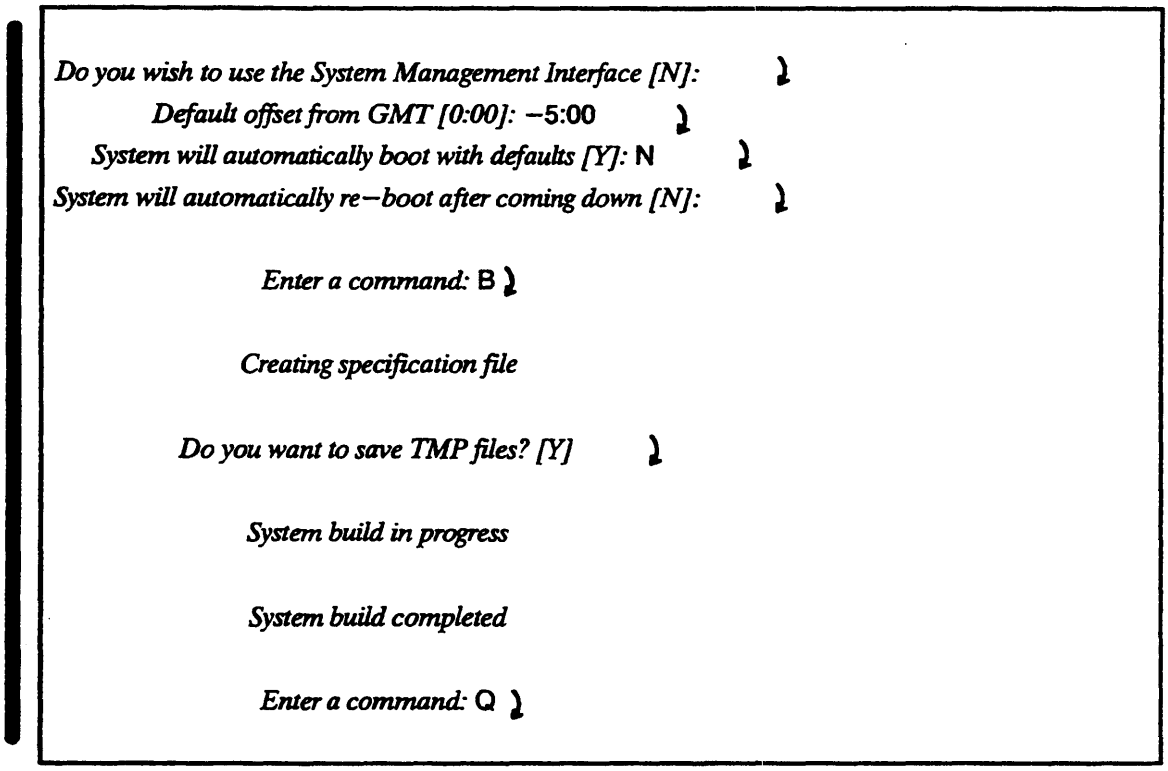

Figure 4–8 VSGEN Session for an MV/7800 Computer System (concluded)

```
) SEARCHLIST :UTIL ↵
) DIR :SYSGEN ↵
) SUPERUSER ON ↵
Su) XEQ VSGEN ↵

Welcome to VSGEN -- Type H for help

Enter a command: H ↵

... (Text of HELP) ...

Enter a command: M ↵
        Enter new model [MV/8000]: MV/20000

Enter a command: C ↵

... (Text of current system description) ...

Enter a command: L ↵

        Name of device to be listed: DPJ ↵

        ... (Description of controller DPJ) ...

Enter a command: A ↵

        Name of device to be added: DPJ1 ↵
        Device code [64]: ↵

Enter a command: A ↵

        Name of device to be added: DPJ2 ↵
        Device code [??]: 126 ↵          (Device code 26, attached to second IOC)

Enter a command: C ↵

... (Text of current system description) ...

Enter a command: A ↵

        Name of device to be added: IAC ↵
        Device code [65]: ↵
        Base line number [0]: ↵
        IAC device type [??]: 24 ↵
        VT100 terminal support? [Y]: N ↵
        Asian language support? [NONE]: ↵

        Do you wish to add line groups to this device? [Y] ↵

There are no line groups defined for IAC.
These lines are undefined: 0-23

You may: (C) CREATE a line group.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

        Enter choice: C ↵
```

Figure 4-9 A VSGEN Session for an MV/20000 (continued)

```
Please specify the following parameters:
        Free-form group name: CRT6 ↵
        Default terminal [CRT3]: CRT6 ↵
        Terminal type [GRAPHICS]: ↵
        Terminal description [DGC D470 compatible graphics terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Clock rate [0]: ↵
        These characteristics are selected: EOC, ST, ULC, WRP
        Enter choices (or NEWLINE when done): IFC, OFC ↵
        These characteristics are selected: EOC, IFC, OFC, ST, ULC, WRP
        Enter choices (or NEWLINE when done): ↵
        Do you want to add lines to this group? [YES]: Y ↵
        Specify lines to add to group {CRT6}: 0-23 ↵
        Lines 4-16 were added to group {CRT6} producing 4-16.

These line groups are defined for IAC: 0-23.
These lines are undefined: 24

You may: (C) CREATE or (K) KILL a line group.
         (L) LIST or (E) EDIT the characteristics of a line group.
         (A) ADD lines to, of (D) DELETE lines from a line group.
         (S) SHOW all line groups for this device.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: A ↵

         Name of device to be added: IAC1 ↵
         Device code [50]: ↵
         Base line number [0]: 24 ↵
         IAC device type [??]: 8 ↵
         IAC split baud rate [NONE]: ↵
         VT100 terminal support? [Y]: N ↵
         Asian language support? [NONE]: ↵

         Do you wish to add line groups to this device? [Y]: Y ↵

There are no line groups defined for IAC1. ↵
These lines are undefined: 0-7.

You may: (C) CREATE a line group.
         (M) MODIFY default terminal types.
         (Q) QUIT line group editing for this device.

         Enter choice: C ↵
```

Figure 4-9 A VSGEN Session for an MV/20000 (continued)

```
Please specify the following parameters:
        Free-form group name: CRT3 ↵
        Default terminal [CRT3]: ↵
        Terminal type [ASCII]: ↵
        Terminal description [DGC D200 compatible terminal]: ↵
        Input buffer length [128]: ↵
        Output buffer length [128]: ↵
        Lines per page [24]: ↵
        Characters per line [80]: ↵
        Break key function [BINARY]: ↵
        Data Bits [8]: ↵
        Stop bits [1]: ↵
        Parity [NONE]: ↵
        Baud rate [0]: 1200 ↵
        These characteristics are selected: EOC, ST, ULC, WRP
        Enter choices (or NEWLINE when done): MOD, MRI, SFF, RAF, RAC, NAS,
          EOL, RAT, UCO, FF, EOS, FKT, ESC, PBN, TSP, TO, NRM, PM ↵
        PBN ignored.
        TSP ignored.
        These characteristics are selected: EOC, EOS, EOL, ESC, FF, FKT, MOD, MRI
          NAS, NRM, PBN, PM, RAC, RAF, RAT, SFF, ST, TO, TSP, UCO, ULC, WRP
        Enter choices (or NEWLINE when done): ↵
        TCC timer value [40000]: ↵
        TCD timer value [5000]: ↵
        TDW timer value [1000]: ↵
        THC timer value [2000]: ↵
        TLT timer value [2000]: ↵
        Do you want to add lines to this group? [YES]: Y ↵
        Specify lines to add to group {CRT3}: 0 1 ↵
        Lines 0-1 were added to group {CRT3} producing 0-1.

This line group is defined for IAC1: 0-1
These lines are undefined: 2-7

You may: (C) CREATE or (K) KILL a line group.
        (L) LIST or (E) EDIT the characteristics of a line group.
        (A) ADD lines to, of (D) DELETE lines from a line group.
        (S) SHOW all line groups for this device.
        (M) MODIFY default terminal types.
        (Q) QUIT line group editing for this device.

Enter a command: A ↵

        Name of device to be added: LPB ↵
        Device code [17]: ↵

Enter a command: A ↵

        Name of device to be added: LPE ↵
        Device code [17]: ↵
        Illegal response
```

Figure 4-9 A VSGEN Session for an MV/20000 (continued)

```
        17 is already in use ↵
        Device code [17]: 57 ↵

        Enter choice: Q ↵

Do you want to save your changes? [YES]: Y ↵
        Saved.

Enter a command: E ↵

        Name of device to edit: BBU ↵
        Full or partial backup [F]: ↵
        Enable auto restart after powerfail [Y]: ↵

Enter a command: P ↵

        Swap [2147483647]: BOTH/DPJ12 ↵  (DPJ12 is an LDU named BOTH)
        Page [2147483647]: BOTH/DPJ12 ↵  (DPJ12 is an LDU named BOTH)
        Cache [128]: 512 ↵
        Minimum number system pageable pages [10]: 50 ↵
        Default file element size [4]: ↵
        Frequency [10]: ↵
        Access [YES]: ↵
        Initial program for PID 2 [CLI.PR]: ↵
        Initial IPC message for PID 2 []: ↵
        Max program load pages -noncontention [0]: 512 ↵
        Max program load pages -contention [0]: 128 ↵
        Fault time prepaging maximum [0]: 32 ↵
        Do you wish to use variable swapfiles [N]: ↵
        Do you wish to truncate swap files after use [N]: ↵
        Do you wish to truncate page files after use [Y]: ↵
        Size above which page files will be truncated [2048]: ↵
        Lowest priority for group 1 processes [255]: ↵
        Lowest priority for group 2 processes [258]: ↵
        Suppress soft tape error reporting [N]: ↵
        Default system dump device [MTB]: . ↵
        Maximum number of processes [255]: 400 ↵
        Do you wish to use the System Management Interface [N]: ↵
        Default offset from GMT [0:00]: -8:00 ↵
        System will automatically boot with defaults [Y ]: ↵
        Specify number of seconds to wait before booting [30]: ↵
        System will automatically re-boot after coming down [N]: Y ↵
        Specify number of seconds to wait before re-booting [30]: ↵
        System will automatically bypass system memory dump [N]: Y ↵
        Specify number of seconds to wait before bypassing dump [600]: ↵
```

Figure 4-9 A VSGEN Session for an MV/20000 (continued)

```
Enter a command: N ↵
        Enter new system name [none]: MSIS_02 ↵

Enter a command: B ↵

        Creating specification file

        Do you want to save TMP files? [Y] ↵

        System build in progress

        System build completed

Enter a command: Q ↵

Su)

Run the update tool to update the new system file (here, MSIS_02).
```

Figure 4–9 A VSGEN Session for an MV/20000 (concluded)

Testing the New System

To test the new system, first shut down the current system. (If the multiuser environment is up, make sure all users are logged off first). Type

Su) BYE↵
Do you really want to shut the system down? Y↵
Starting system shutdown date time

System shutdown
SCP–CLI>

Boot from disk:

SCP–CLI> RESET↵
SCP–CLI> BOOT 24↵ (Or BOOT 27 for DPF–type disks)

The bootstrap program displays the Operating System Load Menu:

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu
. . .
Enter choice [1]:

From the operating system load menu, select choice 2 by entering 2. Depending on your computer, the bootstrap program may display the Technical Maintenance Menu; or it may ask the date, time, and offset from GMT.

If it asks *Date (MM/DD/YY)?*, type today's date. For example, for November 22, 1992, enter 11 22 92. To answer *Time (HH:MM:SS)?*, type the time, using a 24–hour clock. For example, for 4:30 p.m., enter 16 30. To answer the *Offset* question, enter 0.

The bootstrap program displays the Technical Maintenance Menu:

Technical Maintenance Menu

. . .
6 Run a specified program
. . .
Enter choice [1]:

From the Technical Maintenance Menu, select choice 6 by entering 6. The program asks

Pathname?

Type the full pathname of your new system (from the root directory) next to the *Pathname?* prompt. For example, if your system is named MSIS_01.PR, type

Pathname? :SYSGEN:MSIS_01.PR↵

Again, depending on your computer, the bootstrap program may ask the date, time, and offset from universal time; or it may ask *Override default specs?* (skip to that question next). If asked the date and time questions, answer them as explained above.

The bootstrap program displays *File Loader* messages, then an AOS/VS banner, and

Override default specs [N] ?

(If you see the message *WARNING: System patch area contains no patches*, continue bringing up AOS/VS—but *immediately* install the latest AOS/VS update as described in the previous section. Installing patches—which is one of the things the update does—is extremely important. Unless you install the update, your system may crash repeatedly.)

The system is asking about specifications you gave to VSGEN for the new system. You don't want to override, so press NEW LINE.

Override default specs [N] ?↵

A pause occurs here; then

AOS/VS CLI Rev n date time
)

The new, tailored system is running. Skip the next section.

If the New System Doesn't Come Up or Work Properly

If the new system doesn't come up, there will usually be an error message that describes the problem. The solution may be simply a matter of editing a device in the specification file. If the message is *AOS/VS FATAL ERROR*, note the figures displayed and run ESD (Emergency Shutdown) by entering S, as explained in Chapter 6. Then boot from disk (BOOT nn) and bring up the starter system.

To bring up the starter system, choose option 1 from the Operating System Load Menu or wait for the time-out delay. (The starter system is the default system. If this doesn't work, try option 6, *Run a specified program*; when it asks for a pathname, specify :SYSGEN:SYS.PR.)

Then, if you think the problem is in the VSGEN spec, execute VSGEN with the /DEFAULT=*sys* switch; fix the offending device spec(s); give the original name in the Name command; use the Spec command to overwrite the old specification file; then use the Build command again and repeat the "Testing the New System" section, above.

If the new system fails again, or if the problem isn't the VSGEN spec, perhaps you haven't updated your AOS/VS system. Doing this is described in "Updating the New System," earlier in this chapter. If you haven't done this, do it now. Then test again). If the new system fails again, consult your Data General support organization.

A Fast Checkout for the Tailored System

If you know that your VSGEN specification file is okay (perhaps because you've used it to build a system that works), you can skip this section.

If your VSGEN specification file is new, you may want to check a few basic things. (You won't really know that the system works until you've brought up the multiuser environment, as described in the next chapter.) As a basic test, try a few CLI commands:

```
) SEARCHLIST :UTIL⏎
) FILES/AS/S :PAGE:+⏎
Warning: Read or write access is required, file :PAGE:+
) SUPERUSER ON⏎
Su) FILES/AS/S :PAGE:+⏎

... (Sorted list of files in directory :PAGE) ...
```

This sequence of commands sets the search list to :UTIL, and then displays file access controls and shows you the FILESTATUS /S (Sort) and /AS (Assortment) switches.

Now, if you have any other LDUs (formatted with the Disk Formatter), try to initialize and release them. For example, assume you have an LDU with disk unit name DPJ1 that you named UDD1. With unit DPJ1 ready, type

```
Su) INITIALIZE @DPJ1⏎          (Initialize using unit name)
UDD1                           (System displays LDU name)
Su) RELEASE UDD1⏎              (Release using LDU name)
```

Try this with all your LDUs. If the commands work, your disk controllers were correctly identified to VSGEN. If a command doesn't work, you forgot a controller or entered an incorrect controller specification; the VSGEN specification file may need editing.

Turn your line printer on; make sure paper in it is aligned; put the printer on line; and type

```
Su) COPY @LPB :UTIL:AOSVS.PANICS.SR⏎     (Or @LPE or @LPD instead of @LPB)
```

The @ is shorthand for the peripherals directory. This shows that the line printer works and also gives you a copy of the panics file—useful for describing fatal AOS/VS errors.

Type

```
Su) CHAR/DEFAULT⏎

... (Displays terminal characteristics) ...

Su)
```

This shows you the default characteristics set up at VSGEN for the system console.

Type

```
Su) PROCESS/DEFAULT/IOC=@CON2 :CLI↵
PID: 3
Su)
```

This creates a CLI process to run on the terminal whose console filename is CON2. Go over to the console connected as CON2 (line 0 of the asynchronous controller) and verify the baud rate and parity settings on the back (if it's a CRT). Make sure it is on line.

Wait a few moments; then press NEW LINE a few times. If the CLI prompt appears, this means that you have at least one line connected and identified to VSGEN correctly. It's very good news. But if nothing happens on CON2, the hardware may be wrong, or you may have made a mistake in VSGEN.

To terminate the process on CON2, enter BYE on the CON2 keyboard.

Next try some magnetic tape I/O with the tailored system (if it has tape). Get a blank tape, make sure it's write enabled, and mount it on unit 0. Put the tape unit on line. Type

```
Su) DIR :↵
Su) DUMP/V @MTx0↵          (x is B, C, D or J, depending on tape unit model)
```

... (System verifies files dumped) ...

Press CTRL−C, then CTRL−A.

Error: Console interrupt

```
Su) REWIND @MTx0↵          (x is B, C, D, or J, as above)
```

If these commands work, it shows that the tape driver software for unit 0 is okay; it also shows how to interrupt CLI commands with CTRL−C CTRL−A. You can dismount the tape.

You've done nearly all the testing it's practical to do without bringing up the multiuser environment.

Making a Tailored System Tape Set

After testing the system—but before loading other software—you should make a system tape set of your tailored system. (A tape set can include one or two tapes, depending on the capacity of your tape.) Having a system tape set can save many steps if you need to rebuild your system LDU.

We suggest making a system tape set now because the SYSTAPE.CLI macro includes all files in :UTIL, as well as in :HELP, :SYSGEN, and :UPDATE. If these directories include files not shipped with AOS/VS that collectively require significant space—for example, you may have large INFOS II database files, or CEO files in or below :UTIL—running the macro is almost certain to fail because the tape set will not be large enough to hold all of the files. (If you have already loaded other software, you can modify the SYSTAPE.CLI macro to exclude files and directories so that you don't run out of space while writing to the tape set. To modify the macro, use a text editor to exclude those files by modifying the templates in the DUMP_II commands that use templates. For example, to exclude :UTIL:CEO_DIR, change both occurrences of UTIL:# to UTIL:#\CEO_DIR.)

To make a tailored system tape set, follow these steps.

1. Get two write-enabled blank tapes (only one if using 2400-foot tape). Mount a tape on tape unit 0, the tape drive you used for the initial AOS/VS load. Make sure power is ON; then put the unit on line (for a dual-mode MTB unit, press BOT, then ON LINE).

2. Type

   ```
   ) SUPERUSER ON⟫
   Su) DIR :SYSGEN⟫
   Su) SYSTAPE[/16K][/TWO_VOLUMES] @MTx0 sys.PR⟫
   ```

   (x is B, C, D, or J, depending on the unit type; MTJ tapes require using the /16K switch. sys is your tailored system name.)

   CLI COPY and DUMP_II commands in the SYSTAPE.CLI macro create a tailored system tape. SYSTAPE.CLI uses a default buffer size of 2048 bytes for bootable and standalone programs and a default buffer size of 8192 bytes for SYSBOOT, :SYSGEN:sys.PR (your tailored system), and the dump files (tape files 6 and 7). The /16K switch, however, uses a buffer size of 16384; use it for 21-Mbyte and 130-Mbyte MTJ cartridge tapes. Unless you are using a 2400-foot tape, use the /TWO_VOLUME switch; when the first tape is full the macro will prompt for the second volume.

3. When the CLI SUPERUSER prompt returns, rewind the tape:

   ```
   Su) REWIND @MTx0⟫
   Su)
   ```

   Remove the tape from the unit, remove the write ring from the tape, and clip the cover on the tape.

NOTE: If the system encounters a flawed section of the tape, it will display the message *HARD error* or *Physical unit failure*, and then offer to continue or quit. Do not continue; a hard error on the system tape may make it unusable in the future. Instead, quit (Q). Then dismount the tape, find another tape, mount it, and reissue the SYSTAPE command.

Any system tape you make using the SYSTAPE macro has the same format as the AOS/VS system tape set supplied by Data General. However, it has your tailored, patched system in file 5 instead of the starter system. And it has all files and programs currently in your root (:), :UTIL, :HELP, and :SYSGEN directories—including the ones your site created, *and* a copy of the microcode/SCP–OS file (MVnnnn.MCF).

If you ever need to rebuild a blank LDU using this tape set, you can abbreviate the procedures given in Chapter 2 or 3. You won't need to load microcode from a separate tape, or run VSGEN again. In fact, after you load tape file 7, you'll come up in AOS/VS with the root, :UTIL, :HELP, and :SYSGEN directories restored as of the time the system tape was made. Because SYSTAPE uses a default buffer size of 8192 (or 16384 if you specified the /16K switch), you will have to specify LOAD/BUFFERSIZE=8192 or 16384 when loading tape file 7. LOAD_II and the INSTALLER automatically match buffersize.

Making a Tailored System Diskette

To make a tailored system diskette, follow these steps.

1. Get a new, blank diskette and insert it in unit 0.

2. Type

```
) SUPERUSER ON⤶
Su) DIR :SYSGEN⤶
Su) COPY @DPJ10 sys.PR⤶
```

(sys is your tailored system name; for example, SYS_7.70.PR. If the disk and diskette share a controller, the diskette name is DPJ1.)

... (Delay while the sys.PR file is copied to diskette) ...

```
Su)
```

3. Remove the diskette from the unit, and return it to an outer envelope.

This copy diskette has the same format as the starter system diskette supplied by Data General. If you ever need to rebuild a blank LDU (Chapter 2), you can load your tailored system from this diskette and skip VSGEN.

Making the Tailored System the Default System

By default, SYSBOOT brings up the default system. The first time you bring up a new revision of AOS/VS, this is the installed starter system. If you've named another system as the default system, SYSBOOT will bring up that system instead of the starter system. Now that you have tested your tailored system, you can tell SYSBOOT the name of your tailored system so that in the future SYSBOOT will bring it up. To make the tailored system the default system, follow these steps.

1. Shut down the current AOS/VS system, if one is running. (If the multiuser environment is running, make sure all users are logged off first.) To shut down, enter BYE; then type Y and press NEW LINE.

2. Boot the starter system:
   SCP–CLI> RESET↵
   SCP–CLI> BOOT 24↵ (Or 27)

   SYSBOOT displays the Operating System Load menu:

   Operating System Load Menu

   1 Continue immediately with operating system load
   2 Enter the Technical Maintenance Menu
   . . .
   Enter choice [1]:

3. To enter the Technical Maintenance Menu, select option 2:

   Enter choice [1]: 2↵

4. Choose option 8 from the Technical Maintenance Menu:

   Technical Maintenance Menu

   . . .

   8 View or change the default operating system filename
   . . .

   Enter choice [1]: 8↵

5. SYSBOOT prompts you for the pathname of the tailored system:

   Default operating system [xxx]:

   If the system named in *pathname* is the one you want, press NEW LINE. If not, type the pathname of your tailored system, starting from the root. For example, type

   Default operating system [xxx]: :SYSGEN:SYS_7.70.PR↵

6. Now bring up the tailored system by choosing option 1, "Load and start the default operating system."

   Enter choice [1]: ↵

   ... (pause) ...

7. The date and time questions are skipped on computers with a working boot clock.

   Date (MM/DD/YY)? 11 22 92↵ (Type the current date.)

   Time (HH/MM/SS)? 17 24↵ (Type the current time.)

   Offset from universal time [+00:00]?↵ (Use default offset.)

8. *Override default specs [N]?*↵

   ... (pause) ...

9. *AOS/VS CLI Rev n* *date* *time*

Your tailored system is running and it is the default system. Until you change the system or the default, this system will be the default system.

Generating Other AOS/VS Systems

After you generate an AOS/VS system that you like, you can use the new specification file as a base for future tailored AOS/VS systems.

There are two main reasons for generating a new AOS/VS system. The first is to change a specification (as when you acquire a new device) or change software parameters like the number of PCs or real–time clock speed. The second reason is to install a new AOS/VS release. For this second reason, be sure you've applied the latest update before running VSGEN.

You can generate a new system for either case using the /DEFAULT= switch. For interactive work, if you want to view (and possibly change) settings, use only the /DEFAULT= switch. For example,

```
Su) X VSGEN/DEFAULT=MSIS_01↵
```

For noninteractive work, if you know you don't want to change VSGEN settings, you can run a noninteractive session:

```
Su) X VSGEN/BATCH=MSIS_01/YES↵
```

If EXEC is running, you can run VSGEN in a batch stream by inserting the CLI command QBATCH before the X VSGEN command above. The QBATCH command lets you retain use of your terminal while VSGEN is running.

In either case, VSGEN will warn you if any interrevision changes may cause problems.

When you name a new AOS/VS system, you determine whether the old system will be deleted. If you give the new system the same name as an old one, the old system will be deleted (after VSGEN gets confirmation). If you give the new system a different name, the old system will continue to exist in directory :SYSGEN.

If an old system is defective, or its specifications are obsolete, you will probably want to delete it. You can use the CLI DELETE command for this, or run VSGEN and give the new system the same name as the old—whichever is most convenient. If you include the AOS/VS revision in the system name, system file names may differ; therefore old system files may persist, and you will have to use the DELETE command to remove them. But don't delete the original specification files (with .CSF and .SSF suffix) that you will use as a base for new systems. Delete only the sys.PR, sys.ST, and .TMP files (described in Table 4–1).

NOTE: If you want a newly generated system to become the default system, you *must* make it the default as described earlier. This is true even if the system you just generated has the same name as the old default system.

For more information on using an existing specification file to generate a tailored AOS/VS system, see the earlier section, "Using an Existing VSGEN Specification File." Loading new revisions of AOS/VS is described in Chapter 7, "Handling Updates and New Revisions from Data General."

Supporting Synchronous Devices (DCUs, ISCs, MCP1s, LSCs)

AOS/VS supports synchronous devices *only* for bisynchronous communications via RJE80, HASP II, or RCX70 emulator software—or if you want to write applications that make system calls to synchronous lines. For other applications (using DG/SNA, XODIAC/XTS, or TCP/IP network software), the network software—not AOS/VS—will run the synchronous controller; and you must run the network generation program, not an AOS/VS program. Therefore, if your system has one or more synchronous controllers that you will use exclusively for DG/SNA, XODIAC/XTS, or TCP/IP applications, you can skip this section.

Synchronous devices supported directly by AOS/VS include Data Control Units (DCUs), Intelligent Synchronous Controllers (ISCs), Multicommunications Processors (MCP1s), and (on DS/7500, MV/2500 DC, MV/2000 DC, and MV/1400 DC systems) Local–Bus Synchronous Controllers (LSCs).

A DCU is a processor with one or more synchronous communications multiplexors (SLMs); it can handle as many as eight synchronous (sync) lines.

An ISC has a processor and synchronous multiplexors on one circuit board; it can handle up to two synchronous lines. An MCP1 synchronous controller or an LSC controller is like an ISC; you identify it the same way as an ISC.

A DCU, ISC, MCP1, or LSC is required if your system is to use synchronous lines. Synchronous lines are needed for communication with IBM systems or IBM software emulators (RJE80, HASP II, RCX70).

To have AOS/VS support the synchronous lines, you must run the Data General–supplied program BSCGEN; and later, you must run a process called GSMGR that will use the specification file created by BSCGEN. (As mentioned above, you need to have AOS/VS support synchronous lines only if your system will use IBM software emulators—RJE80, HASP II, RCX70—or if your own applications will make system calls to the synchronous lines.)

You need not run BSCGEN *every time* you run VSGEN. However, you must run it when your synchronous line configuration changes or when the AOS/VS Release Notice calls for running it.

The BSCGEN Program

BSCGEN creates a specification file with information about synchronous lines. A program called GSMGR (global synchronous manager) uses this information to manage the line hardware, allowing another program (like RJE80) to use the lines. GSMGR is described in Chapter 5.

To create the synchronous specification file that GSMGR needs, you must run the BSCGEN program.

BSCGEN Dialog

BSCGEN—like VSGEN—is in directory :SYSGEN. To execute it, type the following commands.

```
) SUPERUSER ON⟫
Su) DIR :SYSGEN⟫
Su) XEQ BSCGEN⟫
```

BSCGEN executes and asks the following questions. Valid responses are in parentheses. Default answers (answers that BSCGEN will use if you answer by pressing NEW LINE) are in brackets, as usual.

Do you wish to:

A Create a spec file.
B Edit a spec file.
C Update a pre rev 2.00 spec file.

Enter your selection:

Before AOS/VS revision 2.00, synchronous specification files were created by VSGEN, with the name sys.SYNC where sys was the name given to the new AOS/VS system. If there is an old specification file that you want to update, enter C and press NEW LINE. If there is a BSCGEN-created specification file that you want to view or edit, type B and press NEW LINE. To create a new specification file, type A and press NEW LINE.

Enter name of spec file:

Type the name of the specification file you want to create or edit. For a new file, we suggest the name sys.BSC. For example, use MSIS_01.BSC for an AOS/VS system named MSIS_01. If you want to edit or update a file, and the name you type is not a valid filename, BSCGEN repeats this question.

Do you want to set/change bisync buffer area size (4) ? [N]

The default buffer size is 4 pages (8 Kbytes). This size suits RJE80, HASP II, and RCX70. For the default size, press NEW LINE and skip the next question.

To specify a nondefault size, type Y and press NEW LINE. BSCGEN then asks the size:

Bisync buffer area size in 2 kbyte pages [4]

The valid range of buffer sizes is 1 to 26 (pages). The program that owns this buffer will run resident, so the buffer will always occupy memory while the program runs. Decide on the buffer area size you want, and type it. For example, for RCX70 on two terminals, type 4 and press NEW LINE.

What type is bisync controller # n (DCU200,ISC/2,LSC) [DCU200]

BSCGEN asks this question for each controller you have. If this device is a DCU, press NEW LINE for the default. Otherwise, enter ISC/2 or LSC.

Enter device code for controller # n [m]:

The default device code (*m*) for the first ISC or MCP1 synchronous controller is 25. The default code for the first LSC is 30. The default code for the first DCU is 40. For your first DCU, ISC/MCP1, or LSC, unless you know it is connected to a nonstandard device code, press NEW LINE for the default. If you know the device is connected to a nonstandard code, or if no default code is displayed, type the correct device code and press NEW LINE.

Enter lines to be genned on controller # n: [0, 1]

With an ISC/MCP1 or LSC, press NEW LINE for the default. On a DCU, each SLM usually manages two lines; there can be up to four SLMs—hence eight lines, usually numbered 0 through 7. For a DCU, type the range of lines handled (for example, enter 0,3); or with two lines, press NEW LINE for the default.

Enter logical line number for physical line # m: [n]

Generally, for the first ISC, MCP1, LSC, or DCU, the logical line number should be the same as the physical line number, so press NEW LINE for the default.

For the second and subsequent ISC or MCP1, the logical line number should be (2 * number–of–previous–devices), and then (2 * number–of–previous–devices)+1. For example, for the second ISC, the first line would be 2 and the second line 3.

For the second DCU (if any), you may want the logical line numbers to follow those of the first (not required). BSCGEN displays as default the lowest available line number. If you want the default, press NEW LINE; otherwise, type the desired line number and press NEW LINE.

For either device, the name of the synchronous line will be @SLNn,where n is the number you specify or take as the default, when this specification file is being used.

Is this line switched or dedicated (SWT,DED): [SWT]

If this synchronous line will use a dedicated (leased) phone line, enter DED. If it uses a switched (standard) phone line, press NEW LINE for the default.

Is this line half– or full–duplex (H,F): [H]
(Full–duplex lines will have RTS high always.)

Half–duplex synchronous lines are more common than full–duplex synchronous lines. The bisync protocol is a half–duplex protocol. So generally, you should take the half–duplex default by pressing NEW LINE. This will work with either a half– or full–duplex modem. However, if you *know* that this line will be on a full–duplex modem, *and* that the modem takes a while to switch from transmit to receive, you should enter F. The *RTS* message tells you that the GSMGR process will keep RTS (the ready–to–send signal) high always on full–duplex lines.

For a DCU, BSCGEN skips the next two questions.

Is the clock for this line external? [Y]

Each ISC, MCP1, and LSC has an internal clock, with a frequency that you can select (next). But most modems have and depend on their own clocks. So generally, if this is a modem line, or if you want the line on an external clock, press NEW LINE for the default. If you specify an external clock, BSCGEN skips the next question.

To use the ISC or MCP1 clock, enter N. BSCGEN then asks

Specify internal clock frequency in baud
(300,600,1200,2400,4800,9600,19200,38400) [2400]

Enter the desired baud (data) rate. The device on the other end of the synchronous line must match this baud rate. The default, 2400, is the highest rate that works reliably over an ordinary modem and switched phone line. For the default, press NEW LINE; for a different baud rate, type the desired number and press NEW LINE.

Now, for every line on this device, BSCGEN returns to the *Enter logical line number* question. When you have described all the lines, it asks

Do you have additional bisync controllers ? [N]

If you have another ISC, MCP1, LSC, or DCU to describe, type Y and press NEW LINE; BSCGEN then returns to the *What type is bisync controller...* prompt.

If this was the last ISC, MCP1, LSC, or DCU, press NEW LINE. BSCGEN then asks

Do you wish to display current configuration ? [Y]

BSCGEN gives you this chance to review the specifications entered. To review the specifications, press NEW LINE; BSCGEN then displays them. To skip the specifications, type N and press NEW LINE; BSCGEN then terminates.

If you pressed NEW LINE to see the current configuration, BSCGEN asks

Do you wish to save this spec file ? [Y]

If you think the specification file has many errors, you may want to enter N and rerun BSCGEN from scratch. But you can always rerun BSCGEN to edit the file and correct errors. So generally, you should press NEW LINE. BSCGEN now terminates.

The synchronous specification file is done (along with a display file, named spec.DSP, that you can print). Both files are in directory :SYSGEN. Later, the specification filename will be passed to the GSMGR process when GSMGR is started up (described in Chapter 5).

BSCGEN Example

Figure 4–10 shows a sample BSCGEN dialog for an ISC.

```
Su) XEQ BSCGEN ↵

Do you wish to:
        A  Create a spec file.
        B  Edit a spec file.
        C  Update a pre rev 2.00 spec file.
Enter your selection: A ↵

Enter name of spec file: MSIS_01.BSC ↵

Do you want to set/change bisync buffer size ( 4) ? [N] ↵

What type is bisync controller # 0 (DCU200,ISC/2,LSC) [DCU200]ISC/2 ↵

Enter device code for controller # 0 [040] ↵

Enter lines to be genned on controller # 0 [ 0, 1] ↵

Enter logical line number for physical line # 0: [ 0] ↵

Is this line switched or dedicated (SWT,DED): [SWT] ↵

Is this line half– or full–duplex (H,F): [H] ↵
(Full–duplex lines will have RTS high always.)

Is the clock for this line external ? [Y] ↵

Enter logical line number for physical line # 1: [ 1] ↵

Is this line switched or dedicated (SWT,DED): [SWT] ↵

Is this line half– or full–duplex (H,F): [H] ↵
(Full–duplex lines will have RTS high always.) ↵

Is the clock for this line external ? [Y] ↵

Do you have additional bisync controllers ? [N] ↵

Do you wish to display current configuration ? [Y] ↵

... (Display) ...

Do you wish to save this spec file ? [Y] ↵

Su)
```

Figure 4–10 A BSCGEN Session for an ISC

What Next?

If this was your first system, you will want to create the multiuser environment, which will be easier than what you've done thus far.

If this wasn't your first system, you might want to bring up EXEC and user processes, and perhaps run a few applications to see how they do.

End of Chapter

Chapter 5
Creating the Multiuser Environment

Read this chapter

- When you have generated and tested your first tailored AOS/VS operating system and want to create an environment where many people can use it;
- Whenever you want to create a brand–new multiuser environment, or some useful macros to help manage this environment.

This chapter leads you through the steps needed to create a multiuser environment. It assumes that a tailored AOS/VS operating system has been generated and tested, and is running—as described in Chapter 4.

The AOS/VS multiuser environment is based on two utility programs:

PREDITOR, the user profile editor, which lets you create individual profiles (account definitions) for each user.

EXEC, the executive program that supervises user logon and logoff according to PREDITOR profiles, and manages printing and batch queues. Even if your system has no user terminals, you need EXEC to manage printer and batch queues, and perhaps for labeled tape backup.

Using PREDITOR, you create a profile for each person who will use the system. Next you initialize EXEC. Then, you edit some macros with a text editor so that you can bring the multiuser environment up or down with one command.

Next you consider other Data General software, like compilers, that you acquired with AOS/VS, and you create a tailored error message file for these. Finally—to make life easier for users—you create log–on messages and perhaps help messages.

This chapter explains how to do all these things. The major sections are

- Creating the Initial Profiles
- Initializing EXEC and Its Queues
- Using the SED Editor to Create Useful Macros
- Editing the UP.CLI and DOWN.CLI Macros
- Using Other Data General Software
- Making Life Easier for Users
- Overview of Your System File Structure

Creating the Initial Profiles

This section leads you through a session in which you create two classes of profiles:

The *operator profile*, which provides all privileges and special powers needed to control the system.

User profiles, which provide only those privileges that users actually need.

Later, as your system evolves, you may want to edit individual profiles according to user needs.

Usernames, Passwords, and Network Access

The username is the identifier for every person who will use your system. The username is the only trace to the person who's responsible for the account. Usernames persist over long periods of time; they are not often changed (although PREDITOR does have a command to rename a profile).

Generally, your system should have a unique username for every person; more than one user should not use a single account. If, for any reason, you want to place a set of users in a group, think up a special identifier (like a suffix) for the usernames and make the identifier part of each username. Username groups are further explained in *Managing AOS/VS and AOS/VS II* in the chapter on security.

The rest of this section explains how usernames and passwords relate to access over networks. (If you won't be using networking, skip to the section on the operator profile.)

Data General network software you can run under AOS/VS includes TCP/IP (based on Ethernet/IEEE 802.3 protocol) and XODIAC™ /XTS (based on X.25 protocol). With both networks, a user must know a valid username/password pair on a host system to access the other host system. ("Host" means the same thing as node or member.) Eventually you'll need to coordinate usernames and passwords with other host systems—to have profiles created for your users on these systems and/or learn which remote users to create profiles for.

For access to the network by means of TCP/IP, your choices of username and password have no functional effect. There's no functional benefit to having the same username and password on all hosts (although most people find it easier to remember a single username/password pair than several different ones). If you'll be running TCP/IP with AOS/VS, skip to the section on the operator profile.

For access to the network by means of XODIAC/XTS, your choices of username and password are significant. There's some functional benefit to having each person's username and password be the same on each system.

(Password encryption, explained in the section "The Operator Profile," has no effect on network connections.)

XODIAC/XTS software includes agents (applications) that provide different services. Using XTS to access network hardware, the agents are the Resource Management Agent (RMA), the Virtual Terminal Agent (VTA), and the File Transfer Agent (FTA). Details on these agents follow.

RMA The Resource Management Agent allows users on one host to access devices and files on another host. RMA allows network pathnames and remote access without a logon requirement; for example, you could issue the following command:

```
TYPE :NET:REMOTE_SYSTEM:UDD:SANDY:MYFILE
```

For access to occur by means of RMA,

- The user must have a valid profile on both systems, *with the same user name and the same password* on both systems.
- The user must have the privilege *Access local devices from remote machines* on the remote host.
- The user must have access to the file or device he or she is trying to use. By default, each user has Owner access to files in his/her own user directory. Access to devices like tape units is governed by the unit's access control list (ACL) in the peripherals directory. Access to printers is generally governed by EXEC; users access print *queues* (not printers). You can control user access to queues and devices with the EXEC command ACCESS.

VTA The Virtual Terminal Agent lets users call remote hosts, log on, and use the remote host as if it were a local host. VTA is the only agent involved in PC networks, where a Data General system supports personal computers as if they were user terminals.

FTA The File Transfer Agent can transfer files from one host to another.

Agents VTA and FTA both require users to pass a logon procedure. For access to occur by means of VTA and FTA,

- The user must have a valid profile (but not necessarily the same username and password) on both systems.
- The user must have the privilege *Use virtual console* (for VTA) or *Access local resources from remote machines* (for FTA) on the remote system.
- The user must have appropriate access to the file or device. See comments under RMA.

For any agent, if the first two conditions aren't true, the user will receive an *Invalid username–password pair* message on attempted access.

NOTE: If you will use Data General's CEO® system over a network,remote printing no longer requires that the operator (OP) profiles match, effective with CEO Revision 3.00.

The Operator Profile

You—and the person who routinely operates the system—need a profile that gives you the special privileges that are needed to control the AOS/VS system.

The master CLI (PID 2) that runs on the system console already has all these powers. But having a profile and user directory will

- let you issue Q-series commands (QPRINT, QBATCH and the like) to the CLI;
- allow you to log on as the operator from any terminal (instead of restricting you to the system console); and
- provide a directory for your own files.

So you should create an operator profile first. Type

```
) DIR :UTIL⤶
) XEQ PREDITOR⤶
```

AOS/VS User Profile Editor Rev n date time
Command:

First, a quick list of some of the PREDITOR commands:

Command	What it does
B	Exits the PREDITOR session (Bye).
C	Creates a profile.
D	Deletes a profile.
E	Edits an existing profile.
H	Displays the PREDITOR commands (Help).
L	Lists a profile's specifications.
^ (Shift–F6)	"Back up" to the previous prompt or question in order to change it.

(For a complete presentation of all the PREDITOR commands, see *Managing AOS/VS and AOS/VS II.*)

You want to create a profile, so type C and press NEW LINE.

Username:

The operator profile must have a username of OP, so type OP and press NEW LINE.

Password change? (Y or NL)

The values displayed in parentheses are valid answers to the question. For a new profile, you must type and press Y NEW LINE.

New (6–15 chars):

On the system console, the master CLI is always available and a username and password aren't required to use it. But on any other terminal, you will need to enter the username and password to log on to the system. A password can be any combination of 6 to 15 of the following characters: upper– or lowercase letters (treated as uppercase), numbers 0 through 9, and all printable characters except for ^ (caret). You will be able to change the password when you log on. So, for simplicity, choose something like OPERAND and press NEW LINE.

Encrypt password [No]?

Password encryption is the process of converting a password into what appears to be a string of random characters. The system recognizes the random characters as the password, but a human reading the random characters cannot determine the password from them. PREDITOR can encrypt a password before storing it. From a security standpoint, this is desirable because no one—not even a superuser—can find out an encrypted password.

Once encrypted, a password can't be unencrypted. When the user changes passwords, the new password will also be encrypted. If a password is encrypted and you later decide to have it stored unencrypted, you must edit the profile, create a new password and type it, and say No to the *Encrypt password?* prompt. Then tell the user the new password. (He or she can change it if desired.)

It is a good idea to encrypt passwords, especially the operator's password, since the operator account is privileged. Encryption will *not* affect access by means of CEO Mail to remote hosts or CEO printing on remote printers, nor will it affect access by means of TCP/IP or XODIAC/XTS network software. We recommend that you type Y and press NEW LINE.

Initial IPC file [ ] change? (Y or NL)

The IPC file holds commands that the system will execute when this user logs on. It usually contains a sequence of CLI commands that do such things as set the default ACL, search list, and prompt. The IPC file is not required, but it can be very useful. The empty brackets mean that the default is null (no initial IPC file). You want one, so type Y and press NEW LINE.

New (0–63 chars):

PREDITOR wants the IPC file pathname.

The most flexible way to handle the log–on issue is to use one macro file for all users. This central macro can impose certain system–wide defaults for default ACL, search list, and so on. The last line of the central macro can execute a log–on macro in each user's directory. The user can then edit his/her own log–on macro with a text editor to change the defaults imposed by the central macro, if desired, or add other commands. The central macro can be changed easily if you want to change the defaults; for example, if you want to tighten security on the system.

You (or a user) can create the central and user log–on macros with a text editor, described later in this chapter.

The central macro pathname might be :UTIL:LOGON_CENTRAL.CLI. (Each user log–on macro might be something like LOGON.CLI.) But the central macro pathname is the one you should specify here. If you want to use this approach, type :UTIL:LOGON_CENTRAL.CLI and press NEW LINE.

Program [:CLI.PR] change? (Y or NL)

Take the default for this question by pressing NEW LINE. Then answer the next questions as follows.

Create without block [No]? (Y, N, or NL) Y↵

Use IPC [No]? (Y, N, or NL) Y↵

Use console [Yes]? (Y, N, or NL)↵

Use batch [Yes]? (Y, N, or NL)↵

Use virtual console [Yes]? (Y, N, or NL)↵

Access local resources from remote machines [Yes]? (Y, N, or NL)↵

Change password [Yes]? (Y, N, or NL)↵

Unlimited sons [No]? (Y, N, or NL) Y↵

Change priority [No]? (Y, N, or NL) Y↵

Change type [No]? (Y, N, or NL) Y↵

Change username [No]? (Y, N, or NL) Y↵

Access devices [No]? (Y, N, or NL)↵

Superuser [No]? (Y, N, or NL) Y↵

Superprocess [No]? (Y, N, or NL) Y↵

System manager privilege [No]?

The System Manager privilege lets you turn on System Manager privilege. System Manager privilege lets you

- Issue commands to EXEC.
- Change the system date and time.
- Start or stop the system log (SYSLOG).
- Change default device characteristics from other than PID 2.
- Clear a device (using the CLI command CLEARDEVICE or using the system call ?CLRDV) it doesn't own.
- Send messages to users who have requested no receipt of messages (using CHAR/NRM) on their terminals).
- Change the system bias factor.

(For definitions of terms used here, see the *AOS/VS and AOS/VS II Glossary.*)

Generally, the master CLI (which has all privileges anyway) issues all the commands that require the System Manager privilege. However, the operator may need System Manager privilege to initialize job processors *outside* the UP macro. Also, if your system will run classes using the optional Class Assignment and Scheduling Package (CLASP), the operator will need this privilege. If you want the operator to have System Manager privilege, type Y and press NEW LINE. To say no, press NEW LINE.

Modem [No]? (Y, N, or NL)

You may not want to give the operator profile the privilege to use a modem. If you do give this privilege, and an unauthorized user somehow learns the operator password, he or she can access and use the system at will from outside the installation.

If you will want to use a modem yourself, you can create another profile later, with modem privileges. For now, say No by pressing NEW LINE.

Change address space type [No]? (Y, N, or NL)

Answer Y to this; then accept the defaults for the following prompts:

Change address space type [No]? (Y, N, or NL) Y↵

Change working set limit [No]? (Y, N, or NL)↵

Priority [2] change? (Y or NL)↵

Max qpriority [0] change? (Y or NL)↵

Disk quota [500] change (Y or NL)

The default of 500 512–byte blocks is not much disk space. For now, change the quota to 15000. You can always change the disk quota again later with the PREDITOR Edit command. Type Y and press NEW LINE.

New (0–2147483647):

Type 15000 (do not type a comma) and press NEW LINE.

Logical address space – batch [–1 system default] change? (Y or NL)

Accept the default answers for this *Logical address space* and the next questions as follows.

Logical address space – batch [–1 system default] change? (Y or NL)↵
Logical address space – non–batch [–1 system default] change? (Y or NL)↵
Minimum working set size – batch [–1 system default] change? (Y or NL)↵
Maximum working set size – batch [–1 system default] change? (Y or NL)↵
Minimum working set size – non–batch [–1 system default] change? (Y or NL)↵
Maximum working set size – non–batch [–1 system default] change? (Y or NL)↵

Default user locality – non–batch [0] change? (Y or NL)

This and the following questions about locality are important only if you plan to use class scheduling on your system,using CLASP (see the manual *Using the Class Assignment and Scheduling Package (CLASP)*, or you can write a program to do it using AOS/VS system calls.

For the operator profile, we recommend the default, 0. For the default, press NEW LINE. (There's more information on this prompt and the next in the PREDITOR chapter of *Managing AOS/VS and AOS/VS II.*)

Use other localities – non–batch [No]? (Y, N, or NL)

The locality issue is meaningful only after you've built an application and created classes. For initial profiles, choose the default; press NEW LINE and skip the next question.

If you answer Y, PREDITOR asks

User locality – non–batch [ ] change? (Y or NL)

The operator will be able to change locality of non–batch processes to any locality you specify here. Respond by typing Y and pressing NEW LINE; then type the numbers of *all* localities you want the operator to have. Or press NEW LINE to prevent the operator from changing locality. Separate numbers with spaces. For example, you might enter 0 1 3 5.

Default user locality – batch [0] change? (Y or NL)

This prompt applies to batch processes only, letting you distinguish between users' interactive processes and batch jobs. For the operator profile, choose the default, 0. To accept the default, press NEW LINE.

Use other localities – batch [No]? (Y, N, or NL)

The locality issue is meaningful only after you've built an application and created classes. For initial profiles, choose the default; press NEW LINE and skip the next question.

If you answer Y, PREDITOR asks

User locality – batch [ ] change? (Y or NL)

The operator will be able to change locality of batch processes to any locality you specify here. Respond with the numbers of *all* localities you want the user to have, or press NEW LINE to prevent the operator from changing locality. Separate numbers with spaces. For example, you might enter 0 1 3 5.

User comment [ ] change? (Y or NL)?

User comments are simply text strings placed in the profile file; they are purely informational. They are handy for users' full names, dates, and/or telephone extensions. To enter a comment for the OP profile, answer Y and enter a useful comment; for example,

New (0–79 chars): OP PROFILE, 22 NOVEMBER 92↵

Command:

You've finished the Operator profile. As with any existing profile, you can list its specifications by typing L, then NEW LINE, and then the username and NEW LINE again. You can edit its specifications one by one by typing E, NEW LINE, and then the username.

Whenever you run it, PREDITOR looks for the existence of directory :UDD. If no file with the pathname :UDD exists, PREDITOR creates directory :UDD. For every profile you create, PREDITOR creates a user directory (with disk space limit specified) in :UDD, and the system creates a profile in :UPD (the user profile directory). Each user directory and profile is named the username; for example, :UDD:OP for username OP.

Standard User Profiles

While users' needs vary, you may find that most of your users have more in common than not. PREDITOR has an internal profile that you can edit to fit all or most of your user community. You can then create profiles for each user on your system and accept *your* default answers, changing only one or two for individual cases.

To set up the default profile, edit PREDITOR's internal default profile (!DEFAULT!) as in the following dialog. The values we show here apply to a mix of programmers and CEO users running CEO Revision 3.20. For a complete presentation of PREDITOR, see *Managing AOS/VS and AOS/VS II*. For a thorough discussion of PREDITOR requirements for CEO, see *Managing the CEO® System*.

Command: E↵
Username: !DEFAULT!↵
Password change? (Y or NL) Y↵
New (6–15 chars): GENERAL↵
Encrypt password [No]? Y↵
Initial IPC file [ ] change? (Y or NL) Y↵
New (0–63 chars): :UTIL:LOGON_CENTRAL.CLI↵
Program [:CLI.PR] change? (Y or NL)↵
Create without block [No]? (Y, N, or NL) Y↵
Use IPC [No]? (Y, N, or NL) Y↵
Use console [Yes]? (Y, N, or NL)↵
Use batch [Yes]? (Y, N, or NL)↵
Use virtual console [Yes]? (Y, N, or NL)↵
Access local resources from remote machines [Yes]? (Y, N, or NL)↵
Change password [Yes]? (Y, N, or NL)↵
Unlimited sons [No]? (Y, N, or NL)↵
Sons [1] change? (Y or NL) Y↵
New (0–1023): 15↵
Change priority [No]? (Y, N, or NL)↵
Change type [No]? (Y, N, or NL)↵
Change username [No]? (Y, N, or NL)↵
Access devices [No]? (Y, N, or NL)↵
Superuser [No]? (Y, N, or NL)↵
Superprocess [No]? (Y, N, or NL)↵
System manager privilege [No]? (Y, N, or NL)↵
Modem [No]? (Y, N, or NL)↵
Change address space type [No]? (Y, N, or NL) Y↵
Change working set limit [No]? (Y, N, or NL)↵
Priority [2] change? (Y or NL)↵
Max qpriority [0] change? (Y or NL)↵
Disk quota [500] change? (Y or NL) Y↵

New (0–2147483647): 15000↵
Logical address space – batch [–1 system default] change? (Y or NL)↵
Logical address space – non–batch [–1 system default] change? (Y or NL)↵
Minimum working set size – batch [–1 system default] change? (Y or NL)↵
Maximum working set size – batch [–1 system default] change? (Y or NL)↵
Minimum working set size – non–batch [–1 system default] change? (Y or NL)↵
Maximum working set size – non–batch [–1 system default] change? (Y or NL)↵
Default user locality – non–batch [0] change? (Y or NL)↵
Use other localities – non–batch [No]? (Y, N, or NL)↵
Default user locality – batch [0] change? (Y or NL)↵
Use other localities – batch [No]? (Y, N, or NL)↵
User comment [ ] change? (Y or NL)? Y↵
New (0–79 chars): GENERAL USER↵
Command:

This sequence of responses tailors PREDITOR's !DEFAULT! profile for general use. Now, when you create each profile, the new defaults you gave will appear; this allows you to accept the default value for more questions and save time. The original default values will return when PREDITOR terminates, so you should create all the profiles you need during this PREDITOR session.

"C2" Security Systems

AOS/VS Revision 7.60 is certified as capable of being run at the "C2" security level. If you run your system in this way, your standard user profiles will certainly not include *Superuser*, *Superprocess*, *System Manager*, or *Access devices* privileges, since these abilities permit a user wide-ranging access to files and control over processes and system control functions. To limit such access, and to make it easy to determine who has done what on the system, these abilities should be assigned only to those few individuals who need them to manage the system or perform special operations.

Similarly the ability to change username enables a user to assume other identities, such as OP, thus gaining access to others' files or even the entire system, and making tracing of his or her actions difficult. Do not allow a user to do this unless it is clearly necessary.

Direct access to a system from the outside, such as through a network or by modem, also endangers security by opening up the system to people who are not part of the immediate organization, who may be less well known, and who are thus less subject to control. Once logged on your system, a sophisticated person can find ways to circumvent file access controls and other security measures in order to acquire, change, or even destroy data or programs. For this reason a C2-type AOS/VS system may not include modems or networking in its configuration.

Users on a system without modems or networking obviously have no need to use a virtual console, access local resources from remote machines, or use a modem, and should not be assigned access to these devices. Otherwise, these privileges should only be assigned on an "as needed" basis.

For more information about security and C2 systems, see the manual *Managing AOS/VS and AOS/VS II*.

Creating the Profiles

For each profile you create based on !DEFAULT!, the only values you *must* specify (and cannot take a default for) are username and password.

Each username must be unique among usernames. As a username, you might use a person's first name and initial (if needed). For the password, you can specify the username, and tell the user to change it when he or she logs on (described later). The username is an AOS/VS filename. It can be one to 15 characters long and include the letters A – Z (lowercase are converted internally to uppercase), numbers 0 – 9, ?, $, . (period), and _ (underscore).

If anyone on your system uses other Data General systems (or vice versa) over a network, and his/her password is changed, it may also need to be changed on other systems. If he/she changes the password, have him/her log on to remote system(s) and change it there also. Username, password, and network issues were explained near the beginning of this chapter.

The following dialog shows how you might set up a profile for someone named Jack. It also explains some of the issues involved.

AOS/VS User Profile Editor *Rev n* *date* *time*
Command:

First, a quick list of some of the PREDITOR commands:

Command	What it does
B	Exits the PREDITOR session (Bye).
C	Creates a profile.
D	Deletes a profile.
E	Edits an existing profile.
H	Displays the PREDITOR commands (Help).
L	Lists a profile's specifications.
^ (Shift–F6)	"Back up" to the previous prompt or question in order to change it.

(For a complete presentation of all the PREDITOR commands, see *Managing AOS/VS and AOS/VS II.*)

Command: C↵

Username: JACK↵

Password change? (Y or NL) Y↵

New (6–15 chars): JACKJACK↵

Encrypt password [No]?

PREDITOR can encrypt a user's password before storing it. From a security standpoint, this is desirable because no one—not even a superuser—can read an encrypted password. Encryption will *not* affect access by means of CEO Mail to remote hosts or CEO printing on remote printers, nor will it affect access by means of TCP/IP or XODIAC/XTS network software. So we recommend that you type Y and press NEW LINE to change the setting to Yes.

Initial IPC file [:UTIL:LOGON_CENTRAL.CLI] change? (Y or NL)

For IPC, accept the default central macro name you specified earlier by pressing NEW LINE.

Program [:CLI.PR] change? (Y or NL)

Choose the default if you want the user to enter the CLI when he or she logs on to AOS/VS. Generally, the CLI is a good general-purpose choice because it allows users to access text editors and write programs in *all* Data General languages; the CLI also allows users to execute other programs like BASIC.

You can select either the standard 16-bit CLI or a 32-bit CLI, which has more processing power but uses more memory. The default version of the CLI on AOS/VS is the 16-bit CLI.

For most operations, the CLI versions appear identical. But for some tasks, the 32-bit CLI has major advantages. The 32-bit CLI has far larger stack space, which lets users run macros that call themselves recursively with little fear of exhausting CLI memory. The 32-bit CLI also has a command history feature, similar to the UNIX® history feature. The history feature offers convenient access to previous commands typed; it can save time.

On the other hand, the 32-bit CLI consumes more memory than the 16-bit CLI. If your system has 4 megabytes of memory or less or is near its memory capacity, or if it has reached capacity and encountered memory contention, you should use the 16-bit CLI for all users except, perhaps, the operator. Also, the 16-bit CLI offers labeled diskette support with its OPERATOR and DUMP commands, while the 32-bit CLI has no such support; so if a user wants to use labeled diskettes, he or she will need the 16-bit CLI.

You *can* specify the 32-bit CLI for some users and 16-bit CLI for others. Running two different CLI processes involves some overhead, but not as much overhead as having everyone run the 32-bit CLI.

The program pathname of the 32-bit CLI is :CLI32.PR; the pathname of the 16-bit CLI is :CLI16.PR. PREDITOR's default program name, :CLI.PR, is a link to the 16-bit CLI, so if you accept the default value, the user will get the 16-bit CLI.

If you want the user to use the 32–bit CLI, type Y, then :CLI32.PR and press NEW LINE again. If you know you want *all* users (except the operator) to use the 32–bit CLI, abandon this profile (using the ^ key) and edit the !DEFAULT! profile again to specify :CLI32.PR for program and begin creating the user profiles again; going back to edit the !DEFAULT! profile will save a lot of effort. For the 16–bit CLI, accept the default or type :CLI16.PR and press NEW LINE.

Possibly you may not want the initial program to be the CLI at all. If you want this user to come up in BASIC or some other program, type Y, press NEW LINE, then type the full pathname, with .PR suffix, of the program you want. For BASIC, there is often a BASIC directory off the root directory or in directory :UTIL. If such a directory exits (or you plan to install such a directory), answer Y, press NEW LINE, and then type :BASIC.PR or :UTIL:BASIC.PR, followed by NEW LINE, to start the user in BASIC.

There's another, more versatile, way to start a user in a program other than the CLI. For program, choose CLI.PR; later, edit the user's personal log–on macro to execute the program. Thus, when the user logs on, the central log–on macro will call the :UDD:username:LOGON.CLI macro; and :UDD:username:LOGON.CLI will execute the desired program. This approach has the advantage of allowing the user to log on even if the desired program isn't available: the user will log on into the CLI and receive a *File does not exist* message.

The disadvantages of letting the user log on in the CLI are

- the user can change his/her log–on macro and start in a program you don't want him or her to use;
- possible exposure to the CLI (which might confuse naive users); and
- the need for the user to exit from two programs (the non–CLI program and the CLI) when he or she logs off.

You can minimize these drawbacks by having the log–on macro use the CHAIN command, instead of XEQ, to run the desired program; for example, CHAIN CEO.

Create without block [Yes]? (Y, N, or NL)

Create without block means that the user can have at least two processes running concurrently. Users of CEO or of Data General's SWAT® debugger (for C, COBOL, FORTRAN 77, Pascal, or PL/I programs) must have the ability to create without block. So, press NEW LINE to accept the default, which is yes.

Use IPC [Yes]? (Y, N, or NL)

IPC, or InterProcess Communications calls, are available in assembly language and some higher–level languages. IPC access is needed wherever two or more active processes must communicate. IPCs are needed to use the SWAT debugger and CEO and to communicate with Data General server processes (like network processes or EXEC). Press NEW LINE to accept the default, yes.

Use console [Yes]? (Y, N, or NL)

A yes answer lets the user log on to a local user terminal. In practically all cases, answer yes. If you want the user to access your system only remotely (virtual console or access local resources questions, later), you can answer no to this question and yes to one or both of those questions. In most cases, press NEW LINE.

Use batch [Yes]? (Y, N, or NL)

A yes answer lets the user submit batch jobs using the CLI commands QBATCH and QSUBMIT. Batch offers an efficient way to handle noninteractive operations like compilations and sorts. Unless you know that you don't want this person to use batch processing, we suggest you press NEW LINE to accept the default:

Use virtual console [Yes]? (Y, N, or NL)

This prompt and the next are meaningful only if your system will run networking software (Data General's XODIAC/XTS or TCP/IP). The default answer (yes) allows this user to log on to your system from a remote host system (using XODIAC's VTA agent or TCP/IP's telnet program). The ability to use a virtual console also allows the user to use the XTS loopback feature. A value of N (no) prevents the user from logging on to your system using a virtual terminal.

For security reasons, a user should not have both the ability to use a virtual console and the Superuser privilege (asked later on). The Superuser privilege, with virtual console access, allows a user to explore your entire system from a terminal on a remote system.

If you don't plan to give the user the Superuser privilege, and do want the user to be able to log on to your system from a remote system, the answer to this prompt should be yes. Press NEW LINE to accept the default.

Access local resources from remote machines [Yes]? (Y, N, or NL)

The default answer allows a remote user to access files and devices like tapes and printers on your system. It allows remote users to access your system by means of XODIAC's RMA and FTA agents. Also, it allows remote users to access files on your system by means of the TCP/IP file transfer program, ftp.

Using local resources is different from being able to log on, as discussed in the previous question. If you want the user to be able to use local resources from a remote machine, press NEW LINE.

Change password [Yes]? (Y, N, or NL)

In general, users should be able to change their own passwords, per the default. But if you are setting up a public (guest) profile, to allow guests to use your system, the password must be public; and you should type N and press NEW LINE to prevent a guest from changing the password and barring other guests from the system. In most situations, press NEW LINE:

Unlimited sons [No]? (Y, N, or NL)

A user who can create unlimited son processes has the potential for monopolizing the system. Each process requires some CPU time, and disk I/O to the SWAP and/or PAGE directories. As far as possible, it's a good idea to minimize the number of processes. In most cases, press NEW LINE.

Sons [1] change? (Y or NL)

BASIC and clerical data entry users need fewer sons, 1 or 2. We recommend that you change the default for these users:

- For most non–CEO users, change the number of sons to 3.
- For most users of CEO 3.30 and later, change the number of sons to 15.
- For users importing documents from other computer systems, or using PRESENT with CEO 3.30 and later, change the number of sons to 18.

To change the number of sons from the default, type Y and press NEW LINE. PREDITOR will prompt *New (0–1023)*, and you can then type the new number of sons and press NEW LINE. To accept the default, 1 son, press NEW LINE.

Change priority [No]? (Y, N, or NL)

Processes compete for CPU time, and processes of the same type with higher priority (closer to 0) get preference. But a user process that can change priority can monopolize the system. Also, changing priority may change group status, which can change the way the process is scheduled (process groups are explained in *Managing AOS/VS and AOS/VS II*). So, unless you know a process *must* be able to change its priority, press NEW LINE.

Change type [No]? (Y, N, or NL)

Processes can run as one of three types: resident (always in mainmemory), pre–emptible (generally in main memory, but swappable if blocked), and swappable. Swappable is the most common type and is the default type for user and other processes. Resident is quite rare—used primarily for the AOS/VS peripheral manager and the system itself. If a process can change type, it can become resident, and perhaps hobble the system. So, unless you know that a process must be able to change its type, accept the default value, No, by pressing NEW LINE.

Change username [No]? (Y, N, or NL)

A process that can change its username can assume the name of OP—giving it access to many system files—or to another username, giving it access to that user's files. Again, unless you know that the process must be able to change its username, accept the default value, No, by pressing NEW LINE.

Access devices [No]? (Y, N, or NL)

The ability to access devices lets a process bypass operating system safeguards and access devices directly in machine language. Never give the ability unless the user is a systems programmer who needs it to write device drivers. Network and DG/SNA processes need this ability, but they can be given it from the master CLI. So, in most situations, press NEW LINE.

Superuser [No]? (Y, N, or NL)

The Superuser privilege allows a user process to bypass all file access controls and execute, read, modify, or delete any file on the system. Superusers can run PREDITOR to change their own (or other) profiles; and, unless you choose to encrypt passwords, they can view other users' usernames and passwords. The master CLI needs Superuser to control the system, but most other users do not need it, and they shouldn't have it. Accept the default answer, No, by pressing NEW LINE.

Superprocess [No]? (Y, N, or NL)

The Superprocess privilege allows a user process to terminate any process, including the master CLI, which would bring down the entire system. Superprocess also allows a process to change the type and priority of any process, or block any process, including itself. Unless you know a user needs Superprocess, accept the default answer, No, by pressing NEW LINE.

System manager privilege [No]?

The System Manager privilege allows the user to turn on System Manager privilege. System Manager privilege lets a user

- Issue commands to EXEC.
- Change the system date and time.
- Start or stop the system log (SYSLOG).
- Change default device characteristics from other than PID 2.
- Clear a device (using the CLI command CLEARDEVICE or using the system call ?CLRDV) it doesn't own.
- Send messages to users who have requested no receipt of messages (using CHAR/NRM) on their terminals).
- Change the system bias factor.

The System Manager privilege also lets a user initialize and release job processors (relevant only with a computer that has more than one job processor), create and delete process classes and logical processors, and change the locality of other users' processes. Use of classes and privileged system calls can affect the performance and security of your system.

The master CLI issues all the commands that require system manager privilege. Possibly, a system operator may need this privilege. Users, as a rule, *don't* need it. So, in most cases, accept the default answer, No, by pressing NEW LINE.

Modem [No]? (Y, N, or NL)

If you want this user to be able to log on using a modem, type Y and press NEW LINE. Superusers should not be able to use a modem, because the two privileges allow the user to explore the entire system from wherever a remote terminal is placed. Unless a user requires modem access, accept the default answer, No, by pressing NEW LINE:

Change address space type [Yes]? (Y, N, or NL)

The ability allows the user to execute 16-bit programs from a 32-bit program (like the 32-bit CLI) and 32-bit programs from a 16-bit program (like the 16-bit CLI). Press NEW LINE to accept the default, Yes.

Change working set limit [No]? (Y, N, or NL)

This ability allows the user to run programs that change the system default working set limit. The system default works best for nearly all programs. For the exceptions, this prompt is further described in the PREDITOR chapter of *Managing AOS/VS and AOS/VS*. In most cases, press NEW LINE.

Priority [2] change? (Y or NL)

Most user processes should be equal. For equality and simplicity, accept the default. (Details on priority appear in *Managing AOS/VS and AOS/VS II*.)

Max qpriority [0] change? (Y or NL)

When the multiuser environment is up and running, users will use Q-series commands (QPRINT, QBATCH) to print files and submit batch jobs. The qpriority determines the highest priority a user can specify for his or her jobs in queues (using the /QPRIORITY= switch).

Queue priority 0 is the highest priority; the default queue priority is halfway between 0 and 255. If you give the default to all users, they can receive equal treatment on their Q-series jobs. Unless you want to discourage a user's print or batch jobs, press NEW LINE.

Disk quota [15000] change? (Y or NL)

This prompt sets the limit on the size of the user directory that PREDITOR will create and the system maintain for this user process.

The default you entered in !DEFAULT! is 15,000 blocks: a good general-purpose amount of disk space. If this user process is for guests or other casual users, then you might want to specify less space (perhaps the original default, 500). If this user process will be used by many people (perhaps data entry clerks or students), you might want to specify a larger figure (like 100,000). If this user process will deal with a large database and its directory will contain the database(s), you might want to allot an entire single- or multiple-disk LDU to it.

A Model 6236 disk contains about 690,000 blocks; a Model 6239 disk contains about 1,110,000 blocks; and a Model 6297 disk contains about 1,600,000 blocks. A Model 6061 disk contains about 370,000 blocks and a Model 6122 disk contains about 540,000 blocks. A Model 6446 disk (in a Combined Storage Subsystem, CSS) holds about 450,000 blocks. Using these values, distribute your disk space accordingly.

If you want to change the space quota, type Y and press NEW LINE. PREDITOR will then display the prompt *New (0-2147483647);* type the new space quota.

To accept the default, 15000 blocks, press NEW LINE.

Logical address space – batch [–1 system default] change? (Y or NL)

This series of options gets a more detailed explanation in the PREDITOR chapter of *Managing AOS/VS and AOS/VS II*. For now, accept the default values for these prompts, as follows:

Logical address space – batch [–1 system default] change? (Y or NL)↵
Logical address space – non–batch [–1 system default] change? (Y or NL)↵
Minimum working set size – batch [–1 system default] change? (Y or NL)↵
Maximum working set size – batch [–1 system default] change? (Y or NL)↵
Minimum working set size – non–batch [–1 system default] change? (Y or NL)↵
Maximum working set size – non–batch [–1 system default] change? (Y or NL)↵
Default user locality – non–batch [0] change? (Y or NL)

This prompt has meaning only if you plan to use class scheduling on your system. For initial user profiles, accept the default, 0, by pressing NEW LINE.

Use other localities – non–batch [No]? (Y, N, or NL)

Localities are meaningful only after you've built your application and created classes. For initial profiles, accept the default; press NEW LINE to respond to this as well as to the following questions:

Default user locality – batch [0] change? (Y or NL)↵
Use other localities – batch [No]? (Y, N, or NL)↵
User comment [GENERAL USER] change? (Y or NL)?

As described earlier, you can enter here a comment about the user such as full name, date, and phone extension. Type Y, press NEW LINE, and then enter the desired text. For example,

User comment [GENERAL USER] change? (Y or NL)? Y↵
New (0–79 CHARS): JACK ARMSTRONG 30 DECEMBER 92↵
Command:

You have finished this profile. PREDITOR has written the profile into its profile directory, :UPD, as a file with the filename of the username; for example, JACK for a username of Jack. The profile is ready for use; Jack could successfully log on to the system.

To create another profile, type C, press NEW LINE, and run through this procedure again. (Remember that a user must have a profile to log on. Many people can have a common profile, usable through a common username and password; but, aside from using the system console, a person who doesn't know a valid username/password pair cannot use the system.)

When you have finished all the profiles you want, PREDITOR will prompt you to enter a command. Exit from PREDITOR and return to the CLI by typing

Command: BYE↵
Su)

Continue to the next section.

Initializing EXEC and Its Queues

With the user profiles done, you can initialize the EXEC process. This involves executing EXEC and creating and opening EXEC queues; generally, you need to complete this process only once.

Using the master CLI, set your search list to :UTIL and turn on Superuser:

```
) SEARCHLIST :UTIL⇂
) SUPERUSER ON⇂
Su)
```

Now start the EXEC process by typing the following:

```
Su) PROCESS/DIR=@/DEFAULT/NAME=EXEC EXEC⇂
PID 3
From Pid 3 : (EXEC) Revision n Ready
⇂
Su)
```

The PROCESS command creates a new process—just as XEQ does—but the PROCESS command is more versatile. The switches make the home directory of the EXEC process :PER (@ means :PER, the peripherals directory), give the EXEC process all privileges of its creator (/DEFAULT), and make its process name EXEC.

The *PID* messages indicate that EXEC is running as a process with Process ID 3 (PID 3), give its revision, and indicate that you can issue commands to EXEC. EXEC also creates additional processes XBAT, XMNT, XNET, and XLPT, but does not display messages about them.

Now create the printer queue, and then open the batch, printer, and mount queue by issuing the following commands to EXEC.

```
Su) CONTROL @EXEC CREATE PRINT LPT⇂
From EXEC time
Su) CONTROL @EXEC OPEN BATCH_INPUT⇂
From EXEC time
Su) CONTROL @EXEC OPEN BATCH_OUTPUT⇂
From EXEC time
Su) CONTROL @EXEC OPEN BATCH_LIST⇂
From EXEC time
Su) CONTROL @EXEC OPEN LPT⇂
From EXEC time
Su) CONTROL @EXEC OPEN MOUNTQ⇂
From EXEC time
Su)
```

The CONTROL @EXEC command directs the command through the CLI to EXEC. The commands created EXEC's default spool queues. These queues are stored in a file named :QUEUE:QUEUES. As long as this file exists, you'll never need to repeat these commands.

NOTE: Data General supplies a macro named CX.CLI that contains the CONTROL @EXEC command. So instead of typing CONTROL @EXEC command, you can type simply CX command. For example, above, you could type

```
Su) CX OPEN MOUNTQ
```

Now go to the line printer and make sure power is on, paper is aligned, and it is on line. The printer must be on line for EXEC to start it.

Open batch stream number 1 for processing by typing

```
Su) CONTROL @EXEC CONTINUE 1
From EXEC: time
```

Now start the batch queues on the printer. The device name of the printer is LPB, LPD, LPE, or LPJ, depending on the printer, as explained in Chapter 4. Type

```
Su) CONTROL @EXEC START BATCH_OUTPUT @LPx
```

where x is B, D, E, or J, depending on printer type.

```
From Pid 3 : (EXEC) @LPx Cooperative initiated
From Pid 3 : (EXEC) @LPx Paused
Su) CONTROL @EXEC START BATCH_LIST @LPx
From EXEC ...
```

Now start the print queue on the printer. The command for an LPB printer follows. (If your printer is uppercase only, include the argument UPPER in the EXEC START command; this tells EXEC to change lowercase characters to uppercase for printing.)

```
Su) CONTROL @EXEC START LPT @LPB
From EXEC          time
Su) CONTROL @EXEC CONTINUE @LPB
From EXEC time
Su)
```

For a type LPD printer, use device name LPD instead of LPB. For a type LPE laser printer, use device name LPE instead of LPB. And for a laser printer, use the /NL switch in the EXEC START command, as follows:

```
Su) CONTROL @EXEC START/NL LPT @LPE
```

This tells EXEC to preprocess NEW LINE characters as needed for the laser printer.

You have continued the batch streams, and started the batch queues and printer queue on the printer. Users can now issue Q–series commands. There are 4 default batch streams in the BATCH_INPUT queue, and we have activated (with CONTINUE) only number 1, but this is enough to start. Q–series commands are part of a CLI macro named UP.CLI, which will run on subsequent startups after you edit it, so you will not need to type them individually.

Letter–Quality and Laser Printer Queues

If your system has one or more letter–quality or laser printers (connected to asynchronous controller lines), create and open a printer queue for each. For example, if you have a letter–quality printer and laser printer, you might type

```
Su) CONTROL @EXEC CREATE PRINT LQP↵
Su) CONTROL @EXEC CREATE PRINT LASER↵
Su) CONTROL @EXEC OPEN LQP↵
Su) CONTROL @EXEC OPEN LASER↵
```

Now start the printer–managing process for the letter–quality and/or laser printers. The command to do this resembles the printer command, but the device name is @CONn, where n is the asynchronous line number plus 2. (Remember that a console filename is the line number plus 2.) So, for a letter–quality printer attached to line 13, you would type the following commands.

```
Su) CONTROL @EXEC START LQP @CON15↵
From EXEC          time
Su) CONTROL @EXEC CONTINUE @CON15↵
From EXEC          time
Su)
```

For a laser printer attached to line 13, you would type the following commands.

```
Su) CONTROL @EXEC START/NL LASER @CON15↵
From EXEC          time
Su) CONTROL @EXEC CONTINUE @CON15↵
From EXEC          time
Su)
```

Users can now queue jobs to the letter–quality printer using the QPRINT command and the /QUEUE=LQP switch, or to the laser printer with the /QUEUE=LASER switch.

Additional Line Printer and Plotter Queues

If you have additional line printers, initialize a queue for each as follows:

```
Su) CONTROL @EXEC CREATE PRINT LPT1↵
From EXEC          time
Su) CONTROL @EXEC OPEN LPT1↵
From EXEC          time
Su)
```

And if you have a digital plotter, initialize its queue.

```
Su) CONTROL @EXEC CREATE PLOT PLT↵
From EXEC          time
Su) CONTROL @EXEC OPEN PLT↵
From EXEC          time
Su)
```

Enabling a User Terminal

Now enable a user terminal. The terminal names are the console filenames set at VSGEN. If the terminals haven't been labeled, now is a good time to label them. Using white tape or tape labels, label each with its name, based on the console filename: @CON2, @CON3, and so on.

Choose a CRT (for example, @CON2), turn it on, and place it on line. Then enable it by means of EXEC:

```
Su) CONTROL @EXEC ENABLE @CON2↵
Console enabled, @CON2
From EXEC          time
```

@CON2 is ready for user logon. If you want to enable *all* terminals, type

```
Su) CONTROL @EXEC ENABLE/ALL↵
```

The ENABLE/ALL command tells EXEC to try to enable all terminals (all console files—files of type CON in directory :PER). ENABLE/ALL will return an error message *Device already in use, @CONn* for any terminal line on which you have started a printer process, as above. You can ignore this message for any line on which a printer process has been started.

If EXEC reports only this *Device already in use* message, or does not report any error, skip to the section "Logging On as a User."

If EXEC Fails to Enable a Terminal

If you receive a *Could not enable* or *File does not exist* error message from the EXEC ENABLE command, issue the ENABLE command again. If the error persists, type

```
Su) DIR @↵
Su) FILES/S↵
```

The FILESTATUS command lists the entries in directory @ (@ is a pseudonym for :PER). All the device and console filenames you specified during VSGEN should be in this directory. The console filenames in this directory should match the labels on the terminals. If the names do not match, you may have made a mistake during VSGEN, or the console line connections may be wrong. You may want to refer to the specific error message you receive in the manual *AOS/VS and AOS/VS II Error and Status Messages*.

Try enabling another terminal whose console filename appears in directory @ (:PER); and issue the CONTROL @EXEC ENABLE command with this terminal's console filename. For example, to enable a terminal associated with @CON11, you would type

```
Su) CONTROL @EXEC ENABLE @CON11↵
Console enabled, @CON11
From EXEC          time
```

Logging on as a User

Having enabled a terminal, walk over to it. The screen should display

***** AOS/VS Release n / Press NEW–LINE to begin logging on *****

Log on with the OP username and password you created for the operator with PREDITOR; that is, with the username OP and the password OPERAND. The password you type is not displayed. For example,

```
)
AOS/VS n / EXEC–32 n          date        time        @CONn
Username: OP)
Password: OPERAND)
--------
        Copyright (C) Data General Corporation, 1980 – 1992
        All rights reserved.
        Licensed material –– property of Data General Corporation

        This software is made available solely pursuant to the
        terms of a DGC license agreement which governs its use.

--------
Most recent logon       date        time

AOS/VS CLI Rev n        date        time
)
```

You have now logged on user OP and your user process is running a CLI process for you. This is your own CLI, independent of the CLI on the system console.

Now you know that EXEC's log–on function works, and that the hardware and software configuration of your system are probably correct.

Try some QPRINT commands:

```
) QPRINT :UTIL:UP.CLI)
Queued, Seq = 1, Qpriority = 127
) QPRINT :UTIL:AOSVS.PANICS.SR)
Queued, Seq = 2, Qpriority = 127
)
```

The line printer should now print the text of these files, each preceded by a header sheet that gives your username, file pathname, and date, among other things. You needn't read these files now—they served only to test the printer queue. Take the printed copy to the system console for later use.

If you have a letter–quality printer and created queues for it earlier, try it using a QPRINT/QUEUE=queuename command:

```
) QPRINT/QUEUE=LQP :UTIL:UP.CLI)
Queued, Seq = 3, Qpriority = 127
)
```

The letter–quality printer should print the text of UP.CLI, a prototype for your tailored UP.CLI macro. If nothing happens, or you get an error message, refer to the section "Letter–Quality and Laser Printer Queues," earlier in this chapter.

Try a batch command:

```
) QBATCH Write Hello⟫
Queued, Seq = 4
)
```

The batch output file is sent to the line printer, so the text string "Hello" should appear there, preceded by a printed header and log–on information. If this occurs, EXEC's batch function is okay.

To get a sense of the CLI's Help facility, type

```
) HELP⟫

... (CLI displays HELP topics) ...
)
```

The entire Help facility is available to any user from any CLI process. Use it whenever you have doubts or questions on a topic or command.

You can terminate the user process by typing

```
) BYE⟫

AOS/VS CLI Terminating date          time

Process n Terminated
Connect time hh:mm:ss
User 'OP' logged off @CONn          date          time

**** AOS/VS REV n / Press NEW–LINE to begin logging on ****
```

Then return to the system console.

Changing a Password

Usernames are public information, but passwords—including the OP password—should be private. By default, any user can change his or her password at logon. The user types his or her username and presses NEW LINE, and then types the password, but presses the ERASE PAGE key (or CTRL–L) instead of NEW LINE.

EXEC will then ask for the new password, which must contain from 6 to 15 printable characters. The user types the new password and presses NEW LINE. EXEC then asks again for the password to make sure the user typed correctly. The user then retypes the password and, if the two new passwords match, EXEC announces *New password in effect* and logs the user on to the system. From that point on, the new password will be in effect.

EXEC allows the user five attempts to enter a matching new password/confirmation pair, and provides error messages after any unacceptable entries. If EXEC does not receive a valid pair in five tries, it informs the user that the password remains unchanged, then logs him or her on without changing the password.

Bringing Down EXEC

Return to the system console, and bring down EXEC.

```
Su) CONTROL @EXEC HALT↵
From EXEC ...
From Pid 3 : (EXEC) Terminating on HALT Command.
Su)
```

The EXEC command HALT brings down the EXEC process and all its sons.

Using the SED Text Editor to Create Useful Macros

As you saw, there are a lot of commands involved in bringing EXEC up and down. To make this process easier, Data General supplied CLI macros named UP.CLI and DOWN.CLI in directory :UTIL. Because systems vary, these macros are not directly executable; you must edit them for *your* system before you can use them. We describe the changes you must make in the next major section of this chapter. After you make the changes to the macros, you'll need only to type UP and press NEW LINE to bring up EXEC and the multiuser environment, and DOWN followed by NEW LINE to bring them down.

To edit the macros, you'll need to know how to use a text editor—specifically, the text editor SED. This section will show you just enough SED to edit the UP.CLI and DOWN.CLI macros, and create some other useful macros.

SED in a Nutshell

SED is a text editor with informative error messages and its own Help facility. It has many commands and features. To do the editing you need now, you'll require only a few commands and key sequences. Table 5–1 explains SED commands, while Table 5–2 explains SED key sequences.

Table 5–1 SED Commands

Command	Action
HELP	Gives Help on SED commands or features.
APPEND	Adds text to the end of the file.
INSERT	Inserts lines of text before the current line.
MODIFY	Edits lines of text one by one.
LIST	Displays a range of lines.
FIND	Locates a text string.
DELETE	Removes one or more lines of text.
BYE	Leaves SED and returns to the CLI.

Table 5–2 SED Key Sequences

Key Sequence	Action
BREAK/ESC or ESC key	Terminates an Append, Insert, or Modify command.
→, ←, ↑, ↓	Moves the cursor. These cursor control keys are on the keypad to the right of the main keypad. They move the cursor right, left, a line up, or a line down.
CTRL–E	While you're modifying a line, begins or ends a text insert.
DEL key	Deletes the previous character.

You begin a SED editing session with the command XEQ SED, followed by NEW LINE. The SED prompt is an asterisk (*). As with CLI commands, you can abbreviate SED commands to their shortest unique parts. For example, you can type MOD instead of MODIFY.

SED is a line–oriented editor, dealing with text a line at a time. It is also screen–oriented, depending heavily on cursor control keys. Thus you should use it on a CRT if you can.

If the system console is a hardcopy terminal, follow these steps to work from a CRT:

1. Bring up EXEC again, as follows, from the system console:

   Su) PROCESS/DIR=@/DEF/NAME=EXEC EXEC↵

2. Enable the same user terminal you did before by typing the following:

   Su) CONTROL @EXEC ENABLE @CONn↵

   where n identifies a CRT

3. Log on to the enabled terminal as user OP, as before.

4. Get into directory :UTIL, where the macros are, and turn Superuser on:

) DIR :UTIL↵
) SUPERUSER ON↵
   Su)

5. Create or edit the macros (particularly UP.CLI and DOWN.CLI, which are the most important) using the SED editor. Leave the SED editor by typing BYE and pressing NEW LINE.

The following sections tell you to create a number of macros before you edit UP.CLI. If any of these macros already exist, don't recreate them; simply try them to see if they work. You can see if a macro exists by typing FILES/AS *filename* (where *filename* is the macro filename), and pressing NEW LINE. If the CLI displays the name, the macro exists; if the macro does not exist in the current directory, the CLI simply returns the CLI prompt.

Editing Macro SED.CLI

A useful macro that may not exist on your system is SED.CLI. It allows you to skip the "XEQ" when you want to use SED. The following example shows how to use SED to create the SED.CLI macro. To illustrate editing with SED, the macro text is first entered incorrectly as XRQSED, then corrected to XEQ SED. The strings %/% and %−% tell SED in the first case to accept switches and in the second, to accept an argument (in this case, a filename).

```
Su) XEQ SED SED.CLI↵
SED Rev n; Input File − :UTIL:SED.CLI
Do you want SED.CLI to be created? Y↵
* APPEND↵
1          XRQSED%/% %−%↵
2          (Press BREAK/ESC or ESC key.)
* MODIFY 1↵
1          XRQSED%/% %−%
```

Now use control characters and the space bar to change XRQSED to XEQ SED:

Press →, type E over the R in XRQSED; press →, press CTRL−E to insert, press the space bar; then press NEW LINE.

```
* BYE↵
Output File − :UTIL:SED.CLI
Su)
```

Now you can run SED by simply typing SED filename and pressing NEW LINE. (The line numbers—1 and 2 (listed previously)—are displayed by SED for your editing convenience. They are not part of the file.)

Make the SED.CLI macro accessible to users by typing

```
Su) ACL SED.CLI OP,OWARE +,R↵
```

This command gives user OP all access, and all users Read access to the macro. Read access is all a user needs to run a macro.

Macros ON.CLI and OFF.CLI

You, and perhaps other people who run the system, will often need to turn Superuser on and off. It's a nuisance to have to type the whole command line to do so. Here is the text of macros ON.CLI and OFF.CLI, which turn Superuser or Superprocess on and off.

Text of ON.CLI:

```
COMMENT If user appended the /P switch, turn Superprocess on.
[!equal,%0/%,/P]
  superprocess on
[!else]
COMMENT Without the /P switch, turn Superuser on.
  superuser on
[!end]
```

Text of OFF.CLI:

```
COMMENT If user appended the /P switch, turn Superprocess off.
[!equal,%0/%,/P]
  superprocess off
 [!else]
 COMMENT Without the /P switch, turn Superuser off.
  superuser off
 [!end]
```

Here's how to create ON.CLI:

```
Su) X SED ON.CLI↵
SED Rev n; Input file – :UTIL:ON.CLI
Do you want ON.CLI to be created? Y↵

* APPEND↵
1          COMMENT If user appended the /P switch, turn Superprocess on.↵
2          [!equal,%0/%,/P]↵
3           superprocess on↵
4          [!else]↵
5          COMMENT Without the /P switch, turn Superuser on.↵
6            superuser on↵
7          [!end]↵
8          (Press BREAK/ESC or ESC key.)

* BYE↵
 Output file – :UTIL:ON.CLI
Su)
```

This session created macro ON.CLI. With macros ON.CLI and OFF.CLI in :UTIL, you can turn Superuser on by typing ON and pressing NEW LINE, and you can turn Superprocess on by typing ON/P and pressing NEW LINE. To turn them off, type OFF or OFF/P, and pressing NEW LINE.

Make the macros accessible to users who have Superuser and Superprocess privilege by typing

```
Su) ACL ON.CLI OP,OWARE +,R⏎
Su) ACL OFF.CLI OP,OWARE +,R⏎
```

Users without Superuser or Superprocess privilege will get an error message if they try to execute these macros.

Macro ?.CLI

It's very useful to know which processes are running on your system. Data General supplies a macro that displays process information. The macro name is WHOS.CLI, in :UTIL. You can, if you want, use only WHOS.CLI to display processes on the system. Or you can copy WHOS.CLI to ?.CLI, and then use either macro to display processes.

At Data General, we tend to use ?.CLI, but the supplied macro is named WHOS.CLI to avoid confusion with the ? character—because the ? character serves as a request for help on some non–Data General operating systems.

To copy WHOS.CLI to ?.CLI, type

```
Su) COPY/V ?.CLI WHOS.CLI⏎
 WHOS.CLI
Su)
```

Make this macro accessible to users by typing

```
Su) ACL ?.CLI OP,OWARE +,R⏎
```

Now you—and users—can display the names of all processes on the system by typing

```
) ?⏎
```

For the following few macros, we provide only the text of the macro. Try the SED editing commands for yourself.

Macros BATCH.CLI and CHEK.CLI

By default, when users submit batch jobs (usually with the QBATCH command), the output and list files are sent to the first line printer device, LPB. To see the results of the batch jobs, users must walk to the line printer. This inconvenience may discourage users from using batch processes. The following macros allow any user to do a whole batch job without leaving his or her terminal.

The BATCH.CLI macro queues a batch job with output and list files in a user's initial directory; macro CHEK.CLI types and deletes these files. (It's named CHEK.CLI to distinguish it from the CLI command CHECKTERMS.)

Macro BATCH.CLI is self–documenting. It explains itself if someone types its name without an argument. Self–documenting is a good idea for your own user–oriented macros; if the macros explain themselves, then you don't have to explain them to users.

The text of BATCH.CLI is

```
[!equal,%1%,]
  write CLI macro %0% queues a batch job, with multiple
  write arguments. It writes the batch output file and batch
  write list file to your initial working directory -- instead
  write of the line printer queue -- so that you needn't go to
  write the printer each time you use batch. Do not use it to
  write stack multiple batch jobs -- wait for one job to complete
  write before using it to queue the next job. The format for
  write using this macro is
  write ,, BATCH , normal–command–line , NEW LINE ,,, For example,
  write ,, BATCH , XEQ , MASM , PROG1 , PROG2 NEW LINE
[!else]
  delete/2=ignore :UDD:[!username]:(LAST_BATCH.<OUT,LIST>)
  create          :UDD:[!username]:(LAST_BATCH.<OUT,LIST>)
  qbatch/notify/qoutput=:UDD:[!username]:LAST_BATCH.OUT&
/qlist=:UDD:[!username]:LAST_BATCH.LIST %–%
  write When this batch job is done your terminal will show
  write 'From PID n (EXEC): BATCH_INPUT n COMPLETED' then beep.
  write Type CHEK NEW LINE. Macro CHEK types the batch output file --
  write allowing you to check for errors. Then it allows you to
  write delete or save the batch output and list files.
[!end]
```

The text of CHEK.CLI is

```
[!equal, comment,] This macro prints the batch output file after a
 batch job created by macro BATCH.CLI completes.[!end]
 type   :UDD:[!username]:LAST_BATCH.OUT
 write  To delete batch output and empty batch list files
 write  press NEW LINE.
 string  [!READ To save them type S and press NEW LINE.]
  [!equal,[!string],S]
    write Saving output and list files
    write  :UDD:[!username]:LAST_BATCH.<OUT LIST>
  [!else]
    delete/v  :UDD:[!username]:LAST_BATCH.OUT
    [!equal [!size  :UDD:[!username]:LAST_BATCH.LIST] ,0]
      delete/v  :UDD:[!username]:LAST_BATCH.LIST
    [!else]
      write List file – :UDD:[!username]:LAST_BATCH.LIST
      write is NOT empty. Saving.
    [!end]
  [!end]
```

Make the macros accessible to users by typing

```
Su) ACL BATCH.CLI OP,OWARE +,R⏎
Su) ACL CHEK.CLI OP,OWARE +,R⏎
```

Now, to issue a batch job, all a user needs to do is type BATCH command–line and press NEW LINE; for example

```
) BATCH X MASM MYPROG⏎
```

The BATCH macro tells the user what to do next; and the CLI prompt returns to the terminal. When the batch job is done, the user types

```
) CHEK⏎
```

which displays the batch output file—showing all errors—with an option to delete both files. These macros offer a fast, simple, and effective way for users to issue batch jobs.

Macro REMEMBER.CLI

As people work on your system, they may want to issue reminders to themselves—for example, about meetings or deadlines. You can make it easy for anyone to issue one or more such personal reminders by creating macro REMEMBER.CLI (naturally, you can give it any name you want).

The text of REMEMBER.CLI is

```
[!eq, %2%, ]
   write This macro -- %0% -- reminds you of a future engagement.
   write It enqueues a batch job to run at the time you specify.
   write The batch job sends the specified message to your terminal.
   write
   write To execute the macro use the form
   write ,,, %0% ,,,, date:time ,,,, message ,,,, NEW LINE
   write
   write "date:time" can be a specific date and/or time -- for example
   write "22-NOVEMBER-92:20" means "NOVEMBER 22 92 8pm". Or "date/time"
   write can be relative -- for example "+1" means "an hour from now."
   write Try the HELP *AFTER ,,, topic for more information on "date/time."
[!else]
   string @[!console]
   qbatch%/%/after=%1%/qlist=@NULL/qoutput=@NULL &
   send [!STRING] [!asc 215] [!asc 207] [!asc 216] REMEMBER: [!asc 217] %2-%
[!end]
```

Make the REMEMBER.CLI macro available to users by typing

```
Su) ACL REMEMBER.CLI OP,OWARE +,R
```

Now, for example, if user Sally wanted to be reminded of a meeting on December 31, 1992, at 4:00 p.m. (16:00 on a 24-hour clock), she would type

```
) REMEMBER 31-DECEMBER-92:16 Meeting
```

Then, when the system calendar and clock showed the specified time, Sally's REMEMBER batch job would run; her terminal would beep and display
REMEMBER: Meeting with the message text blinking. REMEMBER works only if you are logged on to the same terminal from which you typed the REMEMBER command. (If all batch streams are busy throughout the delay interval, the REMEMBER batch job will be delayed until a job finishes. So if you plan to run many batch jobs, you might not want to use the macro.)

Editing the UP and DOWN Macros

The UP and DOWN macros are critical parts of your multiuser system. The UP macro initializes LDUs, starts EXEC, creates batch– and printer–managing processes, enables terminals for logon, and, at many sites, starts data management and network software, and applications like CEO. The DOWN macro brings down the multiuser environment, reducing AOS/VS to single–user system status.

This section explains editing these macros. Figures 5–1 and 5–2, later in the chapter, show examples.

Editing Macro UP.CLI

After writing some macros with SED (previous section), you're ready to tackle UP.CLI. The UP.CLI shipped with AOS/VS is a nonexecutable sample. To make it executable, you must edit it. But first, you should print both UP and DOWN macros. To do this, type

```
Su) DIR :UTIL↵
Su) COPY @LPx UP.CLI DOWN.CLI↵        (x identifies your printer; as specified
                                       to VSGEN, x is B, C, D, or E)
... (pause while printing occurs) ...
Su)
```

(If EXEC is running, you'll see a *File is exclusively opened* error message. Use the command QPRINT instead of COPY @LPx.)

After printing the macros, read the printouts. The comments to the system manager give you most, if not all, the information you need. These comments, other comments (and the CLI manual and CLI Help), explain all the commands and their meanings. Notice that each macro creates a log file, named UP.LOG and DOWN.LOG respectively. If a macro stops with an error at runtime, you can type this log file to discover the last command executed; this is particularly useful if your system console is a CRT.

The amount of editing of UP.CLI depends on the hardware and software in your system. At minimum, you need to make the macro executable. You may also want to insert other commands, depending on whether

- you want to set your system ID and/or start the system log;
- you want to set nondefault characteristics for asynchronous lines (such as modem lines);
- you have LDUs to initialize;
- your computer has more than one job processor;
- you have printers other than one type LPB printer;
- you have programs (such as XTS networking, INFOS II, CEO, or your own applications) to start;
- you want to run a secure CLI (LOCK_CLI) on the system console; and/or
- other actions are necessary, as explained in the macro text or in documentation for other software products.

The following sections explain how to make the macro executable, and which commands to use for the system ID and/or log, characteristics, LDU, job processor, and printer issues.

The only *required* sections you must read are "Making UP.CLI Executable" and "Starting Printers." (The latter is required only if your printer is not type LPB.)

Making UP.CLI Executable

To start, type

```
Su) SED UP.CLI
SED Rev n; Input file – :UTIL:UP.CLI
*
```

(Type XEQ SED UP.CLI and press NEW LINE if you don't have a SED.CLI macro.)

Type LIST ALL and press NEW LINE to display all lines in the macro.

The first line to edit is the line with the first !equal. This line makes the macro nonexecutable; in the line, [!equal,1,2] means "if 1 equals 2, execute all lines up to the next !else or !end." You need to change the 2 to 1. Type FIND "!equ".

After SED finds the line, type MOD and press NEW LINE. Then, using cursor controls, position on the line and make the two numbers equal. For example, change the second number to 1:

```
[!equal,1,1]
```

Then press NEW LINE and press the BREAK/ESC (or ESC) key to enter the changed line.

Leaving SED and saving your new UP.CLI file is explained in the section "Finishing Up with UP.CLI."

Setting the System ID and/or Starting the System Log File

The system ID is a text string (limit 31 characters) that identifies your system. The system ID is printed on header sheets on print jobs. Also, on a network, the ID, available to users using the SYSID command, helps remind users what system they're using. (The system ID is not necessarily the same as the network hostname, accessible using the HOST command, or the log–on banner displayed on user terminals—the latter is simply the contents of file :UTIL:LOGON.BANNER.SCREEN.)

Good choices for the system ID include the network hostname (if you plan to use networking and know the hostname), or simply the system name. You need not change the default system ID, which is null (no name). If you do want to set the system ID, use the SYSID command from PID 2, after the comment to the system manager about SYSID. A sample command is SYSID MSIS_01.

The system log file, which you can start with the SYSLOG command, can record all user activity on the system. (The system log is not the same as CLI logging, started with the LOG command.) If you choose to use logging, you should start the log early—after the comment to the system manager about the log file. The syntax of the SYSLOG command, suggestions for using it, and details on the companion REPORT program appear in *Managing AOS/VS and AOS/VS II.* You may choose to start SYSLOG using the macro SYSLOG_UP.CLI, shown in the manual *Managing AOS/VS and AOS/VS II.*

If your computer has more than one job processor, you might want to proceed to the next section. Otherwise, you might want to leave the SED editor and return to the CLI, since the next commands you insert may be complicated enough to try first in the CLI. To leave the SED editor, type BYE and press NEW LINE; then answer the prompt *Do you want to save the original file as a backup file?* by typing Y and pressing NEW LINE. To edit the macro again, you'll simply type SED UP.CLI, as before.

Initializing Another Job Processor in a Multiprocessor System

If you have a multiprocessor computer (such as an MV/20000 Model 2), it's a good idea to initialize additional job processors in your system's UP.CLI macro rather than having to initialize them manually. While you're editing UP.CLI with SED, find the comment to the system manager about job processors (type FIND "job processor"); then delete the word "COMMENT" from the beginning of each line for each job processor on your system.

The /2=WARNING switch lets the macro continue running if this job processor is not functioning. This switch lets the macro bring up the multiuser environment even though not all job processors are functioning.

At this point, you can stop editing UP.CLI and update your UP.CLI macro. The next commands are complicated; you may want to test them from the CLI before you use SED to add them to UP.CLI. To close, press the BREAK/ESC key (just to make sure you've left insert mode). Then type

```
* BYE⤸
Do you want to save the original file as a backup file? Y⤸
Output file – :UTIL:UP.CLI
Backup file – :UTIL:UP.CLI.BU
Su)
```

Saving the original as a backup (here, in file UP.CLI.BU) lets you keep track of what you did in case the edited macro doesn't work the way you want it to. (SED keeps only one version of a backup file, of the form original–filename.BU. If a previous backup already exists, SED deletes this backup file and replaces it with the newer version.)

Initializing Other LDUs

Before users can log on, the UP macro must initialize all disks they may need (if there are LDUs other than the system LDU). When UP.CLI issues these commands, the working directory should be the root (:) and Superuser must be on. The INITIALIZE command has the following form:

INITIALIZE disk-unit-name*[!disk-unit-name] [disk-unit-name[!disk-unit-name]]*

where

disk-unit-name	is the name of the unit that holds the disk; for example @DPJ2.
!	separates images of a mirror. For example, @DPJ2!@DPJ3

For example, if there were an LDU on disk unit DPJ1, you would initialize it as follows:

```
INITIALIZE @DPJ1↵
```

And if there were a mirror image of DPJ1 on DPJ2, you would initialize both images with

```
INITIALIZE @DPJ1!@DPJ2↵
```

If there were an LDU that spanned the physical disks DPJ10 and DPJ11:

```
INITIALIZE @DPJ10 @DPJ11↵
```

After the INITIALIZE command is executed, the system displays the name that was assigned to the logical disk when the disk was formatted with the Disk Formatter.

For each LDU, note the initialization command for later inclusion in UP.CLI.

Initializing Mirrored LDUs

When you want to mirror LDU images, you can specify all images in the INITIALIZE command, or you can specify the primary image in the INITIALIZE/NOMIRROR command and later tell the system to synchronize the other image(s) with the MIRROR command.

Specifying all images in the INITIALIZE command is simpler, but will produce a synchronization error if the images are not synchronized (this would happen if the mirrored LDU had not been released normally). After this error, you must use the proper INITIALIZE/NOMIRROR command to initialize a *more current* image, and then decide whether you want to synchronize the other image(s) using the MIRROR command. The decision depends on the reason for desynchronization; if one or more units isn't operational, you can't synchronize. In other words, your course after the synchronization error requires thought; it's difficult to have the UP macro decide what to do.

The following macro shows one approach you might use. It tries to initialize a mirrored LDU; then, if an error occurs, it displays an appropriate message and stops. You can then type the proper INITIALIZE/NOMIRROR command and, depending on the state of the other images, MIRROR command(s). You can insert this macro's commands in your UP.CLI macro, in the section whose comments tell the system manager to initialize LDUs, or you can create it as a separate macro and call it from UP.CLI. Whichever you do, the macro will not terminate on an initialization error condition; on either a normal return or initialization error, it will continue and pass control back to the remaining part of the UP macro.

```
COMMENT Macro START_MIRRORED_DISKS.CLI
COMMENT Try to initialize as a mirror. On error, drop through.
initialize/s/1=warning/2=warning @DPJ1!@DPJ2
[!equal,[!string],]
  write Initialize command that specified mirroring failed. Try
  write INITIALIZE/NOMIRROR commands on each image until a command succeeds.
  write You may then want to try MIRROR commands for other images.
  [!else]
  COMMENT The command succeeded.
[!end]
```

For each LDU, note the command for later use.

At this point, you might want to create a START_MIRRORED_DISKS macro of your own, with the INITIALIZE commands you've just tested.. After doing so, edit UP.CLI again (SED UP.CLI). Then find the section whose comment tells the system manager to initialize LDUs. After this section, call your START_MIRRORED DISKS macro (just insert the name of your macro).

Changing Default Characteristics for Terminal Lines

If you need to change the default characteristics of one or more terminal lines (perhaps because the desired characteristics weren't chosen at VSGEN), this must be done from PID 2 before EXEC enables the line(s). UP.CLI is an ideal place to do it.

Before you use SED to insert a CHARACTERISTICS command in UP.CLI, test the command from the PID 2 CLI before EXEC comes up. Use the CHARACTERISTICS command with the /DEFAULT switch, using the console filename of the pertinent terminal. For example, to change lines 3 and 4 to support modems instead of local terminals, you would insert these lines:

```
characteristics/default/crt3/mod/mri/ebo/st/ulc/off/eb1 @CON3
characteristics/default/crt3/mod/mri/ebo/st/ulc/off/eb1 @CON4
```

Then start EXEC:

```
PROCESS/NAME=EXEC/DEFAULT/DIR=@ EXEC↵
```

and finally enable all terminals

```
CX ENABLE/ALL↵
```

The CX macro contains the command CONTROL @EXEC.

Make sure the line works the way you want it to. When it does, stop EXEC (type CX HALT, then press NEW LINE).

Having tested the CHARACTERISTICS command(s), use SED to insert the command(s) in UP.CLI, after the lines whose comments advise the system manager to set characteristics. After the last comment line, insert your CHARACTERISTICS commands.

If You Have Graphics Terminals

AOS/VS supports screen windowing on graphics (pixel–mapped) terminals on DS/7500 computers. On such systems, a user can create windows on a graphics terminal, but in order to do so, the user must first assign (get ownership of) the PMAP, an entry in :PER, for the

device. On a multiuser DS/7500 system, unauthorized access to PMAP entries represents a potential security risk.

To prevent unauthorized creation of windows on a multiuser DS/7500 system, add the following line to your system's UP macro *before* the line that enables terminals:

```
assign ([!filenames @PMAP+])
```

This assigns (gives ownership of) the PMAP device entries (specified by @PMAP+) to PID 2.

Likewise, if you have a program that creates additional windows, deletes default windows, or repositions or resizes windows, you can run that program from your UP macro—but run it *before* assigning the PMAPs. For more information on security risks involved with windows, see *Managing AOS/VS and AOS/VS II.*

Starting Printers

The UP macro already contains commands to start and to continue a line printer of type LPB. If your printer is an upper– and lowercase type LPB printer, you can leave the printer specification as is. But if your primary printer is an uppercase–only LPB, use SED to add the argument UPPER to control @EXEC start...LPT command, producing the command

```
control @EXEC start... LPT [!string] UPPER
```

If your first line printer is not type LPB, use SED to change the printer name (in the line string @LPB) to the type you have. For a type LPD printer, change the name @LPB to @LPD. For an LPE laser printer, change @LPB to @LPE; and change control @EXEC start... to control @EXEC start/NL.... And for a type LPJ printer, change the name @LPB to @LPJ.

If you have a second line printer and/or plotter, start and continue its queue after the comment to the system manager about "start any other printers." Depending on the printer type (LPB, LPD, or LPE, uppercase–only or laser document), insert the following commands.

```
control @EXEC start [/NL] LPT1 @LPx [UPPER]
control @EXEC continue @LPx
```

Insert the /NL switch for a laser printer, type LPE. Insert the argument UPPER for an uppercase only printer. x is B1 for the second LPB printer, D for the first LPD printer, D1 for the second LPD printer, E for the first laser printer, E1 for the second laser printer, and so on.

For a digital plotter, insert the following commands:

```
control @EXEC start PLT @PLA
control @EXEC continue @PLA
```

This command allows users to issue printing requests to the second printer using QPRINT/QUEUE=LPT1... commands; and/or issue plotting requests using QPLOT commands.

With two or more line printers, label each printer (perhaps using a sticky–backed tape label) with its queue and device name; for example "Device LPB, queue LPT" for the first printer. Having the names clearly visible will make operations easier later on.

Starting Printers Attached to Asynchronous Lines

If you have one or more printers attached to asynchronous lines, start them *before* EXEC enables terminals for logon; that is, start them after the comment to the system manager about starting other printers. (While a line is enabled for logon, you can't start the line for printing.) Printers attached to asynchronous lines include letter–quality and laser printers.

If you created one or more letter–quality printer queues earlier in this chapter, insert commands to start and continue them. For example, assume you have a letter–quality and a laser printer, connected to asynchronous lines 13 and 14—that is, to devices @CON15 and @CON16. Also assume you created queues named LQP and LASER for them, as shown earlier in this chapter. You'd insert the following commands:

```
control @EXEC start LQP @CON15
control @EXEC start LASER @CON16
control @EXEC continue @CON15
control @EXEC continue @CON16
```

These commands will allow CLI users to issue printing requests to the letter–quality printer using QPRINT/QUEUE=LQP... commands or to the laser printer using QPRINT/QUEUE=LASER... commands.

As with line printers, you may want to label your letter–quality printers with queue name and device name. (If you have the CEO system, you will want to label printers with the CEO printer name also, after configuring the printers using CEO.)

Starting Networks, Database, and CEO Software, and User Applications

The first time you create the multiuser environment, you will probably want simply to start EXEC and the multiuser environment. If you have other software, like network, data management, CEO, and or/user applications software, it must be installed and configured before you can use it.

But after this software has been installed and configured, and you know what command line(s) start it, you can insert these command lines in the UP macro. Most software available from Data General includes its own startup macros (described in the product documentation or Release Notice); for example, XODIAC/XTS network software has a startup macro named UP.NETWORK.CLI, and CEO has one called CEO.SYSTEM.CLI. For such a product, you need only insert the macro name in the UP.CLI macro. For Data General products shipped without a startup macro, you'll need to use CLI PROCESS commands.

For any Data General network or data management product, or the CEO system or user applications, use a text editor to insert the appropriate startup commands in the UP macro after the pertinent comment to the system manager. Figure 5–1, later in the chapter, shows a sample UP macro that includes some of these commands.

Enabling User Terminals

The UP macro contains an EXEC ENABLE/ALL command that enables all terminals, so you do not need to insert ENABLE commands for specific terminals.

But after EXEC enables a terminal, it "owns" that terminal. Some other Data General programs need to own terminals to run on them. Among these are terminal manager programs (like TPMS) and IBM emulator programs (RCX70, DG/SNA). If you plan to run one or more of these other programs, decide which terminals you want them to use.

Then, in the UP macro, start the control process for any of these programs and have them take charge of the consoles they need *before* the control @EXEC enable/all command. (A good place to start the process is immediately after the comment to the system manager about starting data management programs.) The other program(s) will get use of the terminals before EXEC does; EXEC will display the message *Device already in use* when it tries to enable them. Also, if you want to change any terminal characteristics (CHARACTERISTICS/DEFAULT command), do this before the terminal is enabled, as covered earlier.

Locking the System Console CLI

Unless you specify otherwise in the UP macro, a standard CLI, son of the master CLI (PID 2), will remain running on the system console. As son of the master CLI, this CLI has all privileges, which means that any person passing by can turn Superuser on and discover privileged users' passwords or shut the system down. Before the UP macro ends, we recommend that you have it run a locked CLI.

To run a locked CLI, you have a choice. You can execute the 16-bit program LOCK_CLI.PR, or you can execute and lock the 32-bit CLI. If you are familiar with LOCK_CLI, you may want to continue to run it. The 32-bit CLI offers a distinct advantage in that you can lock individual CLI and CONTROL @EXEC commands. In addition, changing the 32-bit CLI password is easier than changing the LOCK_CLI password. A disadvantage of running a 32-bit CLI is that it does use more memory. Decide on the CLI you want to run; then try it as follows:

To run LOCK_CLI type	**To lock CLI32, type**
) EXECUTE :LOCK_CLI.PR↵	) PASSWORD/READ=:PASSWORD↵) LOCK/FILE=:PASSWORD↵

Now try unlocking the CLI you choose by typing UNLOCK and the password. (You will need to do this before running the DOWN.CLI macro.) The default password, shipped with both CLIs, is PASSWORD. You can test to see if the CLI is unlocked by typing XEQ SED. A locked CLI will not execute a program; an unlocked CLI will.

After locking and unlocking the CLI, insert the command EXECUTE :LOCK_CLI.PR if using LOCK_CLI, or insert the commands PASSWORD/READ=:PASSWORD and LOCK/FILE=:PASSWORD if using the 32-bit CLI, in the UP macro at the command EXECUTE CLI.

For security, you will need to change the CLI password. Changing the 16-bit LOCK_CLI password and choosing a password for the 32-bit CLI are described in *Managing AOS/VS and AOS/VS II*. The manual *Using the CLI (AOS/VS and AOS/VS II)* also describes changing the 32-bit CLI password.

Finishing Up with UP.CLI

Having made the UP macro executable, and (perhaps) initialized LDUs and done other things above, you're done with the UP macro.

If you are running the SED text editor, leave the editor and save both old and new files. At the SED prompt, type BYE and press NEW LINE; then, when it asks *Do you want to save the original file as a backup file?,* type

Do you want to save the original file as a backup file? Y↵
Output file – :UTIL:UP.CLI
Backup file – :UTIL:UP.CLI.BU
Su)

Saving the original as a backup (here, in file UP.CLI.BU) lets you keep track of what you did in case the changed macro doesn't work the way you want it to. (SED keeps only one version of a backup file, form original–filename.BU. If a previous backup already exists, SED deletes this and replaces it with a newer version.)

Copy the macro to the root directory with the MOVE command:

Su) MOVE/V/R : UP.CLI↵
UP.CLI
Su)

Sample working UP and DOWN macros appear later in this chapter, in Figures 5–1 and 5–2.

Editing DOWN.CLI

Bringing the multiuser environment down is largely a matter of halting EXEC. Halting EXEC will bring down all user processes created under EXEC, so whoever uses the DOWN macro will need to make sure that all users are alerted to the impending shutdown so they won't lose work. You will also want to shut down network, CEO, and other non–EXEC processes in an orderly way and release any nonmaster LDUs.

Review the text of the DOWN.CLI macro you printed earlier. Then type

```
Su) SED DOWN.CLI⇂
```

As with UP.CLI, to make the macro executable, you must make the two numbers in the "[!equal 2,1]" line the same. For example, you could edit this line to be

```
[!equal,1,1]
```

Adding Warning Notes

Near the beginning of the DOWN.CLI macro, before the macro sets the search list, you might want to add text that gives the operator a chance to reconsider before shutting down. To do so, find the "COMMENT Set search list" command, as in

```
* FIND "Set search list"⇂

n          COMMENT Set search list...
```

Insert the following lines here, before the comment line.

```
write This macro terminates active batch/print jobs and user processes.
write If large batch/print jobs are active or if you have not warned users
write then you may not want to continue. To stop here: type CTRL–C CTRL–A
write
write Then wait for batch/print jobs to finish and/or warn users of shutdown.
write
write [!read To proceed with shutdown: press NEW LINE.]
```

This gives information and allows the person to stop the macro if needed. For completeness, you might add some other information near the end of the macro.

```
* FIND "pop"⇂
 n          pop

* INSERT +1⇂          (Insert before the next line. Type the following commands.)

write The multiuser environment is shut down. To check for other
write processes: use the WHOS macro. To shut down the AOS/VS system: type
write BYE and press NEW LINE -- then confirm with Y and NEW LINE.
```

Stopping User Applications and CEO, Database Management, and Network Software

If the UP macro started any database management, CEO, or network processes, the DOWN macro must shut them down in an orderly way—in reverse order from the UP macro. (Critical databases can be corrupted if some of these processes are simply terminated.)

Most software available from Data General includes its own shutdown macros (described in the product documentation or Release Notice); for example, XODIAC/XTS network software has a shutdown macro named DOWN.NETWORK.CLI, and CEO has one called CEO.SYSTEM.CLI. For such a product, you need only insert the macro name in the DOWN.CLI macro. For Data General products shipped without a shutdown macro or instructions for shutdown, you'll need to use CLI TERMINATE commands. For your own applications, only you know how best to shut them down. TERMINATE commands always work.

For any Data General network or data management product, or CEO or user applications, use SED or another text editor to insert the appropriate shutdown commands in the DOWN macro after the pertinent comment to the system manager. Figure 5–2, later in the chapter, shows a sample DOWN macro that includes some of these commands.

Releasing LDUs

It's important to add commands that release all the nonsystem LDUs that the UP macro initialized. (System shutdown releases all initialized LDUs, but still you should release them specifically in the DOWN macro; this will let you run UP if you want without shutting down AOS/VS.) If you have only one disk in your system, skip the rest of this section.

The RELEASE command form is

```
RELEASE LDU–filename
```

The LDU filename is the name assigned to the LDU during disk formatting. To release an LDU, you need to be in the directory in which the LDU was initialized, or you need to specify a full pathname to the LDU filename. Also, you need Write access to this directory or Superuser on.

In the DOWN.CLI macro, find the comments that advise the system manager to release LDUs. After those comments, insert RELEASE commands for every LDU that UP initialized. For example,

```
RELEASE UDD⏎
RELEASE UDD1⏎
```

Finishing with DOWN.CLI

Having made the DOWN macro executable, and (perhaps) added warning notes, stopped applications, and released LDUs, you're done with the DOWN macro. If you are running the SED text editor, leave the editor and save both old and new files. Type BYE and press NEW LINE; then, when it asks *Do you want to save the original file as a backup file?,* type

```
Do you want to save the original file as a backup file? Y⏎
Output file – :UTIL:UP.CLI
Backup file – :UTIL:UP.CLI.BU
Su)
```

Move the macro to the root directory with the MOVE command:

```
Su) MOVE/V/R : DOWN.CLI⏎
DOWN.CLI
Su)
```

Testing the UP and DOWN Macros

Having edited the macros, try them in sequence. First, make sure all terminals you want to enable are turned on and are on line. Make sure the line printer(s) are on line.

Then try the UP macro:

```
Su) UP
```

Starting log file UP.LOG ...

Running QCMP now ...

... (QCMP messages) ...

Starting EXEC.

Pid 3 : (EXEC) Revision n Ready
...

Starting batch output queues.

Starting default printer queue and continuing...

Continuing batch stream.
From Pid 3 : (EXEC) BATCH_INPUT_1 [Idle]
From Pid 3 : (EXEC) @LPB Cooperative initiated
From Pid 3 : (EXEC) @LPB [Idle].
From Pid 3 : (EXEC) Enabling all consoles
...
Enable all complete, n consoles enabled

AOS/VS CLI rev n *date* *time*
Su)

One of the last lines executed is EXECUTE CLI, which creates a son process under the master CLI. So the master CLI, PID 2, is no longer running on the system console. Check by typing either WHOS or ? and pressing NEW LINE.

If you started any printers on your asynchronous lines, or if any other program enabled consoles before EXEC did, you'll see the message *Could not enable console, Device already in use*. This message does not represent an error condition; it just provides status information.

If you saw any other error messages, type the log file (using the command TYPE UP.LOG) to help track the error. The log file shows all CLI dialog; error messages begin with *"Warning"* or *"Error:"*. If you identify an error, test the corrected command(s) from the CLI. For some errors, like initializing LDUs, you must restore the environment to its status before UP ran, or UP will return an error from trying the same operation twice. (If you can't decide how to restore the environment to its state before UP, a last resort is to shut down AOS/VS—type BYE and respond Y to all questions until you see the SCP prompt; then restart with the BOOT command. After AOS/VS comes up, test the revised command to see if it works.)

When you've learned how to correct an erroneous command, run SED on the UP.CLI in directory :UTIL; correct the error, update the macro by terminating SED with the command BYE; and confirm by typing Y. Then move the revised macro to the root directory (MOVE/V/R : UP.CLI).

Through trial and error, work with UP until you've eliminated all but the *Could not enable console, Device already in use* messages shown above. When UP runs without other errors, go and check the terminals. Each one enabled for user logon will have a *Press NEW LINE to begin logging on* message on it. If any terminals you expected to be enabled do not show this message, note their numbers; perhaps they were not identified to VSGEN or are not working properly. Type the system specification file (:SYSGEN:sys.CSF) to see if all terminal lines were identified to VSGEN. If not, you'll need to run VSGEN again and specify the missing ones.

When the UP macro runs without errors, and all the terminals you want are enabled, try bringing the multiuser environment down with DOWN.

The down sequence generally goes as follows.

1. Warn users that EXEC is coming down, so they can exit from text editors or take other appropriate action. The CLI BROADCAST macro (supplied by Data General) is useful for this. You can use WHOS.CLI or ?.CLI to view all user processes.

2. Check for large or critically important batch or print jobs (QDISPLAY command). If a job you want complete is still running, wait for it to end. You can tell queues and printers to pause (at the end of the current job) with EXEC's PAUSE command.

3. When all users have logged off or have only the CLI running on their terminals, and when no important batch/print job is running, return to the master CLI by typing BYE and pressing NEW LINE. (To safeguard users' work, the DOWN macro works only when run from PID 2. Thus you must return to PID 2 to bring down EXEC.)

   If your system console CLI was locked with LOCK_CLI, it must be unlocked before the BYE command will work. For information on LOCK_CLI refer to the section "Locking the System Console CLI" earlier in this chapter, or *Managing AOS/VS and AOS/VS II.*

4. Type DOWN and press NEW LINE to terminate EXEC.

The following dialog shows these steps.

```
Su) BROADCAST System coming down now!↵
From Pid n : (OP) System coming down now!

Su) ?↵      (or WHOS↵)
Elapsed: ...
PID: 1 PMGR        PMGR     :PMGR.PR
PID: 2 OP  OP      :CLI16.PR
PID: 3 OP  EXEC    :UTIL:EXEC.PR
PID: 4 OP  00004   :UTIL:XLPT.PR
PID: 5 EXEC        @CONn    :CLI.PR
Su)
```

CLI commands in the ?.CLI and WHOS.CLI macros return four pieces of information for each process: the process ID, username, process name, and the program pathname. There are no other processes now because no users are logged on.

The next step is to check the batch and printer queues. To do this, use the QDISPLAY command display queue status. The queues you care about are BATCH_INPUT and LPT. Type

```
Su) QDISPLAY⏎

BATCH_INPUT         BATCH     Open
xxx         xxx     xxx
xxx         xxx     xxx
BATCH_OUTPUT BATCH Closed

LPT                 PRINT     Open
xxx         xxx     xxx
xxx         xxx     xxx

Su)
```

Batch jobs appear in this BATCH_INPUT list. Active jobs have a leading asterisk; for example,
**34 D JACK :UDD:JACK:?34.CLI.00002.JOB*

Print jobs appear in this LPT list. Active jobs have a leading asterisk; for example, **35 JACK :UDD:JACK:MYFILE.*

The QDISPLAY command shows no active batch or print jobs, so you can proceed. To bring down the system, you need to get back to the master CLI, PID 2. You can always do this with the BYE command. To check your PID, use the WHO command. For example,

```
Su) WHO⏎
PID: 5      OP      00005      :CLI16.PR          (You're PID 5.)
Su) BYE⏎
AOS/VS CLI Terminating...

Su) WHO⏎
PID: 2      OP      OP         :CLI16.PR          (You're PID 2.)
Su)
```

As PID 2, with no users logged on and no essential batch/print jobs running, you can proceed with DOWN:

```
Su) DOWN⏎

This macro terminates active batch/print jobs and user processes.
If large batch/print jobs are active or if you have not warned users
then you may not want to continue. To stop here: type CTRL-C CTRL-A

Then wait for batch/print jobs to finish and/or warn users of shutdown.

To proceed with shutdown: press NEW LINE.

⏎

Starting log file DOWN.CLI...
```

Pausing printers and batch streams.

Disabling all consoles.

Bringing down EXEC.
From Pid 3 : (EXEC) Terminating ...
...

The multiuser environment is shut down. To check for other processes: use the WHOS macro. To shut down the AOS/VS system: type BYE and press NEW LINE -- then confirm with Y and NEW LINE.

Type WHOS and press NEW LINE to check on the processes. There should be only two: the peripheral manager and master CLI. If you received error messages, type the log file, DOWN.LOG, to pinpoint their location. Since DOWN is simpler than UP, there should be few—if any—errors. Use SED to fix any errors.

Now test both macros by typing UP and pressing NEW LINE; then, after UP has run, type DOWN and press NEW LINE again.

Within your tailored DOWN macro, you might consider inserting the QDISPLAY command somewhere in the operator warning note (beginning with "This macro"). Knowledge of queue status could be useful to the system operator as he/she prepares to shut down.

When UP and DOWN run without error messages (aside from *Could not enable console, Device already in use*), you're done. UP and DOWN will serve your installation well, executing many relatively complex tasks and requiring only that someone type the macro name.

Figure 5–1 shows a sample working UP.CLI macro, and Figure 5–2 shows a sample working DOWN.CLI macro.

```
COMMENT  UP.CLI

COMMENT  Check if the two arguments are equal.  If so, the macro is executable.
[!equal,1,1]

 COMMENT  Check to see if the process is PID 2.
 [!ueq,2,[!pid]]

  COMMENT  Start log with SYSLOG_UP -- renames old log file based on date.
  :SYSLOG_UP.CLI
  COMMENT  System ID is MSIS_01.
  SYSID  MSIS_01

  COMMENT  Set search list, dir to the root directory, push an
  COMMENT  environment level, and turn Superuser on.
  searchlist :util :
  directory  :
  push
  prompt     pop
  superuser  on

  COMMENT  Set up and start a CLI log file to help track UP errors.
  write
  write    Starting log file UP.LOG. Type this file to track any error.
  delete/2=ignore      :UP.LOG
  create/elementsize=8  :UP.LOG
  logfile              :UP.LOG

  COMMENT  Set tape unit ACLs.
  acl     @MT-  +,ware

  COMMENT  Set default characteristics of console lines.
  COMMENT  Set lines CON42 - CON44 for modem support.
  characteristics/default/crt3/mod/mri/ebo/st/ulc/off/eb1  @CON42
  characteristics/default/crt3/mod/mri/ebo/st/ulc/off/eb1  @CON43
  characteristics/default/crt3/mod/mri/ebo/st/ulc/off/eb1   @CON44

  write    Initializing LDUs UDD1 and UDD2.
  initialize @DPJ1
  initialize @DPJ2

  COMMENT  to system manager:  Set ACLs on newly--initialized LDUs, if desired.

  COMMENT  to system manager:  Initialize other job processors, if any, here.

  COMMENT  Run QCMP to compress the print queues.
  xeq/1=warning/2=warning     QCMP/yes
```

Figure 5–1 Sample Working UP.CLI Macro (continued)

```
COMMENT Create EXEC process.
  write
  write   Starting EXEC.
  process/default/directory=@/name=EXEC EXEC
  WAIT_FOR_PORT @EXEC

  COMMENT Tell EXEC to start batch output queues.

  string  @LPB

  write
  write   Starting batch output queues.
  control @EXEC start batch_output [!string]
  control @EXEC start batch_list   [!string]

  write   Starting default print queue and continuing printer.
  control @EXEC start lpt          [!string]
  control @EXEC continue           [!string]

  COMMENT Start laser printer.
  control @EXEC start/nl LASER     @CON37
  control @EXEC continue           @CON37

  COMMENT Start XTS network software.
  :UP.NETWORK.CLI

  COMMENT Start INFOS II data management software.
  :INFOS:INFOS.UP.CLI

  COMMENT Start CEO.
  push
  prompt  pop
  searchlist :INFOS,[!searchlist]
  dir     :UTIL:CEO_DIR
  CEO.SYSTEM start checkpoint
  pop
  COMMENT to system manager:  Start your own applications, if any, here.

  COMMENT Tell EXEC to open the mount queue.
  control @EXEC open mountq

  COMMENT Tell EXEC to continue batch streams 1 and 2. Set qpriority.
  write   Setting qpriority for stream 2 to 255 only; jobs must be
  write   submitted with /QPRIORITY=255 to be processed in stream 2.
  write
  control @EXEC continue 1
  control @EXEC continue 2
  control @EXEC qpriority 2  255 255
```

Figure 5–1 Sample Working UP.CLI Macro (continued)

```
  COMMENT Tell EXEC to enable all consoles.
  write
  control @EXEC enable/all
  COMMENT Return to original environment. Set up informative prompt.
  checkterms
  pop
  prompt time
  COMMENT Secure the system console by executing :LOCK_CLI.

  execute :LOCK_CLI

 [!else]
  write *Error*
  write %0\% runs only from the master CLI -- PID 2.,,Your PID is [!PID].
  write Required arguments:,,None
  write Optional switches:,,,None
 [!end]

[!else]
 write  This macro is executable only if -- in its first !EQUAL command --
 write  the numbers are the same. To make the macro executable
 write  use a text editor to make the numbers equal. For example
 write  make them both 1.
 write
 write  We suggest that you keep the executable macro in the root
 write  directory. This will provide easy access on startup.
 write  You can move it there via the command ,, MOVE/V/R : UP.CLI
[!end]
```

Figure 5–1 Sample Working UP.CLI Macro (concluded)

```
COMMENT DOWN.CLI

COMMENT Check if the two arguments are equal. If so, the macro is executable.
[!equal,1,1]

 COMMENT Check to see if the process is PID 2.
 [!ueq,2,[!pid]]

  COMMENT Set search list, dir to the root directory, push an
  COMMENT environment level, and turn Superuser on.
  searchlist :util :
  directory :
  push
  prompt   pop
  superuser on

  write  Starting log file DOWN.LOG. Type this file to track any error.
  delete/2=ignore                :DOWN.LOG
  create/elementsize=8           :DOWN.LOG
  logfile                        :DOWN.LOG

  COMMENT Pause printer and batch streams.
  write
  write  Pausing printer and batch streams.
  control @EXEC pause @LPB
  control @EXEC pause @CON37
  control @EXEC pause

  COMMENT Disable all consoles.
  write
  write  Disabling all consoles.
  control @EXEC disable/all
  pause  20

  COMMENT to system manager: Stop your own applications, if running, here.

  COMMENT Stop CEO.
  :UTIL:CEO_DIR:CEO.SYSTEM stop

  write  Bringing down INFOS II.
  terminate/2=warning  OP:INFOS_II
  pause  3

  write  Bringing down the network.
  :DOWN.NETWORK.CLI
```

Figure 5–2 Sample Working DOWN.CLI Macro (continued)

```
  write   Bringing down EXEC.
  control @EXEC halt
  WAIT_FOR_NO_PORT @EXEC

  COMMENT Stop SYSLOG.
  syslog/stop

  COMMENT Release LDUs -- in reverse order of initialization.
  release :udd2
  release :udd1

  checkterms
  pop
 [!else]
  write *Error*
  write %0\% runs only from the master CLI -- PID 2.,,Your PID is [!pid].
  write Required arguments:,,None
  write Optional switches:,,,None
 [!end]

[!else]
 write  This macro is executable only if -- in its first !EQUAL command --
 write  the numbers are the same. To make the macro executable
 write  use a text editor to make the numbers equal. For example
 write  make them both 1.
 write
 write  We suggest that you keep the executable macro in the root
 write  directory. This will provide easy access on shutdown.
 write  You can move it there via the command ,, MOVE/V/R : DOWN.CLI
[!end]
```

Figure 5–2 Sample Working DOWN.CLI Macro (concluded)

If You Have Bisynchronous Communication Lines

If you have bisynchronous communications (bisync) lines, needed for Data General communications programs like RJE80, HASP II, or RCX70, a process called GSMGR must be running before any of these programs can use the lines. GSMGR runs the synchronous controller(s) defined in a specification file created by the BSCGEN program (Chapter 4). (GSMGR has exclusive use of the controller, which means that other communications software, like DG/SNA or XTS, can't use the controller at the same time. However, XTS or DG/SNA can use any synchronous controllers that GSMGR doesn't use.)

In most cases, it's best to create GSMGR in its own bisynchronous UP macro, which you can call from the UP macro—generally, after EXEC is started. You might name the bisync macro UP_BSC.CLI, in directory :UTIL.

The bisync UP macro should create the GSMGR process with the following command:

```
process/resident/superuser/access/ipcusage/name=GSMGR&
/dir=@/username=op/data=:SYSGEN:xxx :GSMGR
```

The ampersand (&) is the CLI line–continuation character; it tells the CLI to ignore the following NEW LINE character, allowing you to write multiple–line commands. The xxx is the filename of the synchronous line specification file created by the BSCGEN program (Chapter 4); for example, MSIS_01.BSC.

After creating GSMGR, the bisync up macro can also start the bisync emulator software (for example, RJE80) and pertinent EXEC queue (if any). The bisync macro can start the EXEC queue only if it is executed *after the EXEC process is created.*

To terminate the GSMGR process, the master CLI (or any Superprocess) can issue the command

```
terminate OP:GSMGR
```

This command can be made part of a bisync DOWN macro (for example, DOWN_BSC.CLI) or DOWN.CLI.

The GSMGR process must be resident (PROCESS command with /RESIDENT switch)—and, like any resident process, involves a certain amount of system overhead. If you will be using bisync lines a lot, and the overhead doesn't bother you, you can call the bisync UP macro from the UP.CLI macro. Otherwise, to minimize overhead, run the bisync UP macro only when you want to use the bisync lines.

Communications products that use synchronous lines are further described in manuals supplied with the communications software. Creating and opening queues needed by the DG/SNA and HASP II products (and by the XODIAC/XTS agent FTA) are described in the EXEC supplement to *Managing AOS/VS and AOS/VS II.*

PREDITOR and EXEC Summary

With user profiles, EXEC, and the macros done, the multiuser environment is practically complete.

If you wish to bring the system down, type BYE, press NEW LINE, then confirm with Y and another NEW LINE. Later, you'll need to bootstrap to bring it up. Assuming power stays on to your CPU and disks, the sequence from startup to normal shutdown is

1. Bring up AOS/VS.
2. Type UP and press NEW LINE at the CLI.
3. The multiuser environment runs; users log on and off, and submit batch and print jobs.
4. Before shutdown, warn users (BROADCAST) and check queues (QDISPLAY).
5. Return to master CLI (PID 2) by typing BYE and pressing NEW LINE.

   If you run a locked CLI—LOCK_CLI or a locked 32-bit CLI, described in *Managing AOS/VS and AOS/VS II*—you must unlock this CLI before BYE will work.
6. Type DOWN and press NEW LINE.
7. Type BYE and press NEW LINE; then confirm by typing Y and pressing NEW LINE.

Actually, you can type BYE at any time, with other processes running, from the PID 2 CLI. If you confirm, everything will be shut down. But this risks terminating processes prematurely and causing users to lose work.

Startup and shutdown are detailed in the next chapter.

There are a number of issues and tools to learn about (described next). And there are other processes and commands you will eventually want to make part of your UP macro. But with user profiles, EXEC, and the UP and DOWN macros, the backbone of the multiuser environment stands.

Other Data General Software

Along with AOS/VS, you may have acquired other Data General products, like communications and networking software; the CEO system; programming languages like C, COBOL, FORTRAN 77, Pascal, and PL/I; the SWAT debugger, database management systems like DG/SQL; and others.

Each of these products comes on its own magnetic tape (or diskettes), with its own documentation. Instructions for loading and using it appear in the documentation and/or in the product Release Notice.

Some products, like XODIAC/XTS and CEO, have a specific home directory. Other products, like programming languages, can be placed where you wish—in their own directories, perhaps under :UTIL, or in :UTIL itself. Putting a product in its own directory keeps it in one place and may allow faster access. But putting a product in :UTIL makes it easier for users to access because their search lists need include only :UTIL.

Some products have programs that must be executed with the PROCESS command; some have commands that the master CLI process or users can issue. Many products, like XODIAC/XTS and CEO, have UP macros of their own to ease operation. CEO may require a one−line edit of your UP.CLI macro (to include the CEO directory in the search list, as described in *Managing the CEO®* System).

For products other than XODIAC/XTS and CEO, after some experience, you may decide to place the pertinent PROCESS and other commands in the UP.CLI macro. This macro is a tool that summarizes the components of your entire system; you will find it, and perhaps different variations of it, very useful.

Error Handling—The ERMES File

Data General strives to have a unique error code for every kind of error that can occur in every process running under AOS/VS. Each code is a number. The system translates each code to a text error message using a file called ERMES.

The CLI uses ERMES to describe its own errors. And when any program executed from the CLI (with a PROCESS or XEQ command) encounters a fatal error, the program process terminates and returns control to its parent CLI. The process may describe the error before it terminates, or it may simply return a numeric error code to the CLI.

When the CLI receives an error code, it looks for the text definition in file ERMES, in the root directory. If ERMES defines the code, the CLI will find and display the text error message. But if the code is not defined in ERMES, the CLI will report *Unknown error code n*, where *n* is the code number.

The ERMES file built by default for AOS/VS contains error message text needed by AOS/VS and the programming languages it depends on, as follows:

Table 5–3 Error Message Filenames

Program	Error message filename(s), in :UTIL
AOS/VS itself	SYSERMES.OB, XYZZYERMES.OB
C runtime routines	CERMES.OB
CLI (CLI16)	ZERMES.OB
CLI (CLI32)	CLI32ERMES.OB
CLRE (common language runtime routines)	CLREERMES.OB
DGL runtime routines	DGLERMES.OB
EXEC	XERMES.OB
FORTRAN 77 runtime routines (F77)	F77ERMES.OB
Language runtime routines	LANG_RTERMES.OB
Link program	LINKERMES.OB
Macroassembler (MASM)	MASMERMES.OB
PL/I language runtime routines	PL1ERMES.OB, PL1ERMES16.OB
PLN language runtime routines	PLNERMES.OB
SED test editor	SEDERMES.OB
SPEED test editor	SPEEDERMES.OB

However, the supplied ERMES does not define error codes for other Data General software, like high–level languages (for example, COBOL, Pascal, or BASIC), data management software (for example, INFOS® II, Sort/Merge), or communications/networking software.

After you have loaded Data General–supplied software not included in the list above, someone must create an ERMES file with text definitions for all its errors. (If this isn't done, users will often get only the numeric error codes.) The easiest and best way to generate a tailored ERMES file is to create a macro to do it.

With a text editor (SED), create a macro to execute the standard AOS/VS file builder, LINK_ERMES.CLI. Have this macro run LINK_ERMES and specify all the error message files you want. This way, you'll be able to build a new version of ERMES easily, whenever you install a new revision of software, by typing just one command. And, since you (not Data General) create the custom macro, new releases of AOS/VS won't delete your macro when you load them.

We suggest you call the macro TAILORED_ERMES.CLI. You can call it anything you want, but a standard name will help you remember. Turn Superuser on and make the working directory :UTIL. With SED, create the macro and insert the LINK_ERMES command, followed by the full pathname of all non–AOS/VS error messages you want to add.

For example, assume you have acquired AOS/VS BASIC, C, COBOL, FORTRAN 77, Sort/Merge, INFOS II, and XODIAC/XTS networking software. You installed COBOL in a directory whose pathname is :COBOL, you installed AOS/VS BASIC in a directory called :BASIC, you put Sort/Merge in a directory :UTIL:SORT, INFOS II in :UTIL:INFOS, and XODIAC/XTS in directory :NET and :NET:UTIL (XODIAC and XTS are always installed in these directories; you have no choice).

After loading these onto the system, you could write your TAILORED_ERMES.CLI macro to look like this:

```
Comment Run the standard macro, :UTIL:LINK_ERMES, and add other ERMES &
pathnames.
:UTIL:LINK_ERMES.CLI &
:BASIC:BASERMES.OB &
:COBOL:COBERMES.OB &
:UTIL:SORTERMES.OB &
:UTIL:INFOS_IIERMES.OB &
:NET:UTIL:NETERMES.OB
```

You can ignore the C and F77 languages because they are included in the default ERMES. The ampersand character (&) continues the line—letting you arrange the text for easy readability.

When you're satisfied, press NEW LINE, then BREAK/ESC. Leave the SED editor as usual by typing BYE and pressing NEW LINE. Then run your tailored macro:

```
Su) TAILORED_ERMES⤸
... (Link messages) ...
Su)
```

If you get *File does not exist...* messages, check the locations of the product directories and make sure the pathnames you include in the macro are correct. Fix any errors with SED.

When your tailored macro runs without error messages, it has created a new ERMES file with your specified error codes added. Copy the new ERMES file from directory :UTIL (where it was created) to the root directory. Use the /R (recent) switch, as follows:

```
Su) MOVE/V/R : ERMES⤸
Deleted :ERMES
ERMES
Su)
```

(The /R switch copies the file only if it is more recent than a file with the existing name in the root directory.)

Next, shut down and restart AOS/VS. (You must do this because AOS/VS opens ERMES only at system startup. AOS/VS can't use the new ERMES codes until you shut down and restart.)

After you restart, users will get text messages in response to BASIC, COBOL, INFOS_II, SORT, and XODIAC/XTS network runtime errors.

ERMES instructions usually appear on the Release Notices of each relevant software product. Also, file :UTIL:ERMES.SR describes the format of the ERMES file.

Making Life Easier for Users

This section tells you how to tailor the log–on screen, create log–on messages, and give and get Help.

Tailoring the Log–on Screen

Every terminal enabled under EXEC displays the log–on banner, which looks like this:

**** AOS/VS Release n.nn / Press NEW LINE to begin logging on ****

For user terminals, you can tailor a log–on screen by editing the file :UTIL:LOGON.BANNER.SCREEN. For hardcopy terminals, create the file :UTIL:LOGON.BANNER.HARDCOPY. If these files exist, EXEC will display the text in them instead of the one–line log–on banner.

You can edit either of these screen files using a text editor like SED. Each file can have as many as 2,048 characters (an 80 by 24 character screen holds 1920 characters).

You don't have to create either of the log–on screen files, but it's a nice way to personalize your system. If the pertinent file (for CRT or hardcopy) doesn't exist, EXEC will display the default one–line banner on the terminal.

User Log–on Macro Files

When you specified the initial IPC file to PREDITOR, you gave a central macro filename (for example, :UTIL:LOGON_CENTRAL.CLI) that would be executed for users when they logged on. You planned for this macro to execute a log–on macro in each user's directory. There will be no error message if these files don't exist, but they serve as a useful information and control tool for users, so you might as well create them.

Use a text editor (SED) to create the files. First, create the central macro—shown by example as file :UTIL:LOGON_CENTRAL.CLI. Go to directory :UTIL, turn Superuser on, execute the SED text editor on the filename you want. Append the text you want and leave the text editor. The text might look something like this:

```
COMMENT This is a central macro that executes user log–on macros.
searchlist :UTIL
defacl [!username],OWARE
:UDD:[!username]:LOGON.CLI
```

Now create the LOGON.CLI macro to be moved into user directories. Sample text for the user log–on macro file follows.

```
write Welcome to the AOS/VS Operating System. The file you are reading
write is a CLI macro in your own directory. You can edit it as desired
write to set characteristics and/or search list and/or default
write access control list -- DEFACL -- for your files.
searchlist [!searchlist]
write Your search list is [!SEARCHLIST]
write Type HELP and press NEW LINE for Help.
```

After writing both macros, put a copy of LOGON.CLI in your directory and test it by executing LOGON_CENTRAL.CLI. The following command lines do these things:

```
Su) MOVE/V/R :UDD:[!USERNAME]:LOGON.CLI↵
LOGON.CLI
Su) LOGON_CENTRAL↵
```

You should see the text you typed after each WRITE command, and the current search list set by the SEARCHLIST command. If there are error messages, they probably result from syntax errors. EXEC processes only the first 512 characters in the central macro file, so you shouldn't make it more than 512 characters long.

When the log–on macro runs without error messages, give everyone Read and Write access to the macro and move a copy of it to everyone's directory by typing the following commands.

```
) SUPERUSER ON↵                          (Turns Superuser on.)
Su) DIR :UTIL↵                           (Makes :UTIL the working directory.)
Su) ACL LOGON_CENTRAL.CLI +,R↵           (Sets ACL of central macro.)
Su) ACL LOGON.CLI +,WR↵                  (Sets ACL of user logon macro.)
Su) MOVE/V/R :UDD LOGON.CLI↵             (Needed to allow move into all user
                                          directories.)
LOGON.CLI                                (System confirms move.)
Su) DELETE LOGON.CLI↵                    (Deletes original user macro from
                                          :UTIL.)
Su) DIR :UDD↵                            (Set to move copy into all user
                                          directories.)
```

```
Su) MOVE/V ([!FILENAMES +]) LOGON.CLI↵
... (CLI verifies each file moved) ...
```

This sequence of commands initializes each user directory and moves a copy of LOGON.CLI into each.

Note that the macro text applies only to CLI users (users whose *initial program*, specified to PREDITOR, is CLI.PR.) If a user's program is BASIC.PR, LOGON.CLI must be rewritten in BASIC to type the log–on message (PRINT statement) if you want. A BASIC program cannot use CLI commands. If a user's initial program is CEO, however, you need not change the IPC file (CEO does not try to execute commands in the IPC file).

For a CEO user, you may want to execute CEO automatically at logon. You can do this by inserting the command line :UTIL:CEO_DIR:CEO at the end of the macro. Wait until CEO is installed before inserting this command line.

Message of the Day—the LOGON.MESSAGE File

If you create a file called LOGON.MESSAGE in :UTIL, EXEC will display the contents of this file to every user who logs on in whatever program.

The LOGON.MESSAGE file is useful for general system information, like planned shutdowns, new features, and so on. The system manager or operator can add information to this file as needed. If you wish, you can give the file an access control list that allows any CLI user to edit it, adding messages of general interest. As with the user log–on file, only the first 512 characters of LOGON.MESSAGE are displayed (but people can use the command TYPE LOGON.MESSAGE to see the whole thing, if it exceeds 512 characters).

Create and/or edit the file LOGON.MESSAGE as you would any file. It must be in directory :UTIL. Sample text is

```
This is the wonderful world of AOS/VS.
If you have questions, please see the system operator.
```

After creating both the user log–on and LOGON.MESSAGE files, bring everything up (type UP and press NEW LINE), then log on as OP on a user terminal. You will see the messages just as any user will see them.

Giving and Getting Help

AOS/VS has a Help mechanism that can help inexperienced people to use it. You may have used part of this with VSGEN, PREDITOR, and SED; you can also use it with the CLI, EXEC, and other Data General products. For example, type the following commands.

```
Su) HELP↵
```

... (CLI displays the list of HELP topics) ...

```
Su) HELP *COMMANDS↵
```

... (CLI displays a list of its commands) ...

```
Su) HELP/V ACL↵
```

... (CLI describes the ACL command) ...

```
Su) XHELP↵
```

... (CLI displays the EXEC commands) ...

```
Su) XHELP ENABLE↵
```

... (CLI describes the EXEC ENABLE command) ...

You can see that HELP provides quick, pertinent information, when people need it. All Help messages, for all programs, are in directory :HELP. This directory was created, and its files loaded, when you first brought up the starter system.

Each Help file begins with a character string that identifies it to the system. For example,

The contents of a Help file named	Will be displayed by the CLI command
CLI.TPC.TOPICS	HELP↵
CLI.TPC.*string*	HELP **string*↵
CLI.CMD.*string*	HELP *string*↵
CLI.PSM.*string*	HELP !*string*↵
EXEC.*string*	XHELP *string*↵

Additional help files in :HELP, accessible from non–CLI programs, are

Filename	Accessible from
DEBUG4.*string*	Assembly language debugger.
FED.*string*	Assembly language disk file editor.
SED.*string*	SED text editor.
SPEED.*string*	SPEED text editor.
VSGEN.*string*	VSGEN program.

By default, every user can read these files (using appropriate HELP or TYPE commands), and the system will automatically find and display them.

Generally, if you want to create one or more Help files and have the system type its contents, use the filename form

CLI.TPC.string

The system will then display the string in proper alphabetical order when a user types HELP and presses NEW LINE. It will display the file's contents when a user types HELP **string* and press NEW LINE.

If a Help message can tell the whole story by itself, you can simply leave it as a Help topic. But if the explanation is quite long, you can use the topic file to tell the user what files to type for more help.

All help files you create should have an Access Control List (ACL) of at least +,R so the users will be able to read them. You can set ACLs as shown in the example below.

Even if you decide not to create your own Help messages now, all files shipped with non–AOS/VS products that begin with "CLI.TPC." should be in directory :HELP. This will allow users to see the topic when they type HELP and press NEW LINE.

Most (if not all) Data General products ship their help files to install in directory :HELP. If, after you install a product, the HELP command doesn't display a topic for it, perhaps the help topic is in the product's home directory instead of :HELP.

In the product's home directory (wherever it is installed), look for filenames of the form CLI.TPC.+ using a + template (a template or "wild card" character that matches all or parts of filenames). The character + (plus sign) matches all characters.

So in directory "DIR," you can see which filenames begin with CLI.TPC.—and sort the filenames—by typing

```
Su) DIR DIR⇩
Su) FILES/S CLI.TPC.+⇩

... (System alphabetically lists all filenames that begin with CLI.TPC.) ...
Su)
```

Help File Example

In directory HELP, with Superuser on, use a text editor to create a file named

CLI.TPC.ABOUTSYSTEM

The contents of this Help file can be any message you want. For example:

```
ABOUTSYSTEM -- This is a Data General MV/Family computer running the AOS/VS
operating system. Type any of the following files for more information:

:HELP:COMPILERS     Describes compilers and how to use them.
:HELP:BATCH         Describes using batch.
:HELP:DAY_RUN       Describes schedule of application programs.
:HELP:DAY_DUMP      Describes daily schedule of Dump/Backup runs.
```

After leaving the text editor, give everyone read access to the Help file:

```
Su) ACL/V CLI.TPC.ABOUTSYSTEM +,R⇩
CLI.TPC.ABOUTSYSTEM
Su)
```

This shows the simplest approach to Help messages. When any user types HELP and presses NEW LINE from the CLI, ABOUTSYSTEM appears as a topic. When the user types HELP *ABOUTSYSTEM and presses NEW LINE, text in the ABOUTSYSTEM file is displayed; the user can then type any of the pathnames described for more information. You'll be able to think up more sophisticated ways to use Help messages later on.

Overview of Your System File Structure

Your multiuser environment is ready for users. During the whole process, there were a number of directories and files created—some by the system tape, some by the tailored system, some by PREDITOR and EXEC, and some by you.

Figure 5–3 shows the directory structure, with some pertinent files, and describes how and when the files were created. An oval indicates a directory file; a box indicates one or more nondirectory files.

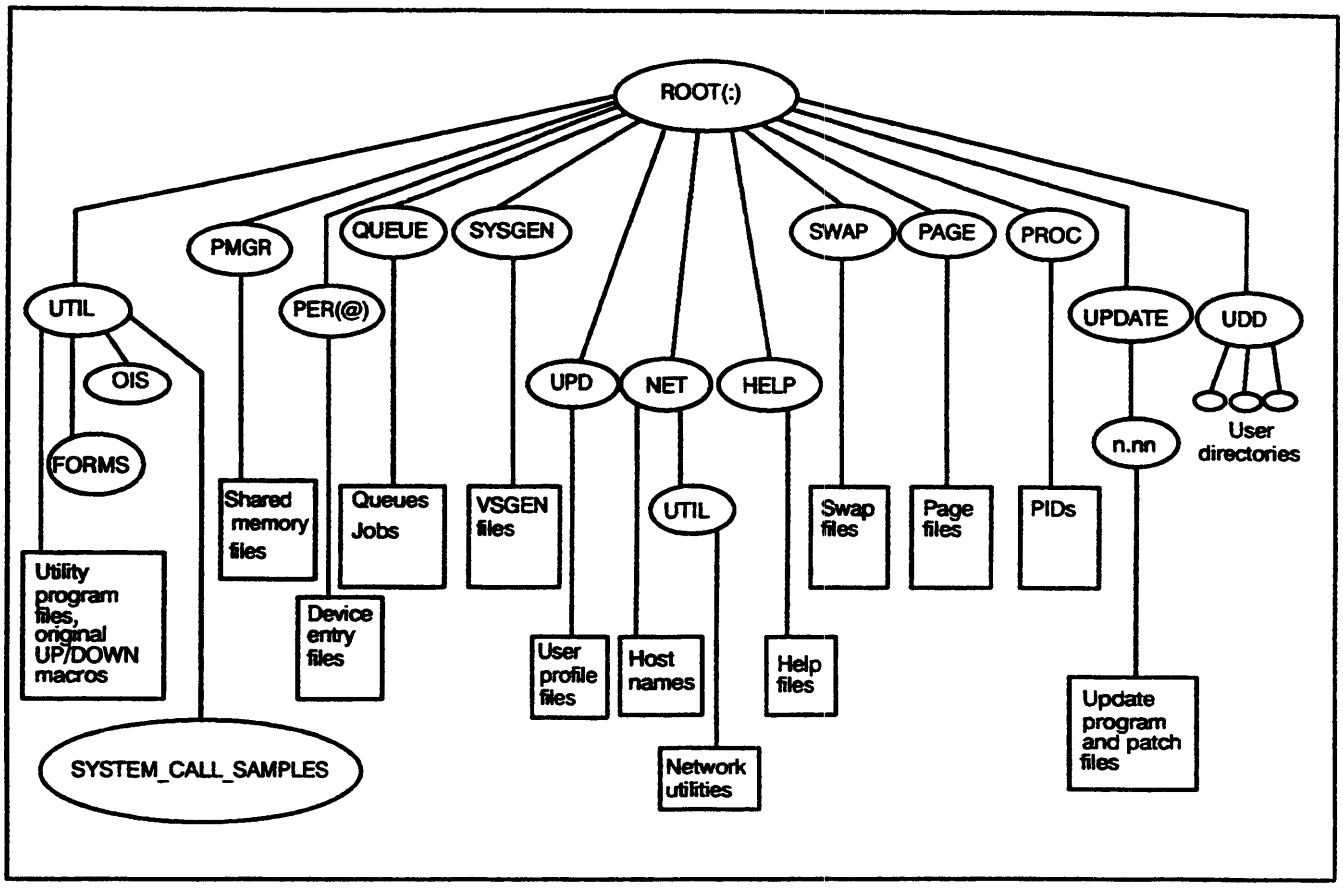

Figure 5–3 Directory Structure in the Finished AOS/VS System

From the top, left to right, the directories shown in Figure 5–3 are as follows.

ROOT (:) — The root directory contains all other directories. It was created by the starter system during the initial load. Its nondirectory files include the system Agent, the peripheral manager (PMGR), DFMTR Disk Formatter, stand–alone FIXUP disk fixer, CLI files, the edited UP.CLI and DOWN.CLI macros (which you moved there), and the error message file (ERMES).

UTIL — The utilities directory contains most AOS/VS utility program files: SED text editor, macroassembler, Link, debugger, and so on. UTIL also has system programs like PREDITOR, EXEC, and PED. It was created by the starter system during the initial load.

FORMS	The FORMS directory contains special printing form directive files you create and the Data General–supplied mapper files that XLPT.PR can use.
OIS	This directory contains OIS CONNECTION software, a software communications product which allows AOS/VS users to access databases. (OIS stands for Online Information Service.)
SYSTEM_CALL_ SAMPLES	This subdirectory contains sample assembly language source programs that you can assemble, link, and execute. For more information, see the *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*
PMGR	The PMGR directory is created by a tailored AOS/VS system each time it comes up. PMGR contains the shared memory files PMAP.SF and PMGR.SF, used as an interface between the peripheral manager and the AGENT. PMGR.SF handles PMGR terminals. PMAP.SF handles bit–mapped terminals; for most systems it will be a zero–length file.
PER or @	The peripherals directory is created by a tailored AOS/VS system each time it comes up. PER contains a device entry file for each device (not controller) generated to be part of the operating system (for example, MTB0, DPJ0, CONn, LPx.) The @ is convenient shorthand for :PER; for example @MTB0 is easier to type than :PER:MTB0. PER is also the home directory of EXEC (although the EXEC program file is in :UTIL). When AOS/VS starts up, it creates device entries in PER. When EXEC starts up, it creates batch and device queues in PER. Other software products, like networking or communications products, also create entries in PER when they are started up. When a system is shut down normally, it deletes PER, so don't place user files there.
QUEUE	Directory QUEUE is created by EXEC the first time EXEC starts up. QUEUE contains two files, QUEUES and JOBS, which have queue information for EXEC. The QCMP utility program may delete all user files in QUEUE, so don't place user files here.
SYSGEN	The system–generation directory was created by the starter system from the system tape during the initial load procedure. It contains needed VSGEN and library files for system generation.
UPD	The user profile directory was created by PREDITOR the first time PREDITOR ran. The user profile for each user—created by the system—lives here. EXEC checks this directory for a matching profile file before logging a user on. After each user has logged on, the system itself enforces the limits set within the profile file.

NET	The network directory is created by the starter system the first time it comes up. XODIAC/XTS network host names are put here automatically by network software. Don't put user files here.
HELP	The HELP directory is created by the starter system from tape during the initial load procedure. It contains topic Help files, command and pseudomacro Help files, and VSGEN and EXEC Help files. You can also place your own help files here.
SWAP	The SWAP directory is part of AOS/VS memory structure. The starter system creates it at startup. Its size is specified at VSGEN, but you can override this if you override default specifications at startup. Do not place user files here.
PAGE	Like SWAP, PAGE is part of the AOS/VS memory structure; the starter system creates it at startup. You can override the size specified at VSGEN at startup. Don't place user files here.
PROC	AOS/VS uses the PROC directory to keep track of running processes. The starter system creates it at startup. Don't place user files here.
UPDATE	The update directory is created with program files, patch files, and an update script file by the first AOS/VS update loaded. Each update creates a directory named n.nn (the release number) within :UPDATE. Generally, restrict this directory to update files; users should not store files here.
UDD	The user directory directory is created by PREDITOR the first time PREDITOR is run on this LDU. In this directory, PREDITOR creates a user directory for each user given a profile. This directory has the name given as a username to PREDITOR; for example, ROBIN, SAM, or F77. The user directory becomes the user's working directory when the user logs on; within it, the user can create files and subordinate directories.

What Next?

This chapter has given you the essentials for creating the multiuser environment.

It has shown you how to create good general–purpose user profiles with the PREDITOR profile editor and how to initialize EXEC, the multiuser environment manager; given you some pointers on other Data General software and the ERMES error file; shown you how to make life easier for users with initial user IPC files and the log–on message file; and offered a picture of your finished system's directory structure.

This chapter ends the "cookbook," blank–disk to finished–system portion of the book. This portion has introduced you to the Data General hardware and software in Chapter 1; told you how to format LDUs, install, and bring up the starter system in Chapter 2 or 3; explained how to generate, patch, and test a tailored system in Chapter 4; and showed how to create the multiuser environment in this chapter.

Whatever your role—Data General engineer, system manager, DP manager, MIS manager, or nonadministrative person—you have done a tremendous job. Not only have you had to execute many steps, but you've had to learn a lot. Your tailored, multiuser system is up and running. You may have to execute parts of preceding chapters again—but you will rarely, if ever, need to do it all again for your installation.

The next chapter details startup and shutdown, both normal and abnormal. Read it if you want to learn about startup, and/or handling abnormal shutdown.

Chapter 7 tells you how to update AOS/VS—how to install updates and new releases shipped periodically from Data General.

For reference on various programs—for example, EXEC, backup, or security—you might want to refer to *Managing AOS/VS and AOS/VS II*. Table 1–1 (in Chapter 1 of the manual you're reading) serves as a general directory to AOS/VS system management task topics.

Depending on your interest, go to the appropriate chapter, different manual, or check the index for a specific topic or product.

End of Chapter

Chapter 6
Startup and Shutdown

Read this chapter

- When you want to start a program like an AOS/VS system or FIXUP;
- When you want to shut an AOS/VS system down;
- If AOS/VS hangs or stops with a fatal error or hard error message;
- When power returns after a power failure.

This chapter gives the details on system startup, normal shutdown, and abnormal shutdown. The major sections are

- The SCP and SCP CLI Commands
- Computer Front Panel
- Cold Start, Computer Power Off
- Warm Start, Computer Running—All Computers
- Microcode File Issues
- Normal Shutdown
- Abnormal Shutdown
- Repair Under Power
- The FIXUP Disk Fixer
- Power Failures

Some computers let you change hardware startup parameters, like printer port and time-out delay, via an Automatic Program Load Menu. These computers are ECLIPSE MV/40000, MV/20000, MV/18000, MV/15000, MV/9000-series, MV/7800, DS/7500, MV/5000-series, MV/3500 DC, MV/2500 DC, MV/1400 DC, and MV/1000 DC. For information on changing automatic program load preset values, see the 014-series "Starting" manuals supplied with your computer.

The SCP and SCP CLI Commands

With AOS/VS, ECLIPSE MV/Family computers also run a second operating system, called the System Control Program (SCP or SCPOS). On MV/40000, MV/20000, MV/18000, MV/15000, MV/10000, MV/9000-series, MV/8000, MV/6000, and MV/5000-series computers, AOS/VS and the SCP run concurrently because each runs in a separate processor. When you bring up AOS/VS, AOS/VS gets and keeps control of the system console until it is shut down. Then the SCP CLI gets control of the system console.

On the MV/7800, DS/7500, and all MV/4000 and deskside ECLIPSE computers, there's only one processor. Either the SCP or AOS/VS can use it. On a cold start (with computer power off), the SCP uses the processor; you then use the SCP to start

AOS/VS. AOS/VS gets and keeps control of the processor and system console while it runs. When the CPU is halted (as when AOS/VS is shut down), the SCP CLI regains control of the processor and system console.

So on all computers but MV/7800s, DS/7500s, MV/4000s, and smaller ones, you can use the SCP CLI while AOS/VS is running. On the other systems, you can use the SCP CLI only when AOS/VS is not running (when it is shut down or frozen).

When the SCP CLI has control, it displays the following prompt on the system console:

SCP–CLI> (or *SCP–CLI/Jp0>* on MV/40000s, MV/20000s and MV/15000s; on some multiprocessor computers, the prompt is *SCP–CLI/Jp1>*.)

Next to the prompt, you can type SCP commands to boot an AOS/VS system or other stand–alone program; the SCP will then load a program that loads your specified program into the main processor's memory. The new program takes control of the processor and system console and starts its own dialog. But the SCP will regain control when the new program terminates.

SCP CLI commands (also called the *soft console*) extend the functions of hardware switches on the computer front panel. Generally, you should use SCP CLI commands only when AOS/VS is shut down. Most SCP CLI commands change main processor state; so if you use them when AOS/VS is trying to run the processor, AOS/VS may fail when it regains control of the processor.

The most common SCP CLI commands appear in Table 6–1. You can abbreviate all SCP commands except RESET to the shortest identifiable string of characters.

Table 6–1 Commonly Used SCP CLI Commands

Command Format	What Command Does	Example
ATTACH *[n]*	For multiprocessor computers only. Tells the SCP to apply future commands to processor *n*; by default SCP commands apply to processor 0. Omit *n* to display the number of the attached processor.	*SCP–CLI/Jp0>* ATT 1 ↵ *SCP–CLI/Jp1>* BOOT 24 ↵
BOOT *[n]*	Program loads from the first device on device code *n*. The program on this device takes control of the system console. Reset the processor before using BOOT.	*SCP–CLI>* RESET ↵ *SCP–CLI>* BOOT 24 ↵
CONFIG *[arg]*	On MV/40000s, displays or modifies the system configuration. Argument DDL sets the default device list (autoboot device).	*SCP–CLI>* CONFIG ↵
CONTINUE *[n]*	Tells the processor to continue running a halted program. Argument *n* specifies processor *n* (on multiprocessor systems). Useful after someone has accidentally typed the break sequence on MV/7800, DS/7500, MV/4000, and smaller systems.	*SCP–CLI>* CONT ↵

(continued)

Table 6–1 Commonly Used SCP CLI Commands

Command Format	What Command Does	Example
FLAGS *[fl]* {*YES*} {*NO* }	Sets or clears an SCP flag. Typed without arguments (*fl*), reports flag status. Some flags are AUTOBOOT and SCOPE. Set AUTOBOOT to Y the first time a system is powered up, to provide automatic load on future powerups. SCOPE tells the SCP to erase characters when you press the DEL key (instead of echoing ^\). SCOPE is useful on CRT terminals. (AUTOBOOT and SCOPE are not available on all systems.)	*SCP–CLI*> FL AUTO Y ↵
HALT *[n]*	Halts the current processor after it completes the current instruction. With argument *n*, halts processor *n* (multiprocessors only).	*SCP–CLI*> HALT ↵
HELP *[item]*	Gives a general Help message (without *item*) or, depending on computer model, gives help on *item*.	*SCP–CLI*> HE ↵
RADIX *[x]*	On MV/40000s, displays or changes the default radix used for BOOT and other commands. As argument *x*, you can use O for octal or H for hexadecimal.	*SCP–CLI*> RADIX O ↵
RESET *[n]*	Halts and resets the whole system. With argument *n*, halts and resets processor *n* without resetting I/O. Use RESET before booting or running ESD. You cannot abbreviate this command.	*SCP–CLI*> RESET ↵
START addr	Starts the current processor at address addr. The processor must be halted. This command is useful under unusual circumstances for emergency AOS/VS shutdown.	*SCP–CLI*> RESET ↵ *SCP–CLI*> START 50 ↵
TTY	Gives the main (not SCP) processor control of the system console. (TTY is not available on MV/7800, MV/7500, MV/4000, and smaller systems; use CONTINUE instead.)	*SCP–CLI*> TTY ↵

(concluded)

SCP features are further described in the SCP manual supplied with your computer.

Computer Front Panel

The controls on your computer's front panel affect how—and if—the SCP gets control while AOS/VS is running.

MV/40000 Front Panel

The MV/40000 front panel is explained in the manual *Starting ECLIPSE MV/40000™ Series Systems*.

MV/20000, MV/18000, and MV/15000 Front Panels

The front panel on ECLIPSE MV/20000, MV/18000, and MV/15000 computers has a sliding power switch, four back–lit switches, an unlit switch, three lights, and two digital displays.

The switches and lights work as follows:

- POWER switch — Sliding the switch up (toward |) turns computer power on. Sliding the switch down (toward O) turns power off. *Don't turn power off when AOS/VS is running.*
- POWER light — This glows when you turn the power switch on.
- REMOTE light — This flashes when there's a remote connection to the computer's diagnostics remote processor (DRP). The DRP, in conjunction with a special communications switch, lets Data General engineers call your system via the telephone and run diagnostics.
- BOOT switch — If the processor(s) are halted and this switch is lit, pressing it tells the SCP to program load from the default device code (usually disk). If the processor is running, nothing happens.
- SYS RST switch — If this switch is lit, pressing it resets the computer. When you release the switch, the processor(s) are halted and fault codes are cleared.

  CAUTION: Don't press this switch when AOS/VS is running.
- TEST switch — If this switch is lit, pressing it tests the switches and digital displays. These will light and show each digit for one second; then the panel will return to normal.
- SYS FAULT light — This flashes after a system (hardware) fault has caused the processor(s) to halt. The digital display shows a fault code.
- PWR FAULT light — This lights if a power fault occurs. The digital display shows a fault code.
- CON RST switch — If this switch is lit, pressing it resets the system console. If the console is locked by the SCP command LOCK, CON RST unlocks it.

Use CON RST when the system console seems frozen and CTRL–Q doesn't help. AOS/VS, if running, will continue. Don't use this switch unless you must.

- DISPLAY switch

  DISPLAY is a lock switch; pushing DISPLAY backlights and enables the other touch–sensitive switches. When you touch an enabled switch, the switch stays lit and other switches go dark. When you release the switch, the other switches light again.

  When AOS/VS is running, if the other switches are lit, press DISPLAY to disable them.

- Digital display

  This lights up and shows a fault code when a processor or power fault occurs. Fault codes are explained in the 014–series "Starting" manual supplied with your computer.

MV/10000 SX, MV/10000, and MV/8000 II Front Panels

MV/10000–series and MV/8000 II computers have five front panel switches—PWR, LOCK, CONSOLE, SYSTEM, and STATUS—and a row of lights. The switches work as follows:

- PWR switch

  This switch should be at the ON–1 position, unless you want to cut CPU power.

- LOCK switch

  In the on position, the LOCK switch disables the SYSTEM RESET switch, the CONSOLE switch, the off position (O) switch, and the break sequence. On earlier models, LOCK ON enables transfer to the backup battery (if any) if outside power goes down. LOCK ON tells the hardware to program load from the jumper–selected device code (usually the device code of your primary disk) when power is turned on.

  You must turn LOCK OFF to enable the break sequence, or bootstrap from a device other than the one selected with jumpers. On earlier models, you may also need to turn LOCK off to turn power off. *Keep LOCK in the on position unless you want to do one of these things.* Pressing LOCK to its current position (for example, pressing it on when it is on) has no effect; so whenever you don't know what position it is in, it does no harm to press it to the desired position.

  If LOCK is off when you turn power on, a microcoded console loader program (*BOOT WHAT DEVICE?* prompt) gets control. Then you can press NEW LINE to bootstrap from the jumper–selected device code as above, or you can type the device code to bootstrap from any device, for example, tape.

- CONSOLE switch — Pressing this to RESET on an unlocked computer gives control of the system console to the SCP operating system. AOS/VS, if running, continues. To return control of the system console to AOS/VS, enter

  TTY⏎

- SYSTEM switch — If the console loader program (*BOOT WHAT DEVICE?* prompt) has control, pressing SYSTEM BOOT tells the hardware to load from the jumper–selected device code as mentioned above. If the SCP CLI has control, SYSTEM BOOT tells it to display *BOOT WHAT DEVICE?* on the system console; you can then type the desired device code and press NEW LINE. SYSTEM BOOT has no effect if the CPU is running (as when AOS/VS is running). Pressing SYSTEM RESET (MV/10000–series only) resets the computer, if unlocked.

  CAUTION: Don't press this switch when AOS/VS is running.

- STATUS switch — Pressing STATUS to LAMP TEST tests the condition of the data lights; they should all glow. On an MV/10000–series machine, STATUS at the MONITOR position continuously displays the control store (microcode) memory address.

  STATUS in the POWER SYSTEM position gives the power supply status in the rightmost seven lights (9–15 on MV/10000–series, 0–6 on MV/8000 II). *There has been a power supply fault if any of the rightmost seven lights stay on with the STATUS switch at POWER SYSTEM.* This position gives the most useful information. MV/10000–series and MV/8000 II power supply fault codes are described in the SCP manual for the computer.

The lights on the front panel work as follows:

- ON light — This is lit when power is flowing to the computer.
- RUN light — This is lit when the main CPU is executing instructions (running AOS/VS or diagnostics).
- BATT light — This is lit when the CPU has transferred from normal power to backup battery.
- Data lights — The meaning of these depends on the STATUS switch, as described under the STATUS switch above.

When the computer is running AOS/VS on normal power, the ON and RUN lights are lit. When the POWER switch is off, all lamps are off.

When the system is running normally, you don't need the panel switches. To cut CPU power, press LOCK OFF and POWER OFF. To power up, press LOCK ON and POWER ON. For a continuous power status display, leave STATUS in the POWER SUPPLY position. Generally, avoid touching the panel switches unless you must force a shutdown.

MV/9000–Series Front Panel

The MV/9300™, MV/9500™, and MV/9600 front panel is explained in the manual *Starting ECLIPSE MV/9500™ Computer Systems*.

MV/8000 C Panel Switches and Lights

MV/8000 C computers have three front panel rocker switches: LOCK, PR LOAD/RESET, and POWER. The *cabinet* power switch, above these, must be set ON to provide cabinet power; we suggest that you leave the cabinet switch ON and use the computer switches to control power. The front panel has three lights that indicate faults by blinking; fault codes are described in the *ECLIPSE MV/8000® II and ECLIPSE MV/8000® C System Control Processor Operator's Reference*.

The *panel* switches work as follows.

- LOCK switch — In the on position, the LOCK switch disables the PR LOAD/RESET switch and the break sequence. LOCK on enables transfer to the backup battery (if any) if outside power goes down. LOCK on also tells the hardware to program load from the jumper–selected device code (24, 27, or 33) when power is turned on. You must turn LOCK off to enable the break sequence, or to bootstrap from a device other than the one selected with jumpers. *Keep LOCK in the on position unless you want to do one of these things.* (LOCK does not disable either the local or cabinet power switches on MV/8000 C machines.)

  If LOCK is off when you turn power on, a microcoded console loader program (*BOOT DEVICE?* prompt) gets control. Then you can press NEW LINE to bootstrap from the jumper–selected device code, or you can type the device code to bootstrap from any device, for example, tape.

- PR LOAD/RESET switch — If the console loader program *(BOOT DEVICE)* has control, pressing PR LOAD tells the hardware to load from the jumper–selected device code. If the SCP CLI has control, PR LOAD tells it to display *BOOT DEVICE?* on the system console, you can then type the desired device code and press NEW LINE. PR LOAD has no effect if the CPU is running (as when AOS/VS is running). Pressing RESET resets the computer, if unlocked.

  CAUTION: *Don't press this switch when AOS/VS is running.*

- POWER switch — This switch should be at the ON position, unless you want to cut CPU power.

The lights on the MV/8000 C panel work as follows:

- PWR light — This is lit when dc power is normal; it is off when power is off or the computer is under partial battery backup.

- BATT light — This is lit when computer has transferred from normal power to backup battery (full or partial backup).

- RUN light — This is lit when the computer is executing instructions (AOS/VS or diagnostics); it is off when the computer is halted.

When the computer is running AOS/VS on normal line power, the PWR and RUN lamps are lit. When the POWER switch is off, all lamps are off. When one or more lights *blink,* this indicates a power supply fault. MV/8000 C power supply fault codes are described in the SCP manual.

In the normal course of system operations, you don't need any panel switches. To cut CPU power, press the local CPU rocker switch POWER off. To power up, press rocker switch POWER on. Otherwise, avoid touching the switches unless you must force a shutdown.

MV/8000 Panel Switches

MV/8000 computers have one light (on when power is on) and two front panel switches: RESET and POWER. The switches work as follows:

- RESET switch — Pressing this to SYSTEM resets the CPU. *Don't do it if AOS/VS is running.* Pressing this to CONSOLE has the same effect as a break sequence. Avoid pressing it to CONSOLE unless you must (as for an AOS/VS deadlock).

- POWER switch — This switch should be on, unless you want to cut CPU power.

In the normal course of system operations, you don't need any panel switches. To cut CPU power, press POWER off. To power up, press POWER on. Otherwise, avoid touching the switches unless you must force a shutdown.

MV/7800, MV/7800 C, and MV/7800 XP Front Panels

MV/7800, MV7800 C, and MV/7800 XP computers have four front panel rocker switches: LOCK, CONSOLE, SYSTEM, and POWER. Some systems also have a cabinet power switch above these. The cabinet power switch, if there is one, must be set on to provide cabinet power. We suggest that you leave this switch on and use the computer switches to control power.

The panel switches work as follows:

- LOCK switch — In the on position, the LOCK switch disables the CONSOLE and SYSTEM switches. It doesn't disable the POWER switch. Generally, keep LOCK in the on position.

- CONSOLE switch — Pressing this to RST (possible only if LOCK is off) on an unlocked computer halts the CPU and gives control to the SCP operating system. AOS/VS, if running, freezes. To have AOS/VS continue, enter CONTINUE. Avoid using this switch unless you really need the SCP CLI.

- SYSTEM switch — This switch is disabled if LOCK is on. Pressing SYSTEM BOOT, if the computer is halted, displays the Automatic Program Load menu. If the computer is running (AOS/VS or diagnostics), pressing SYSTEM to BOOT does nothing.

Pressing SYSTEM to RST resets the computer, if unlocked.

CAUTION: *Don't press this switch when AOS/VS is running.*

- POWER switch — This switch should be at the on (|) position, unless you want to cut CPU power. *Don't turn power off is AOS/VS is running.*

The lights on the MV/7800 panels work as follows:

- PWR light — This is lit when dc power is normal; it is off when power is off or the computer is under partial battery backup.
- BATT light — This is lit when the computer has transferred from normal power to backup battery (full or partial backup).
- RUN light — This is lit when the computer is executing instructions (AOS/VS or diagnostics); it is off when the computer is halted.

When the computer is running AOS/VS on normal power, the PWR and RUN lamps are lit. When the POWER switch is OFF, all lamps are off. When one or more lights *blink,* this indicates a power supply fault. Power supply fault codes are described in *Starting ECLIPSE MV/7800™ Series Computers* .

In the normal course of system operations, you don't need any panel switches. Leave LOCK ON. To cut CPU power, press POWER to OFF. To power up, press POWER to ON. Otherwise, avoid touching the switches unless you must force a shutdown.

DS/7500, MV/5000–series, MV/3500 DC, MV/2500 DC, MV/2000 DC, MV/1400 DC, and MV/1000 DC Front Panels

This section applies to DS/7500, ECLIPSE MV/5000–series, MV/3500 DC, MV/2500 DC, MV/2000 DC, MV/1400 DC, and MV/1000 DC systems.

These systems have an on/off button switch for power. On all except the MV/1000 DC, a light within the button glows when power is on. The power switch controls power to the computer and all devices in the cabinet, including disk, diskette, and/or tape units.

Note that all peripheral devices with separate switches (like tape units and printers) must be turned on before computer power is turned on. Unless you do this, you won't be able to use the device.

On powerup, diagnostics test every controller in the system; the test messages, followed by *PASSED* messages, appear on the system console. If a fault occurs on powerup, the system console will indicate an error condition (fault code or partial power–up test message). To interpret the error indicator, consult the 014–series "Starting" or "Installing" manual supplied with the computer.

In the normal course of system operations, you don't need the power switch. To cut CPU power after shutdown, press the power switch to the O (off) position. To power up press the switch to the | (on) position. *Otherwise, avoid touching the power switch.*

For details on the MV/1000 DC, see *Information Update: Starting Your ECLIPSE MV/1000™ DC Computer.*

MV/6000 Front Panel

MV/6000 computers have three front panel switches: LOCK, PR LOAD/RESET, and POWER. The switches work as follows:

- LOCK switch — In the LOCK position, the LOCK switch disables the PR LOAD/RESET switch and POWER off switch. LOCK also tells the hardware to program load from the jumper–selected device code (often 27) when power is turned on. You must unlock LOCK to turn power off or to bootstrap from a device code other than the one selected with jumpers; *but we recommend that you keep the computer locked otherwise.*

- PR LOAD/RESET — Pressing this switch to RESET resets the computer if it is unlocked; *don't do this if AOS/VS is running.*

- POWER switch — This switch should be on, unless you want to cut CPU power.

When the computer is running AOS/VS on normal power, the PWR and RUN lamps are lit. When the POWER switch is off, all lamps are off.

In the normal course of system operations, you don't need any panel switches. To cut CPU power, press LOCK off and POWER off. To power up, press LOCK and POWER on. Otherwise, avoid touching the switches unless you must force a shutdown.

MV/4000 Front Panel

MV/4000 computers have four front panel rocker switches: LOCK, CONSOLE, SYSTEM, and POWER. The *cabinet* power switch, above these, must be on to provide cabinet power; we suggest that you leave this switch on and use device switches to control power.

The *panel* switches work as follows.

- LOCK switch — In the on position, the LOCK switch disables the SYSTEM RST switch, the CONSOLE switch, the POWER off switch, and the break sequence. LOCK on enables transfer to the backup battery (if any) if outside power goes down. LOCK on also tells the hardware to program load from the jumper–selected device code (27 or 33) when power is turned on. You must turn LOCK off to turn power off with the rocker switch, enable the break sequence, or bootstrap from a device other than the one selected with jumpers. *Keep LOCK in the on position unless you want to do one of these things.* (LOCK does not disable cabinet power off.)

  If LOCK is off when you turn power on, a microcoded console loader program (@ prompt) gets control. You must type L to bootstrap from the jumper–selected device code (or type the device code followed by L (form nnL)—to bootstrap from any device, for example, tape.

- CONSOLE switch Pressing this switch to RST on an unlocked computer halts the CPU and gives control to the SCP operating system. AOS/VS, if running, freezes. To have AOS/VS continue, enter CONTINUE. Avoid using this switch unless you really need the SCP CLI.

- SYSTEM switch If the console loader program (@ prompt) has control, pressing SYSTEM BOOT tells the hardware to load from the jumper–selected device code. If the SCP CLI has control, SYSTEM BOOT tells the hardware to display *BOOT DEVICE?* on the system console; you can then type the desired device code and press NEW LINE. SYSTEM BOOT has no effect if the CPU is running (as when AOS/VS is running). Pressing SYSTEM to RST resets the computer, if unlocked—*don't do this if AOS/VS is running.*

- POWER switch This switch should be at the on (|) position, unless you want to cut CPU power.

When the computer is running AOS/VS on normal power, the PWR and RUN lamps are lit. When the POWER switch is OFF, all lamps are off. When one or more lights *blink,* there is a power supply fault. MV/4000 power supply fault codes are described in the manual *Data General 4000–Class System Control Programs Operator's Reference.*

In the normal course of system operations, you don't need any panel switches. To cut CPU power, press LOCK off and rocker switch POWER off. To power up, press LOCK on and rocker switch POWER on. Otherwise, avoid touching the switches unless you must force a shutdown.

MV/4000 DC, MV/4000 SC, and DS/4000–Series Front Panels

MV/4000 DC, MV/4000 SC, and Data General DS/4000–series front panels have two switches: PWR and RESET.

The panel switches work as follows:

- PWR switch The power switch controls power to the computer and all devices in the cabinet, including disk and diskette units. When you turn power on, the action depends on the setting of a DIP switch on the multifunction I/O controller (MIOC) PC board. This DIP switch can be set to a device code (usually done by a Data General engineer when the system is installed). If the DIP switch is set to a device code, the computer tries to program load from this device on powerup. The device code is usually that of the disk, 24. If the DIP switch is *not* set to a device code, the computer runs the console loader program, which displays an @ prompt. You must then type the desired device code and L; for example, 24L to load from disk, or 22L to load from tape.

- RESET switch Pressing this resets the computer. *Don't do it if AOS/VS is running.*

In the normal course of system operations, you don't need any panel switches. To cut CPU power *after shutdown,* press PWR off. To power up, press PWR on. Otherwise, avoid touching the switches.

Cold Start, Computer Power Off

A cold start includes turning power on (if off), starting an AOS/VS operating system or other stand–alone program, and bringing up the multiuser environment. It assumes that AOS/VS was shut down normally (not by a fatal error or power failure). If abnormal shutdown occurred, see "Abnormal Shutdown," later in this chapter.

From a cold start (computer power turned off), startup differs for different computer models. Startup is easier from a warm start, in which computer power has remained on—because the SCP OS and microcode need not be loaded. (These are in volatile memory and vanish when power is cut.)

This section explains cold start steps; see the portion that applies to your computer. Warm start steps for all computers follow this section.

Cold Start, Computer Power Off, MV/40000 Computers

Cold start on an MV/40000 is similar to cold start on MV/20000 systems, described next. For an MV/40000 computer, you can view or change default boot devices via the Automatic Program Load Menu, as described in *Starting ECLIPSE MV/40000™ Series Systems*.

Cold Start, Computer Power Off, MV/20000, MV/18000 and MV/15000 Computers

1. Make sure the system console is on and on line. Make sure that the disk(s) you want to use are on, started (for removable disks), and write enabled. Each unit's READY light must be lit.

2. Turn the computer POWER switch ON. The POWER light should glow.

3. Now EPROM code in the SCP does some power–up tests. When these succeed, the system console displays

   ** *POWER UP TESTING COMPLETED* **

   If this entire message doesn't appear, try again. Slide the POWER switch to OFF, and then to ON. If you get the message ** *POWER UP TESTING – FAILED – xx–yy–zz*, check the fault code(s) *xx–yy–zz* in the 014–series "Starting" manual for your computer.

   Next, only if your system configuration has changed since the last time you powered it up, you may see the message *Configuration changed from previous power–up*, followed by a list of the current configuration.

   Then the code in EPROM displays the Automatic Program Load Menu:

   Automatic Program Load Menu *date time*

   1 Continue immediately with automatic load
   2 Change preset values . . .
   The default device is n
   . . .
   Enter choice [1]:

4. The default choice (1) has the hardware continue with AOS/VS startup, using preset values for the startup device. You can change a preset value by entering 2 and then working from another menu (described in the the 014–series "Starting" manual for your computer. To start from a device other than the one specified by code *n*, you must select choice 3 or 2. For example, to start from tape you must enter 3, then specify the tape information (device code 22, or, for tape on a separate IOC, 122).

   Generally, you'll want to start from the default device, *n*. To do so, press NEW LINE or wait out the time–out delay (original default is 45 seconds). The hardware reads the default startup device and loads the disk bootstrap, which in turn loads the SYSBOOT program. SYSBOOT displays the Operating System Load Menu

   Operating System Load Menu

   1 Continue immediately with operating system load
   2 Enter the Technical Maintenance Menu
   ...
   Enter choice [1]:

5. From the Operating System Load Menu, you'll generally want the default, 1, which is *Continue immediately with operating system load.* If so, take the default. On a CRT, press NEW LINE; on a hardcopy terminal, press CTRL–A and then NEW LINE. Or you can outwait the time–out delay (original default is 45 seconds).

   (If the default choice is 2, AOS/VS wasn't shut down normally. You must run FIXUP. SYSBOOT defaults will lead you to through the Technical Maintenance Menu to FIXUP.)

   To avoid the default, perhaps to change the default system, skip to the next numbered step.

   SYSBOOT now loads microcode from the default microcode file, MV20000.MCF. This may take up to a minute. Then SYSBOOT loads AOS/VS. There's a pause, and the system console displays *AOS/VS REV n* and a question. Skip to "Initializing AOS/VS—All Computers."

   (If FIXUP is needed, SYSBOOT displays the Technical Maintenance Menu. Press NEW LINE for the default. SYSBOOT loads microcode from the default microcode file, which takes a minute or so, then loads FIXUP. The system console displays the FIXUP banner. If a default script filename has been identified to SYSBOOT, FIXUP runs automatically. Otherwise, FIXUP will ask questions. The FIXUP section later in this chapter can help you answer these questions or create a script file to run FIXUP automatically.)

   If an error occurs during any of these operations, control goes to the SCP CLI. Turn power off and on again, and return to step 1.

6. To avoid the default choice, enter 2. SYSBOOT then displays the Technical Maintenance Menu. On the Technical Maintenance Menu, make the choice you want (like a new default system or shorter time–out delay).

   After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load microcode and the default system as above. Details on changing defaults using SYSBOOT's Technical Maintenance Menu appear later in "Changing Operating System Load (SYSBOOT) Defaults."

Cold Start, CPU Power Off, MV/10000–Series, MV/8000 II, and MV/8000 C Computers

1. Make sure the system console is on and on line. Make sure that the disk(s) you want to use are on, started (for removable disks), and write enabled. Each unit's READY light must be lit.

2. Press the CPU LOCK switch to on unless you want to cold start from magnetic tape or any other nondefault device.

3. Turn the CPU POWER switch to on. The POWER lamp should light.

4. Now EPROM code in the SCP does some power–up tests. When these succeed, the system console displays

   POWER UP TESTING COMPLETED

   If this entire message doesn't appear, try again: Push the LOCK switch to off, turn the power off, push the LOCK switch to on, and turn power on. If this doesn't help, consult the manual *AOS/VS and AOS/VS II Error and Status Messages*.

   The SCP reads the startup device and loads the disk bootstrap, which in turns loads the SYSBOOT program.

5. If your system disk was formatted as part of a multiple–disk LDU by a Revision 6.00 Disk Formatter, then the first time you start AOS/VS, SYSBOOT will prompt *Specify each additional disk in the LDU.*

   Specify each disk unit name (for example, DPJ1) and default or specify the device code until you've described all disks; then press NEW LINE. SYSBOOT then loads microcode and the system (or FIXUP) as described next. In the future, SYSBOOT will skip these questions unless all disks in the LDU aren't on line at startup.

   Then, SYSBOOT displays

   Operating System Load Menu

   1 Continue immediately with operating system load
   2 Enter the Technical Maintenance Menu
   ...
   The default operating system pathname is xxx
   ...
   Enter choice [default]:

(If you turn power on when the LOCK switch is unlocked, no menu is displayed. Instead, an MV/10000–series computer asks *BOOT WHAT DEVICE? (CHANNEL AND DEVICE CODE).* An MV/8000 II or MV/8000 C asks *BOOT DEVICE?* On either machine, type the device code of the device you want to boot from; for example, 22 for tape or 27 for a DPF–type disk. The first blocks on the device must contain the appropriate bootstrap (tape or disk). The device must contain the SCP–OS and needed microcode; and it must include a program to load SCP–OS and microcode. All these conditions normally do apply to the MV/n system tape you received from Data General and also to your master LDU.)

6. Generally, you'll want the default choice 1 *Continue immediately with operating system load.* (If the default choice is 2, AOS/VS wasn't shut down normally. You must run FIXUP. SYSBOOT defaults will lead you to FIXUP through the Technical Maintenance Menu.)

   To take the default, press NEW LINE or outwait the time–out delay (original default is 45 seconds). To avoid the default, perhaps to change the default system, skip to the next numbered step.

   SYSBOOT now loads microcode from the default microcode file, (the filename appears in Table 6–3, later). This may take up to a minute. Then SYSBOOT loads AOS/VS. There's a pause, and the system console displays *AOS/VS REV n* and a question. Skip to "Initializing AOS/VS—All Computers."

   (If FIXUP is needed, SYSBOOT displays the Technical Maintenance Menu. Press NEW LINE for the default choice. SYSBOOT loads microcode from the default microcode file, which takes a minute or so, then loads FIXUP. The system console displays the FIXUP banner. If a default script filename has been identified to SYSBOOT, FIXUP runs automatically. Otherwise, FIXUP will ask questions. The FIXUP section later in this chapter can help you answer these questions or create a script file to run FIXUP automatically.)

   If an error occurs during any of these operations, control goes to the SCP CLI. Turn power off and on again and return to step 1.

7. To avoid the default choice, enter 2. SYSBOOT then displays the Technical Maintenance Menu. On the Technical Maintenance Menu, make the choice you want (like a new default system or shorter time–out delay).

   After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load microcode and the default system as above. Details on changing defaults using SYSBOOT's Technical Maintenance Menu appear later in "Changing Operating System Load (SYSBOOT) Defaults."

Cold Start, Computer Power Off, MV/8000 Computers

1. Make sure the system console is on and on line. Make sure that the disk(s) you want to use are on, started (for removable disks), and write enabled. Each unit's READY light must be lit.

2. Make sure that the SCP/microcode diskette is correctly inserted in its unit slot and that the diskette door is latched.

3. Turn the CPU POWER switch on. The POWER lamp should light.

4. Now EPROM code does some power–up tests. When these succeed, the system console displays

   CONSOLE READY*

   MV/8000 SYSTEM CONTROL PROGRAM

   . . .

   ENTER DATE (MO DAY YEAR)

   (If one or more power–up tests fail, the system console will show a partial or no ***CONSOLE READY**** message and the SCP octal debugger prompt (!) will appear. Turn power off and on again. If the problem recurs, see the SCP manual for your computer.)

   Type the date in numeric form; for example, for November 22, 1992, enter 11 22 92.

   TIME (HR MIN SEC)

5. Type the time per a 24–hour clock. For example, for 2:52 p.m., enter 14 52.

   MICROCODE(1= STD, 2= C350/MMPU[1])?

6. Accept the default microcode by pressing NEW LINE. You'll see loading and microcode messages, and then

   SCP–CLI>

   The SCP and microcode load take a little more than a minute. If you see an error message, make sure the diskette is inserted properly; turn the power off and on again, and type the date and time again. If the error recurs, try another SCP/microcode diskette.

7. Reset; then boot from the device code of your master LDU, as follows:

   SCP–CLI> RESET↵
   SCP–CLI> BOOT 27↵

   The SCP reads the startup device and loads the disk bootstrap, which in turn loads the SYSBOOT program.

8. If your system disk was formatted as part of a multiple–disk LDU by a Revision 6.00 Disk Formatter, then the first time you start AOS/VS, SYSBOOT will prompt *Specify each additional disk in the LDU.*

Specify each disk unit name (for example, DPF1) and default or specify the device code until you've described all disks; then press NEW LINE. SYSBOOT then loads microcode and the system (or FIXUP) as described above. In the future, SYSBOOT will skip these questions unless all disks in the LDU aren't on line at startup.

Then, SYSBOOT displays

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu
...
The default operating system pathname is xxx
...
Enter choice [default]:

9. Generally, you'll want the default choice 1, *Continue immediately with operating system load.* (If the default choice is 2, AOS/VS wasn't shut down normally. You must run FIXUP. SYSBOOT defaults will lead you to FIXUP through the Technical Maintenance Menu.)

To take the default, press NEW LINE or outwait the time–out delay (original default is 45 seconds). To avoid the default, perhaps to change the default system or shorten SYSBOOT's time–out delay, skip to the next numbered step.

SYSBOOT now loads AOS/VS. There's a pause, and the console displays *AOS/VS REV n* and asks for the date. Skip to "Initializing AOS/VS—All Computers."

(If FIXUP is needed, SYSBOOT displays the Technical Maintenance Menu. Press NEW LINE for the default choice. SYSBOOT then loads FIXUP and the system console displays the FIXUP banner. If a default script filename has been identified to SYSBOOT, FIXUP runs automatically. Otherwise, FIXUP will ask questions. The FIXUP section later in this chapter can help you answer these questions or create a script file to run FIXUP automatically.)

If an error occurs during any of these operations, control goes to the SCP CLI. Turn power off and on again, and return to step 1.

10. To avoid the default choice, enter 2. SYSBOOT then displays the Technical Maintenance Menu. On the Technical Maintenance Menu, make the choice you want (like a new default system or shorter time–out delay).

After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load the default system as above. Details on changing defaults using SYSBOOT's Technical Maintenance Menu appear later in "Changing Operating System Load (SYSBOOT) Defaults."

If an error occurs during any of these operations, control goes to the SCP CLI. Turn power off and on again and return to step 1.

11. To avoid the default choice, enter 2. SYSBOOT will then display the Technical Maintenance Menu. On the Technical Maintenance Menu, make the choice you want (like a new default system or shorter time–out delay).

After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load the default system, which may take a minute or so. Details on changing defaults using SYSBOOT's Technical Maintenance Menu appear later in "Changing Operating System Load (SYSBOOT) Defaults."

Cold Start, Computer Power Off, MV/9000–Series and MV/7800–Series Computers

This section describes startup for ECLIPSE MV/9000–series, MV/7800, MV/7800 C, and MV/7800 XP computers.

1. Make sure the system console is on and on line. Make sure that the disk(s) you want to use are on, started (for removable disks), and write-enabled. Each unit's READY light must be lit.

2. Press the computer LOCK switch to LOCK unless you want to cold start from magnetic tape. LOCK is a two-position rocker switch; you can see whether it's in LOCK or UNLOCK.

3. Turn the computer POWER switch on. The POWER switch light should glow.

4. Now, the computer does some power–up tests. When these succeed, the system console displays

   ** *POWERUP TESTING COMPLETED* **

   (If this entire message doesn't appear, try again: set LOCK switch to UNLOCK, power OFF, LOCK switch to LOCK, power ON. If you still get only a partial message or if you get the message ** *POWERUP TESTING FAILED***, consult the manual *Starting ECLIPSE MV/7800™ Series Computers* for what to do.)

   After successful powerup, the system displays the Automatic Program Load Menu:

   date *time*

   Automatic Program Load Menu

   1 Continue immediately with preset values.
   2 Change preset values.

   Loading with preset values will continue automatically unless you respond within 45 seconds.

   The default device is dd.

   Enter choice [1]:

5. The default choice (1) has the hardware continue with AOS/VS startup, using preset values for startup device, date, time, and time-out delay. You can change a preset value by entering 2, then working from the menu that appears next. You must enter 2 and select 3 "Load from different device" if you want to load from a device other than the one specified by code dd, for example, if you want to start from tape (device code 22).

Generally, you'll want to start from the default dd. To do so, press NEW LINE or wait out the time–out delay (original default 45 seconds). The hardware reads the default startup device and loads the disk bootstrap, which in turn loads the SYSBOOT program. SYSBOOT displays the Operating System Load Menu:

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu
...
The default operating system pathname is xxx
...
Enter choice [default]:

6. Generally, you'll want the default choice 1, *Continue with operating system load.* (If the default choice is 2, AOS/VS wasn't shut down normally. You must run FIXUP. SYSBOOT defaults will lead you through the Technical Maintenance Menu to FIXUP.)

   To take the default, press NEW LINE or wait out the time-out delay (original default is 45 seconds). To avoid the default, perhaps to change the default system or shorten SYSBOOT's time-out delay, skip ahead to the next numbered step in this section.

   SYSBOOT now loads microcode from the default microcode file, MV7800.MCF. This may take up to a minute. Then SYSBOOT loads AOS/VS. There's a pause, and the system console displays *AOS/VS REV n* and a question. Skip ahead to the section, "Initializing AOS/VS—All Computers."

   (If FIXUP is needed, SYSBOOT displays the Technical Maintenance Menu. Press NEW LINE for the default choice or wait out the time-out delay. SYSBOOT loads microcode from the default microcode file, which takes a minute or so; then loads FIXUP. The system console displays the FIXUP banner. If a default script filename has been identified to SYSBOOT, FIXUP runs automatically. Otherwise, FIXUP will ask questions. The FIXUP section later in this chapter can help you answer these questions or create a script file to run FIXUP automatically.)

   If an error occurs during any of these operations, control goes to the SCP. Press the SYSTEM switch to RST (or press the PR LOAD/RESET switch to RESET), and return to step 4.

7. To avoid the default choice, enter 2 . SYSBOOT then displays the Technical Maintenance Menu. On the Technical Maintenance Menu, make the choice you want (like a new default system or shorter time-out delay).

   After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load microcode and the default system as above. Details on changing defaults using SYSBOOT's Technical Maintenance Menu appear later in the section, "Changing Operating System Load (SYSBOOT) Defaults."

   If an error occurs during any of these operations, control goes to the SCP. Turn power off and on again and return to step 1.

Cold Start, Computer Power Off, DS/7500, MV/5000–Series, MV/3500 DC, MV/2500 DC, MV/2000 DC, MV/1400 DC, and MV/1000 DC Computers

To cold start your DS/7500, MV/5000–series, MV/3500 DC, MV/2500 DC, MV/2000 DC, MV/1400 DC, or MV/1000 DC computer, do the following:

1. Make sure the system console is on and on line.

2. If you have a tape unit, turn it on now. (With some models, to use the tape unit, you must turn it on before turning computer power on.)

3. Turn computer power on via the switch on the cabinet.

   Now the computer runs power–up tests on each PC board in the computer. On the system console, you'll see *TESTING* messages.

   The power–up tests take a minute or so. (If the system fails to complete a message after 15 seconds or so, turn computer power off and on. If the problem recurs, there is a hardware fault condition. Consult your 014–series "Starting" or "Installing" manual for an explanation of the fault code.)

   After the computer hardware passes the power–up tests, EPROM code in the SCP does some power–up tests. Then it displays the Automatic Program Load Menu:

   date *time*

   Automatic Program Load Menu

   1 Continue immediately with preset values
   2 Change preset values
   . . .
   The default device is dd
   . . .
   Enter choice [1]:

4. Generally, you'll want the default choice 1, *Continue with operating system load.* (If the default choice is 2, AOS/VS wasn't shut down normally. You must run FIXUP. SYSBOOT defaults will lead you to FIXUP through the Technical Maintenance Menu.)

   To take the default, press NEW LINE or outwait the time–out delay (original default is 45 seconds). To avoid the default, perhaps to change the default system or shorten SYSBOOT's time–out delay, skip to the next numbered step.

   SYSBOOT now loads microcode from the default microcode file, (the filename appears in Table 6–3, later). You may see *LOADING MICROCODE* messages. Then SYSBOOT loads AOS/VS. There's a pause, and the system console displays *AOS/VS Rev n* and a question. Skip to "Initializing AOS/VS—All Computers."

   (If FIXUP is needed, SYSBOOT displays the Technical Maintenance Menu. Press NEW LINE for the default choice. SYSBOOT loads microcode from the default microcode file, then loads FIXUP. The system console displays the FIXUP banner.

If a default script filename has been identified to SYSBOOT, FIXUP runs automatically. Otherwise, FIXUP will ask questions. The FIXUP section later in this chapter can help you answer these questions or create a script file to run FIXUP automatically.)

If an error occurs during any of these operations, control goes to the SCP CLI. Turn power off and on again, and return to step 1.

5. To avoid the default choice, enter 2. SYSBOOT then displays the Technical Maintenance Menu. On the Technical Maintenance Menu, make the choice you want (like a new default system or shorter time–out delay).

   After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load microcode and the default system as above. Details on changing defaults using SYSBOOT's Technical Maintenance Menu appear later in "Changing Operating System Load (SYSBOOT) Defaults."

Cold Start, Computer Power Off, MV/6000 Computers

1. Make sure the system console is on and on line. Make sure that the disk(s) you want to use are on, started (for removable disks), and write–enabled. Each unit's READY light must be lit.

2. Press the CPU LOCK switch to LOCK unless you want to cold start from magnetic tape. LOCK is a two–position rocker switch; you can see whether it's in the lock or unlock position.

3. Turn the CPU POWER switch to on. The POWER lamp should light.

4. Now EPROM code in the SCP does some power–up tests. When these succeed, the system console displays

   POWER UP TESTING COMPLETED

   (If this entire message doesn't appear, try again: LOCK switch to unlock position, power switch to off, LOCK switch to LOCK, power to ON.)

   The SCP reads the startup device and loads the disk bootstrap, which in turn loads the SYSBOOT program.

5. If your system disk was formatted as part of a multiple-disk LDU by a Revision 6.00 Disk Formatter, then the first time you start AOS/VS, SYSBOOT will prompt *Specify each additional disk in the LDU.*

   Specify each disk unit name (for example, DPF1) and default or specify the device code until you've described all disks; then press NEW LINE. SYSBOOT then loads microcode and the system (or FIXUP) as described next. In future, SYSBOOT will skip these questions unless all disks in the LDU aren't on line at startup.

   Then, SYSBOOT displays

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu
...
The default operating system pathname is xxx
...
Enter choice [default]:

(If you turn power on when the LOCK switch is unlocked, no menu is displayed. Instead, it asks *BOOT DEVICE* and you must enter the two-digit device code of the device you want to boot from; for example, enter 22 for tape or 27 for a DPF-type disk. The first blocks on the device must contain the appropriate bootstrap (tape or disk). The device must contain the SCP-OS and needed microcode; and it must include a program to load SCP-OS and microcode. All these conditions would normally be true for the MV/n system tape you received from Data General and for your master LDU.)

6. Generally, you'll want the default choice 1 *Continue... with the load of operating system xxx*. (If the default choice is 2, AOS/VS wasn't shut down normally. You must run FIXUP. SYSBOOT defaults will lead you to FIXUP through the Technical Maintenance Menu.)

   To take the default, press NEW LINE or outwait the time-out delay (original default is 45 seconds). To avoid the default, perhaps to change the default system or shorten SYSBOOT's time-out delay, skip to the next numbered step.

   SYSBOOT now loads microcode from the default microcode file, MV6000.MCF. This may take up to a minute. Then SYSBOOT loads AOS/VS. There's a pause, and the system console displays *AOS/VS REV n* and a question. Skip to "Initializing AOS/VS—All Computers."

   (If FIXUP is needed, SYSBOOT displays the Technical Maintenance Menu. Press NEW LINE for the default choice. SYSBOOT loads microcode from the default microcode file, which takes a minute or so, then loads FIXUP. The system console displays the FIXUP banner. If a default script filename has been identified to SYSBOOT, FIXUP runs automatically. Otherwise, FIXUP will ask questions. The FIXUP section later in this chapter can help you answer these questions or create a script file to run FIXUP automatically.)

   If an error occurs during any of these operations, control goes to the SCP CLI. Turn power off and on again, and return to step 1.

7. To avoid the default choice, enter 2. SYSBOOT then displays the Technical Maintenance Menu. On the Technical Maintenance Menu, make the choice you want (like a new default system or shorter time-out delay).

   After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load microcode and the default system as above. Details on changing defaults using SYSBOOT's Technical Maintenance Menu appear later in "Changing Operating System Load (SYSBOOT) Defaults."

   If an error occurs during any of these operations, control goes to the SCP CLI. Turn power off and on again and return to step 1.

Cold Start, Computer Power Off, MV/4000 Computers

1. Make sure the system console is on and on line. Make sure that the disk(s) you want to use are on, started (for removable disks), and write–enabled. Each unit's READY light must be lit.

2. If the CPU cabinet power switch is OFF, press it to ON. Then press the LOCK switch to ON (unless you want to cold start from magnetic tape). LOCK is a two–position rocker switch; you can see whether it's at OFF or ON.

3. Press the POWER rocker switch to ON. The POWER lamp should light.

4. Now the computer does some power–up tests. When these succeed, the system console displays

   MV4000 READY

   (If this entire message doesn't appear, try again: LOCK switch to OFF, power to OFF, LOCK switch to ON, power to ON. If this doesn't help, consult the *Data General 4000–Class System Control Programs Operator's Reference* manual, fault conditions self–test table.)

   The SCP reads from the startup device and loads an AOS/VS bootstrap program, which in turn loads the SYSBOOT program.

5. If your system disk was formatted as part of a multiple–disk LDU by a Revision 6.00 Disk Formatter, then the first time you start AOS/VS, SYSBOOT will prompt *Specify each additional disk in the LDU.*

   Specify each disk unit name (for example, DPF1) and default or specify the device code until you've described all disks; then press NEW LINE. SYSBOOT then loads microcode and the system (or FIXUP) as described next. In the future, SYSBOOT will skip these questions unless all disks in the LDU aren't on line at startup.

   Then, SYSBOOT displays

   Operating System Load Menu

   1 Continue immediately with operating system load
   2 Enter the Technical Maintenance Menu
   ...
   The default operating system pathname is xxx
   ...
   Enter choice [1]:

   (If you turn power on when the LOCK switch is OFF, no menu is displayed. Instead, the loader program prints a commercial at sign (@). You must manually load by typing the desired two–digit device code, followed by L: for example 22L for tape. The first blocks on the device must contain the appropriate bootstrap (tape or disk). The device must contain the SCP–OS and needed microcode; and it must include a program to load SCP–OS and microcode. All these conditions would normally be true for the MV/4000 system tape you received from Data General and for your master LDU.)

6. Generally, you'll want the default choice 1 *Continue operating system load*. (If the default choice is 2, AOS/VS wasn't shut down normally. You must run FIXUP. SYSBOOT defaults will lead you to FIXUP through the Technical Maintenance Menu.)

   To take the default, press NEW LINE or outwait the time–out delay (original default is 45 seconds). To avoid the default, perhaps to change the default system or shorten SYSBOOT's time–out delay, skip to the next numbered step.

   SYSBOOT now loads microcode from the default microcode file, MV4000.MCF (or a different name if the default microcode filename was changed on the Technical Maintenance Menu). Then SYSBOOT loads AOS/VS. There's a pause, and the system console displays *AOS/VS REV n* and asks for the date. Skip to "Initializing AOS/VS —All Computers."

   (If FIXUP is needed, SYSBOOT displays the Technical Maintenance Menu. Press NEW LINE for the default choice. SYSBOOT loads microcode from the default microcode file, then loads FIXUP. The system console displays the FIXUP banner. If a default script filename has been identified to SYSBOOT, FIXUP runs automatically. Otherwise, FIXUP will ask questions. The FIXUP section later in this chapter can help you answer these questions or create a script file to run FIXUP automatically.)

   If an error occurs during any of these operations, control goes to the SCP CLI. Turn power off and on again and return to step 1.

7. To avoid the default choice, enter 2. SYSBOOT then displays the Technical Maintenance Menu. On the Technical Maintenance Menu, make the choice you want (like a new default system or shorter time–out delay).

   After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load microcode and the default system as above. Details on changing defaults using SYSBOOT's Technical Maintenance Menu appear later in "Changing Operating System Load (SYSBOOT) Defaults."

8. SYSBOOT loads the default microcode file and the default operating system.

   The MV/4000 hardware cannot tell SYSBOOT whether a hardware floating–point unit is installed. Thus, the Data General default microcode file is MV4000.MCF, which is for firmware (not hardware) floating point. The blank–disk procedure in Chapter 3 advised readers who have hardware floating point to change the default file, and explained how. But if your machine has hardware floating point or if you want a different default, change the default as shown in "Changing Operating System Load (SYSBOOT) Defaults."

   As SYSBOOT loads microcode, you'll see the messages

   MV4000 MICROCODE REV n LOADING
   CONTROL STORE LOADING
   CONTROL STORE VERIFIED
   SCRATCH PAD LOADING
   SCRATCH PAD VERIFIED
   MV4000 MICROCODE REV n LOADED AND VERIFIED

(If an error occurs, control goes to the loader program and you will see the @ prompt. Press LOCK OFF, power OFF, press LOCK, power ON to try again.)

At this point, you can get to the SCP CLI by typing the break sequence (CMD and BREAK keys, or BRK, or BREAK, depending on the console model). But let's assume you want to bring up AOS/VS. Skip to "Initializing AOS/VS—All Machines."

Cold Start, Computer Power Off, MV/4000 DC, MV/4000 SC and DS/4000–Series Computers

To cold start your MV/4000 DC, MV/4000 SC, or Data General DS/4000–series computer, do the following:

1. Make sure the system console is on and on line.

2. If you have a cartridge tape unit, turn it on now, by moving its switch to ON–1. (To use the tape unit, you must turn it on before turning computer power on.)

3. Turn computer power on via the switch on the cabinet.

4. Now the computer does some power–up tests. When these succeed, the system console displays

   MV4000 READY
   ... (test message about IOC board) ...

   (If these messages don't appear, try again: turn power off and on. If this doesn't help, consult the *Data General 4000–Class System Control Programs Operator's Reference* manual, fault conditions self–test tables.)

   The message that follows these depends on the setting of a switch in the computer (specifically, a DIP switch on the MIOC PC board).

5. If the DIP switch is set to the disk device code, a loader program reads the disk bootstrap, which in turn loads the SYSBOOT program.

6. If your system disk was formatted as part of a multiple–disk LDU by a Revision 6.00 Disk Formatter, then the first time you start AOS/VS, SYSBOOT will prompt *Specify each additional disk in the LDU.*

   Specify each disk unit name (for example, DPJ1) and default or specify the device code until you've described all disks; then press NEW LINE. SYSBOOT then loads microcode and the system (or FIXUP) as described next. In the future, SYSBOOT will skip these questions unless all disks in the LDU aren't on line at startup.

Then, SYSBOOT displays

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu
...
The default operating system pathname is xxx
...
Enter choice [1]:

If this menu appears, you can proceed to start up any disk–based software. To do so, skip to step 7.

To start from tape or diskette (perhaps to install a new system), type the break sequence (press CMD, hold it down, and press the BREAK/ESC key) to get the @ prompt. Then continue to the next step.

7. If the DIP switch isn't set to the disk device code, or if you typed the break sequence in step 5, the system console displays a commercial at sign (@):

@

You must manually load by typing the desired two–digit device code, followed by L. The device code of the disk is 24; the device code of the diskette is 64; and the code of the tape unit (if you have one) is 22. For example, enter

@ 64L (To program load from diskette)

The device you specify must contain the appropriate bootstrap (tape or disk). The device must also contain needed microcode and the SCP–OS; and it must include a program to load SCP–OS and microcode. All these conditions are true for the MV/4000 system tape or first system diskette you received from Data General, and for your master LDU.

Now, the computer tries to program load from the device you specify. When it succeeds, the bootstrap program displays a prompt. For disk or an AOS/VS diskette, the bootstrap program is SYSBOOT, whose prompt is the menu shown in step 5a above: *Operating System Load Menu*. If you see that prompt, return to step 5a and continue as described there. (But if you're installing a new revision of AOS/VS from diskette or tape, you should be reading Chapter 7, not this one.)

8. Generally, you'll want the default choice 1 *Continue operating system load.* (If the default choice is 2, AOS/VS wasn't shut down normally. You must run FIXUP. SYSBOOT defaults will lead you to FIXUP through the Technical Maintenance Menu.)

To take the default, press NEW LINE or wait out the time–out delay (original default is 45 seconds). To avoid the default, perhaps to change the default system or shorten SYSBOOT's time–out period, skip to the next numbered step.

SYSBOOT now loads microcode from the default microcode file, MV4000.MCF (unless a different microcode file was specified to the Technical Maintenance Menu; for supplied microcode files, see Table 6–3). Then SYSBOOT loads AOS/VS. There's a pause, and the system console displays *AOS/VS Rev n* and asks for the date. Skip to "Initializing AOS/VS—All Computers."

(If FIXUP is needed, SYSBOOT displays the Technical Maintenance Menu. Press NEW LINE for the default choice. SYSBOOT loads microcode from the default microcode file, then loads FIXUP. The system console displays the FIXUP banner. If a default script filename has been identified to SYSBOOT, FIXUP runs automatically. Otherwise, FIXUP will ask questions. The FIXUP section later in this chapter can help you answer these questions or create a script file to run FIXUP automatically.)

If an error occurs during any of these operations, control goes to the SCP CLI. Turn power off and on again and return to step 1.

9. To avoid the default choice, enter 2. SYSBOOT then displays the Technical Maintenance Menu. On the Technical Maintenance Menu, make the choice you want (like a new default system or shorter time–out delay).

After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load microcode and the default system as above. Details on changing defaults using SYSBOOT's Technical Maintenance Menu appear later in "Changing Operating System Load (SYSBOOT) Defaults."

Warm Start, Computer Running—All Computers

You can *warm start* your system if AOS/VS was shut down normally and power remained on. After normal shutdown, the SCP gets control and displays the SCP CLI prompt on the system console. These steps assume that the SCP CLI is active on the system console.

1. Make sure all disks are on, write-enabled, and ready.

2. Make sure that your line printer(s) are on and on line, with paper aligned.

3. Reset the processor:

   SCP-CLI> RESET↵

4. Boot from disk:

   SCP-CLI> BOOT 24↵ (Or 27 for a model DPF-type disk; or 33 for a model 6234 disk)

   The SYSBOOT program displays

   Operating System Load Menu

   1 Continue immediately with operating system load
   2 Enter the Technical Maintenance Menu
   ...
   The default operating system pathname is xxx
   ...
   Enter choice [default]:

5. Generally, you'll want the default choice 1 *Continue operating system load.* (If the default choice is 2, AOS/VS wasn't shut down normally. You must run FIXUP. SYSBOOT defaults will lead you to through the Technical Maintenance Menu to FIXUP.)

   To take the default, press NEW LINE or outwait the time-out delay (displayed on the screen). (To avoid the default, perhaps to change the default system or shorten SYSBOOT's time-out delay, skip to the next numbered step.)

   SYSBOOT loads AOS/VS. There's a pause, and the system console displays *AOS/VS Rev n* and asks a question. You can start initializing AOS/VS (next section).

   (If FIXUP is needed, SYSBOOT displays the Technical Maintenance Menu. Press NEW LINE for the default choice. SYSBOOT will load FIXUP, and the system console will display the FIXUP banner. If a default script filename has been identified to SYSBOOT, FIXUP will run automatically. Otherwise, FIXUP will ask questions. The FIXUP section later in this chapter can help you answer these questions.)

6. To avoid the default choice, enter 2 ; then SYSBOOT displays its Technical Maintenance Menu. Make the choice(s) you want (like a new default system or shorter time–out delay). After changing defaults on the Technical Maintenance Menu, you can continue loading the default operating system by selecting choice 1. SYSBOOT will then load the default system as describe above. You can start initializing AOS/VS (next section).

7. If your system disk was formatted as part of a multiple–disk LDU, then the first time you start AOS/VS, SYSBOOT will prompt *Specify each additional disk in the LDU.*

   Specify each disk unit name (for example, DPJ1) and default; or specify the device code until you've described all disks; then press NEW LINE. SYSBOOT then loads microcode and the system (or FIXUP) as described above. In the future, SYSBOOT will skip these questions unless all disks in the LDU aren't on–line at startup.

Initializing AOS/VS—All Computers

The system console shows

AOS/VS Rev n

Master LDU: name (*name* as given to the Disk Formatter)

Date (MM/DD/YY)?

If your computer has a battery-powered boot clock, AOS/VS gets the time and date from it, skips the *Date* and *Time* questions, and prompts *Override default specs?* (see step 3 below). (If the boot clock isn't running or its battery is exhausted, AOS/VS *will* ask the date and time questions.) Having the date and time supplied automatically is a convenience, but make sure they're correct when the AOS/VS CLI displays its banner on the system console. Computers with boot clocks include MV/40000, MV/20000, MV/18000, MV/15000, MV/9000–series, MV/7800, DS/7000-series, MV/5000–series, MV/3000–series, MV/2500 DC, MV/2000 DC, MV/1400 DC, and MV/1000 DC systems.

(If you see a message starting with *WARNING: System patch area contains no patches*, continue bringing up AOS/VS. As soon as possible, use the update tool (described in Chapter 7) to apply patches to the system. Patches are extremely important. Unless you apply them, your system may crash repeatedly.)

1. It's *very* important that the date and time be correct. (You can fix them if needed, via the DATE or TIME command, after the CLI comes up.) Type the date as numbers for month, day, and year. Spaces or slashes can separate numbers. For example, for November 22, 1992, type

   Date (MM/DD/YY)? 11 22 92↵

   Time (HH:MM:SS)?

2. Type the time, based on a 24-hour clock, in hours, minutes, and seconds. (Minutes and seconds are optional. If you omit them, the system sets each to 0.) Use spaces or colons to separate each number pair. For example, for 2:35 p.m., type

   Time (HH:MM:SS)? 14 35↵

   Offset from universal time [+00:00]?

3. If your computer is part of a network that spans time zones, set the offset from universal time or Greenwich mean time by typing the difference in hours between local time and Greenwich mean time. Precede the number by a minus sign for locations west of Greenwich. For example, for Eastern Standard Time, enter −5.

   Offset from universal time [+00:00]? −5↵

   AOS/VS will continue with defaults automatically
   unless you respond within 00:00:30

   Override default specs [N]?

4. *Specs* means the parameters in the system specification file created during VSGEN.

   These parameters include the following.

   - *Number of buffers in cache* (number of system buffers).
   - *Swap directory definition* (swap file size or device).
   - *Page directory definition* (page file size or device).
   - *Initial load* (used when you are installing a new revision of AOS/VS on this LDU).

   For more information, see the section in Chapter 4, "Specifying System Parameters."

   If you wish to override any default specification, enter Y; the system will then ask about each one and you can take the default or specify a new value. If you see the message *AOS/VS will continue with defaults automatically unless you respond within 00:00:30,* you have thirty seconds to interrupt the automatic boot sequence. (30 seconds is the default time−out for the option; you may see a different time−out duration.) In most cases, though, you will not want to override the default specifications, so you will press NEW LINE or outwait the time−out delay.

   A pause occurs here, then

   AOS/VS CLI Rev n *date* *time*
)

   The master CLI, process ID (PID) 2, is running.

NOTE: If the date or time is wrong, fix it now with the DATE or TIME command before bringing up the multiuser environment. (On computers with boot clocks, the CLI commands DATE and TIME also set the boot clock's date and time.) Changing date or time while EXEC is running can confuse users. Also, if you run the system log (SYSLOG), changing the time after you start logging may produce wrong account information. For these reasons, it is better to change the date or time while the multiuser environment is not running.

It is possible, via VSGEN, to have the master CLI execute a command file automatically when it starts up. Typically, you would choose your UP.CLI macro. To ensure that the UP macro executes properly,

- you must ensure that all printers are on and on line before bringing up AOS/VS;
- you must take extra care to type the correct date and time when you initialize AOS/VS; and
- you can skip the next two steps.

5. Make sure that all your line printers are on and on line, with paper aligned.

6. Bring the multiuser environment up by running your tailored UP macro:

```
) UP⟫
Pid n
... (EXEC messages) ...
... (Messages you may have put in UP.CLI) ...
)
```

7. Make sure the CPU LOCK switch (if any) is in the locked position. Or on an MV/20000, press the DISPLAY switch if the other switches are lit.

EXEC and the multiuser environment are up; users can log on; and you can bring up other processes and/or issue EXEC and CLI commands as needed.

If you have a multiple-processor system like an MV/20000 Model 2, your UP macro should have initialized the second processor via the CLI command JPINITIALIZE.

Figure 6-1 shows the steps taken by all parties to bring the whole system up. Figure 6-2 summarizes cold startup and normal shutdown for computers with working boot clocks (time–of–day clocks); Figure 6-3 does the same for computers without working boot clocks.

Using the Technical Maintenance Menu

At startup, some computers display an Automatic Program Load Menu, described above. On *all* computers, hardware settings (set on the program load menu or some other way), tell the hardware to load software from a magnetic medium, usually disk. The software most often loaded is SYSBOOT, which has menus of its own.

Via SYSBOOT's Technical Maintenance Menu, you can change a number of default settings, including

- time–out delay (before SYSBOOT starts loading the default system)
- default AOS/VS system
- default microcode filename
- FIXUP script file filename (runs FIXUP automatically, without need for human answers to its questions)

The Technical Maintenance Menu also allows you to run any stand–alone program (like the Disk Formatter). And it will prompt run FIXUP if AOS/VS wasn't shut down normally.

To change any of these values, you must start up AOS/VS (this runs SYSBOOT). Either a cold or warm start works.

During startup, SYSBOOT will display its Operating System Load Menu. Enter 2 before the default time–out delay expires. (The default system gets control automatically after the delay expires.) SYSBOOT will then display the Technical Maintenance Menu. Depending on your machine and options, the menu may show from four to eleven choices. You may not see more than four choices. All possible choices follow.

```
1  Load and start the default operating system
2  Load and verify microcode
3  Enter the SCP CLI
4  Change the time-out delay
5  Run diagnostics (if MV/ADEX is installed on disk)
6  Run a specified program
7  Run FIXUP
8  View or change the default operating system filename
9  View or change the default microcode filename
10 View or change the FIXUP default script filename
11 Boot from a different disk unit
```

Choice 1 is the default unless FIXUP must be run; it tells SYSBOOT to load the default operating system.

Choice 2, to load and verify microcode, is sometimes useful if you're seeing mysterious error messages, like *CPU RUNNING* or *Insufficient memory for FIXUP.* SYSBOOT loads and verifies the default microcode file.

Choice 3, "Enter the SCP CLI," is useful when you really need the SCP CLI; for example, on an MV/20000, to attach a different processor.

Choice 4 lets you change the default time–out delay, originally 45 seconds. You might want to shorten the delay and speed up automatic startup (although you can always press NEW LINE to start loading immediately). If you enter 4, SYSBOOT prompts

Number of seconds to wait before loading the operating system [n]:

Enter the new figure, 10 to 45 seconds, and press NEW LINE.

Choice 5 lets you run MV/ADEX diagnostics (if these are installed on your disk). These diagnostics are explained in the Advanced Diagnostic Executive System manual. If you enter 5, SYSBOOT asks

Are you sure you want to run diagnostics? [N]:

To continue with MV/ADEX, enter Y; to skip them press NEW LINE.

Choice 6 lets you specify the pathname of any program to run (for example, the stand–alone Disk Formatter. After you enter 6, SYSBOOT asks

Pathname?

Enter the pathname of the program to run, starting at the root directory. For example, for the Disk Formatter, enter DFMTR .

Choice 8, lets you change the default AOS/VS operating system. This is useful after you've generated (and patched and tested) an AOS/VS system with a name different from the old one. Originally, when your system LDU was built, there was no operating system. If no one has specified a system name since then, the default system is the installed system. When you enter 8, SYSBOOT asks

Default operating system [default–name]:

To retain the default, which may be a system pathname or INSTALLED SYSTEM if the default is the installed system, press NEW LINE. (With AOS/VS revision 7.00, there's little point in installing a system since it's so easy to specify a default to SYSBOOT.) To change the default, you can enter a pathname from root (like SYSGEN:SYS_7.00.PR), or, if you used the Installer to install a system, you can enter INSTALLED SYSTEM to specify the default system.

Choice 9 lets you view or change the default microcode filename, useful if you have an ECLIPSE MV/4000–series computer with an option like hardware floating point, or if you have a custom microcode file. After you enter 9, SYSBOOT asks

Default microcode filename [MVxxxxx.MCF]:

You can press NEW LINE to retain the default, or specify a microcode file pathname from the root directory; for example, MV4000GFP.MCF. You can make sure the new microcode is loaded by selecting choice 2, "Load and verify microcode," on the Technical Maintenance Menu. The microcode filename issue gets more detail in the next section.

When you change the microcode file, SYSBOOT records the new default microcode filename in "invisible" space on the LDU. The new microcode filename will become the default microcode. It will remain in effect until you change it again (or run a

Full format on the disk). (Just as an aside, SYSBOOT cannot resolve link files, so the procedure above is the neatest way to make a nondefault microcode file the default.)

Choice 10 lets you specify (or change) the FIXUP script filename. When run without a script file, FIXUP asks a minimum of five or so questions for each LDU you want fixed. Via stand–among FIXUP itself, using the /BUILDSCRIPT switch, you can create a script file, then specify its name here. Thereafter, FIXUP will run the script file without requiring operator interaction. This is a convenience, especially with inexperienced system operators.

Until someone specifies a default script file, there is no default. If you want to create (or change) a script file, the FIXUP section near the end of this chapter tells how. To *specify* the script filename, enter 10 at the Technical Maintenance Menu. SYSBOOT then asks

Default FIXUP script filename [default]:

To retain the default, press NEW LINE. To change it, type the script filename (must be in the root directory). FIXUP script files always have the suffix .FXP. You can include—or omit—the suffix when you type the name. For example, enter FIX_DPJ0
.

Boot from a different disk unit

This choice lets you start AOS/VS from a different disk unit than the default. You might want to use this to run another program or a stand–alone system (perhaps an AOS/VS system) that's on a different disk unit. The disk must have been formatted as a system disk and have current AOS/VS bootstraps installed on it. It must also contain all files the program needs to run.

After you select this choice, the program asks for the disk unit name; then it tries to run the bootstrap program that's on the destination disk. Via that program, you specify the pathname to run.

Microcode Filenames

Microcode is the heart of your ECLIPSE MV/Family computer. It's essential that the correct microcode for your system be loaded. SYSBOOT does this load on a cold start—you specify the default name using a SYSBOOT Technical Maintenance Menu.

NOTE: If microcode is loaded when you change the default, SYSBOOT *may not* load the new microcode, but may just start up AOS/VS. You can make sure the new microcode is loaded by selecting choice 2, "Load and verify microcode," on the Technical Maintenance Menu.

Correct microcode for your system was supplied on the MV/n tape or diskette shipped with the system. You'll receive periodic updates if you belong to the Microcode Subscription Service. Table 6-2 shows the correct filenames for all ECLIPSE MV/Family machines.

Table 6–2 Microcode Filenames for ECLIPSE MV/Family Systems

Computer Name	Default Microcode Filename	Hardware Floating–Point Option	Graphics Instruction Set Option
MV/40000	MV40000.MCF	Doesn't apply	Doesn't apply
MV/20000 (all)	MV20000.MCF	Doesn't apply	Doesn't apply
MV/18000 (all)	MV18000.MCF	Doesn't apply	Doesn't apply
MV/15000 Model 20 MV/15000 Model 10 MV/15000 Model 8	MV15000_20.MCF MV15000_10.MCF MV15000_8.MCF	Doesn't apply Doesn't apply Doesn't apply	Doesn't apply Doesn't apply Doesn't apply
MV/10000 Model SX MV/10000	MV10000SX.MCF MV10000.MCF	Doesn't apply Doesn't apply	Doesn't apply Doesn't apply
MV/9600	MV9600.MCF	Doesn't apply	Doesn't apply
MV/9500	MV9500.MCF	Doesn't apply	Doesn't apply
MV/9300	MV9300.MCF	Doesn't apply	Doesn't apply
MV/8000 (file on diskette)	MV8000.MCF	MV8000FP.MCF	Doesn't apply
MV/8000 II	MV8000_II.MCF	MV8000_IIFP.MCF	Doesn't apply
MV/8000 C	MV8000_C.MCF	MV8000_CFP.MCF	Doesn't apply
MV/7800 (all)	MV7800.MCF	MV7800_FP.MCF	Doesn't apply
DS/7500	MV7500.MCF	Doesn't apply	Graphics Instruction only: DS7500GIS.MCF
MV/6000	MV6000.MCF	Not available	Doesn't apply
MV/5000–series	MV5.MCF	Not available	Doesn't apply
DS/4000–series	MV4000.MCF	MV4000FP.MCF (with Graphics Instruction Set: MV4000GFP.MCF)	Graphics Instruction only: MV4000G.MCF
MV/3000–series	MV35.MCF	Doesn't apply	Doesn't apply
MV/2500 DC	MV2500.MCF	Doesn't apply	Doesn't apply
MV/2000 DC	MV2000.MCF	Doesn't apply	Doesn't apply
MV/1400 DC	MV1400.MCF	Doesn't apply	Doesn't apply
MV/1000 DC	MV1000.MCF	Doesn't apply	Doesn't apply

Normal Shutdown

Normal shutdown means orderly shutdown from an active multiuser system to the SCP CLI and, optionally, to turning off power to devices.

These shut–down steps assume that EXEC is running and that multiple users are logged on to the system. If no users are logged on, skip to step 4.

1. Send a message to all users indicating that the multiuser environment will be coming down. You can use the BROADCAST macro for this. For example,

) BROADCAST System coming down in 5 minutes. Please log off.↵

2. Look at printer and batch queues, via the QDISPLAY command, to ensure that no large jobs will be aborted.

   (If a batch job was active at shutdown, all work done in it is lost. If a print job is active at shutdown, printing stops, but you can save the pages already printed. At startup, the system will try to restart any batch or print jobs that were active at shutdown. After a print job restarts, to have it print from a specific page—preserving the pages printed before AOS/VS shutdown—use EXEC's RESTART command with page number and printer name.)

   The QDISPLAY command tells you the status of all queues, including BATCH_INPUT, LPT, and other queues you created. Type

) QDISPLAY↵

   BATCH_INPUT BATCH Open
   xxx xxx xxx xxx (Batch jobs appear in this BATCH_INPUT list. Active jobs have a leading asterisk; for example,
   **34 D JACK :UDD:JACK:?34.CLI.00002.JOB*)
   BATCH_OUTPUT BATCH Closed

   LPT PRINT Open
   (Print jobs waiting for the first line printer appear in this LPT list. Active jobs have a leading asterisk; for example,
   **35 JACK :UDD:JACK:MYFILE*)

)

   If the QDISPLAY shows no active batch or print jobs, you can proceed.

3. Use the WHOS or ? macro (Chapter 5) to verify that users are logged off. Use BROADCAST and WHOS until all users who stand to lose work are logged off. CLI users might not lose anything when you bring EXEC down (although they might be annoyed if they are not notified). People using text editors, word processors, and/or CEO—and perhaps user processes running application programs—*will* lose work if you terminate EXEC, so you should try to get them out of their editors or programs before you do it. For example, type

```
) WHOS⏎

PID:  1   PMGR     PMGR       :PMGR.PR
PID:  2   OP       OP         :CLI16.PR
PID:  3   OP       EXEC       :UTIL:EXEC.PR
PID:  4   OP       XBAT1      :UTIL:XBAT.PR
PID:  5   OP       XMNT1      :UTIL:XMNT.PR
PID:  6   OP       XLPT1      :UTIL:XLPT.PR
...
PID: 33   HUGH     CON151     :CLI16.PR
PID: 36   SUSAN    CON152     :CLI16.PR
PID: 37   SUSAN    00036      :UTIL:SED.PR

) BROADCAST System coming down in 2 min. Please log off now.⏎
) WHOS⏎

PID:  1   PMGR     PMGR       :PMGR.PR
PID:  2   OP       OP         :CLI16.PR
PID:  3   OP       EXEC       :UTIL:EXEC.PR
PID:  4   OP       XBAT1      :UTIL:XBAT.PR
PID:  5   OP       XMNT1      :UTIL:XMNT.PR
PID:  6   OP       XLPT1      :UTIL:XLPT.PR
...
PID: 33   HUGH     CON151     :CLI16.PR
```

4. Within a reasonable time, all users will have logged off or be in the CLI. If not, you must choose from among the following options:

   1. Wait for the user to return to his or her terminal and exit from the program.
   2. Walk to the user's terminal and exit from the program *for* the user.
   3. Proceed with shutdown, at the risk of costing the user some work.

   When ready, get back to PID 2, the master CLI. Type

   ```
   ) BYE⏎
   ```

   then

   ```
   ) WHO⏎
   ```

   If the system's answer is PID 2, go to step 6.

5. If you are running a locked LOCK_CLI (a lockable CLI, described in *Managing AOS/VS and AOS/VS II*, the security chapter), LOCK_CLI remains an active PID on the system console. The BYE command does not affect a locked CLI. To terminate the 16–bit LOCK_CLI, enter UNLOCK, then the LOCK_CLI password, and BYE. To unlock a locked 32–bit CLI, enter UNLOCK, then the CLI password. For example:

   ```
   ) WHO⏎
   PID: 20   OP       00020      :LOCK_CLI.PR
   ```

) UNLOCK↵ (Start to unlock it.)
XYZZY↵ (Password doesn't echo.)
) BYE↵ (Try to return to master CLI. If you mistyped the password, this BYE command is ignored.)

AOS/VS CLI Terminating date time (You typed the correct password.)

) WHO↵
PID: 2 OP OP :CLI16.PR (Back in the master CLI.)
)

6. Run the DOWN.CLI macro to bring down the multiuser environment. It's a good idea to specify the root copy of DOWN.CLI (:DOWN), as follows:

) :DOWN↵

... (Messages from DOWN.CLI) ...

7. With EXEC terminated, check the processes again with WHO. There may be only two processes left: the peripheral manager and the master CLI.

If processes like CEO, XODIAC, and INFOS II are still running, terminate these normally. For CEO, enter CEO.SYSTEM STOP; for XODIAC processes, enter DOWN.NETWORK, and so on. If there are any other processes (like application–based processes), terminate *these* normally. Eventually, you may want to put all the process–terminating commands needed in the DOWN.CLI macro.

When ready, start shutdown by typing

) BYE↵

Do you really want to shut the system down?

8. This message gives you a chance to change your mind. To keep AOS/VS running, enter N. To shut it down, type

Do you really want to shut the system down? Y↵

Starting system shutdown date time

If automatic rebooting was selected (at VSGEN or system startup), the system starts automatic rebooting. If automatic rebooting was not selected, control returns to the SCP CLI. The automatic reboot message is

Automatic reboot will occur in n:n:n

To reboot immediately from the default device, press NEW LINE.
To enter the SCP CLI, type the break sequence.

Reboot from octal device code [n]

... (A *HALTED* message followed by register status appears on some systems) ...

SCP–CLI>

9. If the system is rebooting, let the reboot procedure continue or interrupt it with the break sequence. If the SCP CLI prompt appeared, use the BOOT command as explained earlier

   Note that PID 2, the master CLI, can always shut the system down directly via BYE. If so, AOS/VS will say

   You have sons. Do you want to terminate?

   If you answer Y, all processes below PID 2 will be terminated. The system will ask for confirmation again, and then shut down. (If you answer N to the *sons* question, nothing will be terminated.) If any processes other than EXEC are running, this is a very dangerous way to shut the system down. For example, certain processes that use databases (like CEO) depend on normal shutdown to close the database properly. If shut down improperly, the structure and/or the integrity of the database may be compromised. So, use this quick method only if processes that would not be jeopardized (like CLI processes) are running.

   After shutdown, you can boot an AOS/VS system as described under "Warm Start, Computer Running—All Computers" earlier in this chapter; or you can bootstrap another system or stand–alone program. Or you can leave everything as is; or you can cut power to any or all devices.

   To power down your disk(s), on a sealed disk unit, press READY; on a removable–pack disk unit, press the disk switch and give the disk pack time to stop spinning before pressing the DC POWER switch to off. (On a removable–pack unit, cutting power eliminates braking action; if the disk is spinning when you cut power, it will continue spinning without cooling air, which could damage unit bearings.)

   To power down a tape unit, take it off line and unload the tape (if a tape is mounted); then press the power switch off. To power down the system console, use the rocker switch behind the console or the knob near the front lower right; or for a hardcopy console, use the switch under the keyboard to the right.

   If you power down the computer, the SCP and microcode will vanish and will have to be reloaded later. Thus the next start will be a cold start, described earlier. If you decide to cut power to the computer, press the LOCK switch (if any) to off or unlock, and press the POWER switch to off. Powering down any machine except an MV/8000 deletes the SCP error log (if any), which is kept in volatile memory, so don't do this if you want to retain entries in this log.

Figure 6–1 shows the steps taken by all parties to bring the whole system up. (These don't include the original blue and white MV/8000, which loaded microcode from diskette.)

Figure 6–2 summarizes startup and normal shutdown for computers that have a working boot clock (time–of–day clock); Figure 6–3 does the same thing for computers that don't have a working boot clock.

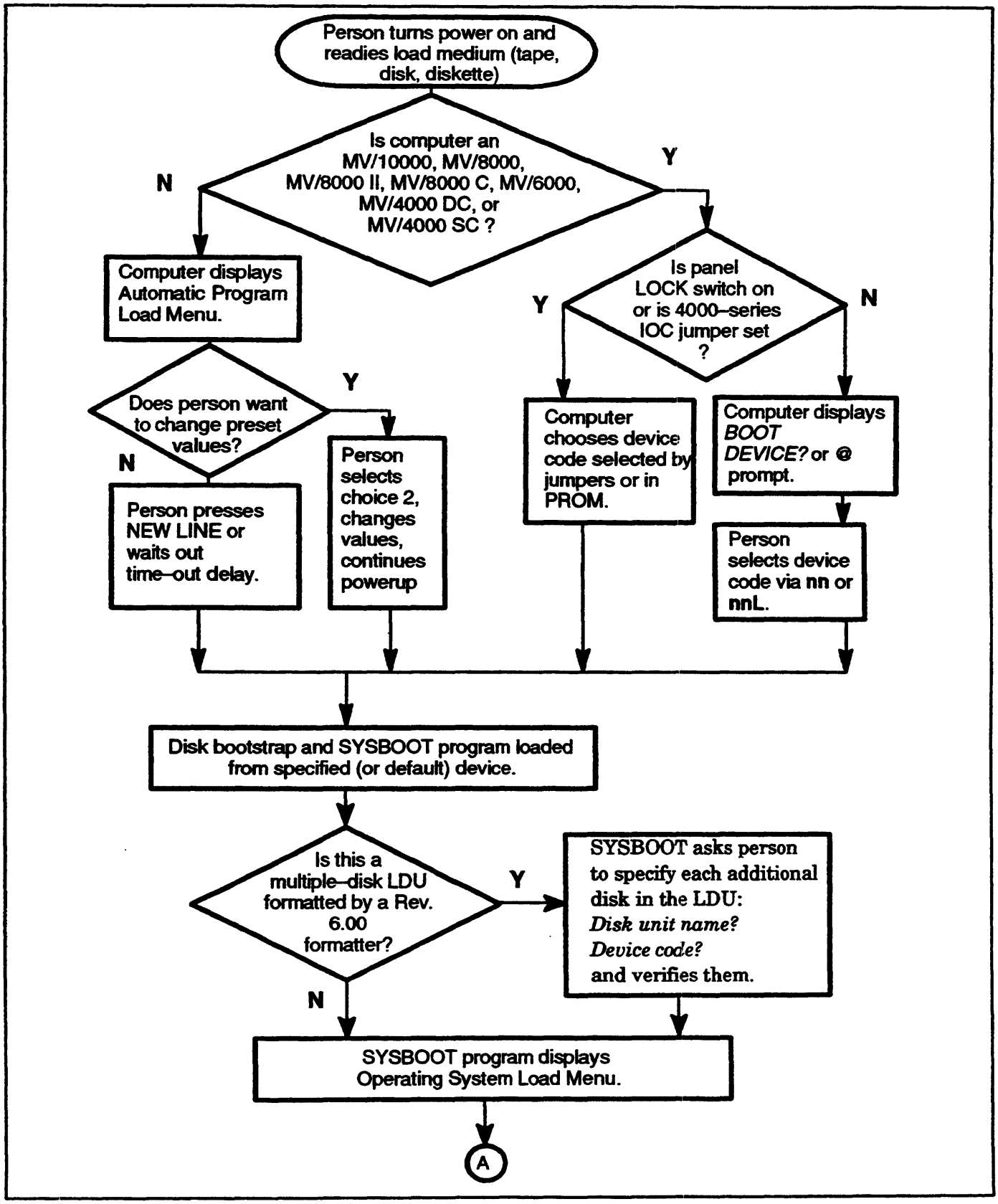

Figure 6–1 How AOS/VS Comes Up from a Cold Start (continued)

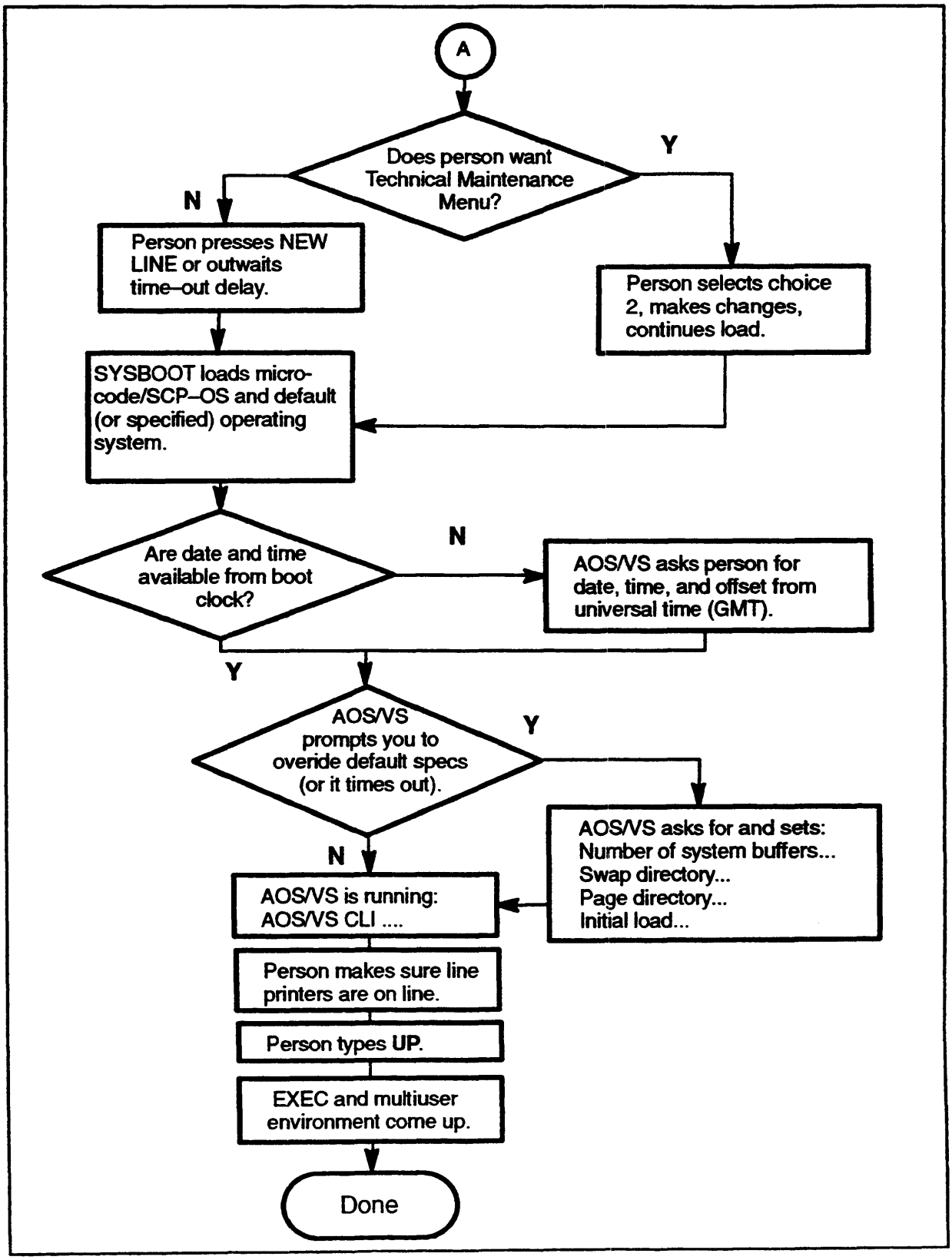

Figure 6–1 How AOS/VS Comes Up from a Cold Start (concluded)

For a cold start, begin with step 1. For a warm start, type RESET, BOOT 24 (or other system LDU device code), and begin with step 4.

1. Turn the system console, disks, and tape unit on and put them on line. Disk units must be write–enabled and you should wait for them to become ready (if either of these conditions apply).

2. Press front panel POWER switch on.

   POWER UP TESTING COMPLETED

   Automatic Program Load Menu
   ...

3. *Enter choice [1]:* ↵

4. *Operating System Load Menu*
   ...
   1 Proceed immediately with operating system load
   ...
   Enter choice [1]: 1 ↵

   ... (Microcode loading messages) ...

   Loading file
   xxx (*xxx* is the default operating system pathname)

   AOS/VS Release n

   Computers with a working boot clock get date and time from the boot clock. (If the boot clock isn't working, AOS/VS asks *Date?* and *Time?* Specify the current date; for example, 11 22 92. Then specify the time, using 24–hour notation; for example, for 1:30 p.m., type 13:30. Next, enter (or take default for) the offset from universal time (GMT). Plan to replace the battery in the boot clock.)

5. *AOS/VS will continue with defaults automatically unless you respond within n:n:n* (This message may appear.)

   Override default specs [N]?
   (Or outwait time–out.) ↵

   AOS/VS CLI Rev n *date* *time*
)

6. Verify date and time. Correct them with DATE or TIME commands, if needed.

7. Make sure all line printers are on line, with paper aligned.

8.) UP ↵
   Pid n

   ... (EXEC messages) ...

)

Figure 6–2 Startup–Shutdown Summary for Computers with Working Boot Clocks (Time–of–Day Clocks) (continued)

When you want to shut AOS/VS down, follow these steps.

1.) BROADCAST System coming down in 5 min. Please log off. ↵

2.) QDISPLAY ↵ (Look at queues BATCH_INPUT and LPT to make sure there are no critical batch or print jobs in process.)

3. Use the WHOS or ? macro and BROADCAST until you see that all text editor and other users who stand to lose work have exited from their programs.

4.) BYE ↵
) WHOS ↵

   If the answer is PID 2, skip to step 6. Otherwise, proceed.

5. Unlock the locked CLI. Type UNLOCK, XXXXX (LOCK_CLI password), and BYE. (If running the 32-bit CLI, you don't need to type BYE.) Make sure you're PID 2 by typing WHO. If not, try again.

6.) :DOWN ↵

   From Pid 3 : (EXEC) Terminating on HALT command

7. Shut down other software as needed. Then type

) BYE ↵

8. *Do you really want to shut the system down?* Y ↵

   Starting system shutdown date time
   System shutdown

   If automatic rebooting was selected (at VSGEN or system startup), the system starts automatic rebooting. If automatic rebooting was not selected, the system displays *CPU HALTED* and *SCP-CLI/Jpn*. The automatic reboot message is

   Automatic reboot will occur in n:n:n

   To reboot immediately from the default device, press NEW LINE.
   To enter the SCP CLI, type the break sequence.

   Reboot from octal device code [n]

   To interrupt the reboot procedure, type the Break sequence (CMD and BREAK/ESC keys).

   . . .

   SCP-CLI>

   Power down devices if you want.

Figure 6-2 Startup-Shutdown Summary for Computers with Working Boot Clocks (Time-of-Day Clocks) (concluded)

For a cold start, begin with step 1. For a warm start, type RESET, BOOT 27 (or other system LDU device code), and begin with step 4.

1. Turn the system console, disks (if separate), and tape unit on and put them on line. Disk units must be write enabled and you should wait for them to become ready (if either of these conditions apply).

2. Press front panel LOCK switch (if any) to the on or the lock position.

3. Press front panel power switch to on.

   POWER UP TESTING COMPLETED (or *MV4000 READY*)

   (If, on an MV/10000, nothing happens, you will need to use the SCP SYSTEM MEDIA tape. See steps earlier in this chapter, in section "Cold Start, CPU Power Off, MV/10000–Series, MV/8000 II, and MV/8000 C Computers.")

4. *Operating System Load Menu*

   ...

   1 Proceed immediately with operating system load

   ...

   Enter choice [1]: ↵

   ... (Microcode loading messages, followed by a *Loading file* message) ...

   AOS/VS Release n

5. *Date (MM/DD/YY)?* 11 22 92 ↵ (Specify the current date.)

6. *Time (HH:MM:SS)?* 14 35 ↵ (Specify the current time, using 24–hour notation.)

7. *Offset from universal time [+00:00]?* –5:00 ↵

8. *AOS/VS will continue with defaults automatically unless you respond within n:n:n* (This message may appear.)

   Override default specs [N]? ↵ (Or outwait time–out.)

   AOS/VS CLI Rev n date time
)

9. Verify the date and time. Correct with DATE or TIME commands, if needed.

10. Make sure all line printers are on line, with paper aligned.

11.) UP ↵

    Pid n

    ... (EXEC messages) ...

)

Figure 6–3 Startup–Shutdown Summary for Computers without Working Boot Clocks (continued)

When you want to shut AOS/VS down, follow these steps.

1.) BROADCAST System coming down in 5 min. Please log off. ↵

2.) QDISPLAY ↵ (Check queues BATCH_INPUT and LPT to make sure there are no critical batch or print jobs in process.)

3. Use the WHOS or ? macro and BROADCAST until you see that all text editor and other users who stand to lose work are out of their programs.

4.) BYE ↵
) WHOS ↵

   If the answer is PID 2, skip to step 6. Otherwise, proceed.

5. Unlock the locked CLI. Type UNLOCK, XXXXX (LOCK_CLI password), and BYE. (If running the 32–bit CLI, you don't need to type BYE.) Make sure you're PID 2 by typing WHO. If not, try again.

6.) :DOWN ↵

   ... *(Messages from DOWN.CLI)* ...

7. Shut down other software as needed. Then type

) BYE ↵

8. *Do you really want to shut the system down?* Y ↵

   Starting system shutdown date time

   System shutdown

   If automatic rebooting was selected (at VSGEN or system startup), the system starts automatic rebooting. If automatic rebooting was not selected, the system displays *CPU HALTED* and *SCP–CLI/Jpn.* The automatic reboot message is

   Automatic reboot will occur in n:n:n

   To reboot immediately from the default device, press NEW LINE.
   To enter the SCP CLI, type the break sequence.

   Reboot from octal device code [n]

   To interrupt the reboot procedure, type the Break sequence (CMD and BREAK/ESC keys).

   Power down devices if desired. For the computer, press the LOCK switch (if any) to unlock position first.

Figure 6–3 Startup–Shutdown Summary for Computers without Working Boot Clocks (concluded)

Abnormal Shutdown

An abnormal shutdown is any shutdown not executed with the BYE command from the master CLI, PID 2, on the system console. If you get an *Abnormal System Shutdown* message during a normal shutdown, then it, too, is an abnormal shutdown.

An abnormal shutdown can result from a deadlock (hang), panic (*AOS/VS FATAL ERROR*), hardware failure (which may cause a panic), or power failure.

There are several software tools to help you handle and recover from abnormal shutdown situations. They are

- The AOS/VS Emergency Shutdown (ESD) routine. After a fatal AOS/VS error, ESD can close open files and turn the abnormal shutdown into a normal shutdown. If ESD runs successfully, you can restart AOS/VS immediately. ESD is described in this section.
- The Memory Dump routine. This copies main memory to tape or diskette for later analysis. The Memory Dump routine is described in this section.
- Diagnostic tests. Most computers include powerup diagnostics, which can help identify faulty hardware. If you have Data General's ADEX diagnostic system—either on tape or installed on the system disk—ADEX can pinpoint hardware problems. ADEX may not allow you to restart immediately, but it can tell Data General engineers how to fix your system. Powerup diagnostic codes are described in the 014–series "Starting" manual for your machine (or, if there is no "Starting" manual, in the SCP manual). Using ADEX is explained in the *ADEX Operator's Manual*.
- The AOS/VS disk fixer, FIXUP. FIXUP corrects disk inconsistencies and allows you to restart AOS/VS. It takes much longer than ESD, but also corrects inconsistencies that ESD can't. You are not *required* to run FIXUP unless ESD fails.

System Deadlocks (Hangs)

If AOS/VS seems to be denying service, it may be hung in a deadlock. A deadlock can result from a high–priority and/or resident process that malfunctions, monopolizing processor time. A deadlock can also occur if three or four heavily used batch streams are running along with many interactive processes.

The primary symptom of a deadlock is long response time. Another symptom is a process (like a text editor) that is not aborted by the abort sequence CTRL–C CTRL–B. Users may complain that nothing is happening on their terminals; and/or there may be little or no response to commands given at the system console. (If the system console shows an *AOS/VS FATAL ERROR* message, a panic has occurred; see the next section.)

The first thing to do, if a terminal seems dead, is to type CTRL–Q to cancel a CTRL–S that may have frozen its display. If CTRL–Q restores activity, fine. If not, make sure the terminal is on and on line, and that the fault lights (if any) aren't lit. If the keyboard has a HOLD key, make sure the HOLD status light is off (press HOLD until light goes out).

If the problem persists, check processes from the system console by entering WHOS or ?. This may identify one or more *hungry* processes (for example, a batch stream that's dumping for file backup). If so, you can then decide whether to block or terminate the process(es) (CLI command BLOCK or TERMINATE), or to reduce the process priority (PRIORITY command) or to change the process type (PRTYPE), or to live with the situation until until the process(es) finish what they are doing.

If you can't identify a problem process, try running PED (explained in *Managing AOS/VS and AOS/VS II*) to see if any process is getting too much processor time. If so, block or terminate the process (or if the process is using a batch stream, use CX FLUSH to flush it). Terminating or flushing a process generally discards work the process has done, so do this only after deciding that the process is using too much processor time to continue.

If the deadlock persists, and/or the system console is not accepting input, you must force a shutdown and bring up AOS/VS again. Note that if you want to report this deadlock to Data General in a Software Trouble Report (STR), you must follow additional steps, described in the STR section of *Managing AOS/VS and AOS/VS II*. To simply force a shutdown, follow these steps:

1. If the computer has a LOCK switch in the lock position, press to unlock.

2. Type the break sequence on the system console. For most CRT terminals, this means pressing the CMD key, holding it down, and pressing BREAK/ESC. For hardcopy terminals, press BRK. For older CRTs, press BREAK.

   The break sequence should bring up the SCP CLI on the system console:

   SCP–CLI>

   If the break sequence has no effect, retry it. If it still doesn't work, the SCP flag LOCK might be set. On the computer front panel, press the CON (or CONSOLE) switch to RST (or RESET).

3. Reset the CPU; then force an emergency shutdown by typing the following:

   SCP–CLI> RESET↵
   SCP–CLI> START 50↵

   This should abort processing and start a shutdown. (If nothing happens, type the break sequence again; then enter TTY). The system console prompts

   Do you want a memory dump (to submit a Software Trouble Report) (Y or N)? [N]

4. To shut down, press NEW LINE and the Emergency Shutdown routine will run as described in the section "About ESD," later in this chapter. To do a memory dump, enter Y immediately and proceed as described under the section "Doing a Memory Dump," which follows.

AOS/VS and AOS/VS II Error and Status Messages contains more information on errors. Deadlocks are described under the message *None. Nothing...* in that manual.

Panics

A panic (crash) results from an error that AOS/VS recognizes but cannot rectify. It may involve hardware or software. On a panic, the system console displays the message

AOS/VS FATAL ERROR: p on date time

value1	*value2*	*value3*	*value4*
value5	*value6*	*value7*	*value8*
sp	*fp*	*sl*	*sb*

Do you want a memory dump (to submit a Software Trouble Report) (Y or N)? [Y]

If you want a memory dump, type Y and press NEW LINE immediately; if you don't and automatic rebooting is enabled, the system will run ESD and try to reboot after the delay expires.

The panic values have the following meanings:

p is the octal panic code.

values 1–8 may contain additional panic information.

sp is the value of the hardware stack pointer.

fp is the value of the hardware frame pointer.

sl is the value of the hardware stack limit.

sb is the value of the hardware stack base.

File :UTIL:AOSVS.PANICS.SR can help you interpret panic values. Your site should keep a printout of the *current revision* of this file near the system console. To determine roughly the cause of the panic, identify the panic group (1000 to 1777 octal is a group, 2000 to 2777 octal is another group, and so on). Look at the group base (for example, 1000) against the values in PARU.32.SR that start with .DUSR in column 1. The comment that follows the group base number briefly explains the cause of the panic.

Generally, you should log each panic in a system log book kept near the system console. Note the time, revision of AOS/VS system, any unusual conditions (like new software or hardware) that may have helped cause the panic and the panic values. The written record is especially important if your system console is a CRT. Panic records can be very important to Data General personnel whom you may call on for assistance.

The panic may have originated in hardware, as described later in this chapter or in file :UTIL:AOSVS.PANICS.SR. In any case, you may want to do a memory dump, and to run ESD, described after the memory dump section.

Doing a Memory Dump

AOS/VS always lets you do a memory dump after a panic, or after you abort processing by typing the break sequence, and then entering RESET⟫ and START 50⟫. If you selected the *automatic dump* feature in VSGEN, the memory dump starts automatically, before ESD runs.

You *can* skip the dump by answering No to the *Do you want a memory dump ...* question. Skip the dump only if you don't want to submit an STR.

A memory dump is required if you want to submit a Software Trouble Report (STR). To submit an STR to Data General, complete the on-line form :UTIL:STR_FORM_AOSVS. For more information, see Chapter 10 in *Managing AOS/VS and AOS/VS II.*

To do a memory dump, follow these steps.

1. The system console is displaying

   Do you want a memory dump (to submit a Software Trouble Report) ...? [Y]

   NOTE: This prompt defaults to Y (Yes) if your system is configured to dump memory automatically. You need do nothing. The steps in this section occur without intervention.

   Type Y⟫

   (If the VSGEN parameter *System will automatically bypass system memory dump* was chosen, the system will prompt *Automatic reboot will bypass memory dump in n:n:n.* You must choose to do a memory dump before the time-out delay occurs, typically 10 minutes.)

2. The system console displays

   Dump to Magnetic tape or diskette (T or D)? [T]

   The default response here (T for tape or D for diskette) is determined by the default dump device specified in VSGEN. Select the default, or choose Diskette or Tape, depending on your system configuration.

3. If you selected D to dump to diskette, skip to step 4.

   If you selected T to dump to tape, the system displays

   Please mount tape. Then specify unitname. [xxx]

3a. Get a scratch tape. For reel-to-reel tape, the tape must be at least 800 feet long. The tape you use must be write-enabled: make sure there's a write-enable ring or that the RECORD or SAFE switch is in position to allow writing. Mount the tape on unit 0 on the first controller, if available. If the unit has a density switch, choose DENSITY HIGH.

3b. If you mounted the tape on the unit shown as the default (for example, MTB0), press NEW LINE. If the tape is on a different unit, type the unit name and press NEW LINE.

3c. After you respond, the memory dump routine copies main memory and other important information to tape. If the routine needs another tape it displays

Please mount next tape.
Press NEW LINE when ready.

If you see this *Please* message, remove the tape and mount another. Then press NEW LINE.

When done, the routine rewinds the tape and, before starting the Emergency Shutdown (ESD), provides the following important reminder about submitting an STR:

When submitting an STR to Data General, remember to copy your system's symbol table to @MTxx:1

Skip to step 5.

4. If you selected D to dump to diskette, the system displays

Please insert diskete in unit.. Then specify unitname. [xxx]

4a. Get 3–4 scratch diskettes with 2 Mbytes of memory. Disketttes must be hardware formatted but need not be formatted with the Disk Formatter.

If you mounted the diskette on the unit shown as the default (for example, DPJ10), press NEW LINE. If the diskettes are on a different unit, type the unit name and press NEW LINE.

4b. The system displays *Dumping*, followed by periods to indicate the passage of time. If the routine needs another diskette, it displays

Diskette is full.
Please insert next diskette in unit.
Press NEW LINE when ready.

Insert another diskette and press NEW LINE.

4. When done, the routine prompts you to remove the last diskette and press NEW LINE before it runs ESD. If you had a diskette that was initialized as an LDU in the diskette unit, reinsert it *before* pressing NEW LINE.

5. ESD runs as shown in the next section. The messages are:

Memory dump completed. (Dumping to tape)

Memory dump completed. Please remove diskette.
Press NEW LINE when ready. (Dumping to diskette.)

Running Emergency Shutdown (ESD)

File system restart

Now restarting device ...

... (Other ESD messages) ...

System shutdown

If the *Automatic reboot* feature is enabled, the system displays

Automatic reboot will occur in hh:mm:ss.
To reboot immediately from the default device, press NEW LINE.
To enter SCP CLI, type the break sequence
Reboot from octal device code [nn]

To reboot from the current system disk (its device code is displayed as the default *nn*), press NEW LINE or outwait the time-out delay (displayed as the default *hh:mm:ss*). To reboot from another disk, type its device code, then press NEW LINE.

If the *Automatic reboot* feature is *not* enabled, when ESD has finished, the system displays the SCP-CLI prompt.

SCP-CLI>

(If the memory dump routine hits an error, it will prompt you to retry. To retry, mount a different tape or diskette; then type Y and press NEW LINE.)

Dismount the tape or diskette—and, if you want to save the dump in preparation for the STR, label the tape or diskettes.

If you want to submit an STR, Data General needs the memory dump you just did and the operating system symbol table, pathname :SYSGEN:sys.ST. To submit an STR to Data General, complete the on-line form :UTIL:STR_FORM_AOSVS. For more information, see Chapter 10 in *Managing AOS/VS and AOS/VS II.*

6. If the *Automatic reboot* feature is *not* enabled, reboot the system.

About ESD

ESD is a routine that tries to restart AOS/VS and force a normal shutdown, by writing system buffers to disk and closing open files. ESD is not perfect: it can't cope with certain system errors, and it can't verify the accuracy of system databases that the panic may have affected. But it offers a good way to handle panics and hangs.

The system tries to run ESD after you've done a memory dump, or skipped the memory dump by typing N after the following prompt:

Do you want a memory dump (to submit a Software Trouble Report) (Y or N)? [Y] N↵

If the *Automatic bypass* feature is enabled, this prompt defaults to N (No) and the system displays

Automatic reboot will bypass memory dump in hh:mm:ss.

If the *Automatic dump* feature is enabled and the memory dump procedure detects that a dump was already taken before ESD ran, it will not run again; this *Do you want a memory dump...* prompt does not appear.

The ESD messages are:

File system restart
Now restarting device nn unit n

Flushing buffers

Open file processing

System shutdown

If the *Automatic reboot* feature is enabled, the system displays

Automatic reboot will occur in hh:mm:ss.
To reboot immediately from the default device, press NEW LINE.
To enter SCP CLI, type the break sequence
Reboot from octal device code [nn]

To reboot from the current system disk (the device code of the current disk is displayed as the default *nn*), press NEW LINE or outwait the time–out delay (displayed as the default *hh:mm:ss*). To reboot from another disk, type its device code, then press NEW LINE.

If the *Automatic reboot* feature is *not* enabled, when ESD has finished, the system displays the SCP–CLI prompt.

SCP–CLI>

If the *Automatic reboot* feature is *not* enabled, reboot the system.

(If the memory dump routine hits an error, it will prompt you to retry. To retry, mount a different tape or diskette; then type Y and press NEW LINE.)

Dismount the tape or diskette—and, if you want to save the dump in preparation for the STR, label the tape or diskettes.

If you want to submit an STR, Data General needs the memory dump you just did and the operating system symbol table, pathname :SYSGEN:sys.ST. To submit an STR to Data General, complete the on-line form :UTIL:STR_FORM_AOSVS. For more information, see Chapter 10 in *Managing AOS/VS and AOS/VS II*.

The main processor is halted. You can start up AOS/VS as described under "Warm Start" earlier. (If you want to submit an STR, you must dump the AOS/VS system symbol table to tape or diskette after AOS/VS comes up. Doing this is described in *Managing AOS/VS and AOS/VS II*.

If ESD fails, it issues a *FATAL ERROR* message of its own. You can help us improve ESD by taking a memory dump at this failure, and submitting it with an STR to Data General. To take a dump, mount a tape or diskette and enter Y, as described in the previous section. To skip the dump, enter N . In either case, if ESD fails again, it cannot deal with the error. Reset the computer, boot the system, and have FIXUP run on all LDUs that were part of the system when the error occurred.

If AOS/VS comes up, but you cannot initialize any nonmaster LDUs that were initialized when the error occurred, then you should execute stand-among FIXUP from AOS/VS and run it on the inaccessible LDUs. If AOS/VS displays *FIXUP RECOMMENDED* for any LDU, you should also run FIXUP on that LDU.

Hardware Errors

AOS/VS relies on hardware to run. Inconsistencies in the processor (including components like the ATU and map), disk, or other devices (like IACs or LANs) may cause it to panic.

Processor Errors

If an error occurs in a job processor, AOS/VS may panic, and/or control may go to the SCP operating system, which may try to describe the error.

Some computers have sensors that will cut ac power under fan failure, high temperature, or brownout (voltage drop) conditions. If such a condition occurs, computer power will be cut, and you must fix the problem if possible. Fault lights on the front panel may identify the problem; if any lights are lit, look at the fault codes in the 014-series "Starting" manual for your computer (or, if there is no "Starting" manual, the SCP manual) to see what they mean.

If the solution is easy, fix the problem; then proceed as described under "Power Failures," later in this chapter. If you can't identify the problem, examine the microcode (explained under "Microcode Errors").

Main Memory Errors

If a hard error occurs in memory, AOS/VS generally will panic and the SCP will report a hard memory error to the system console. You should call your Data General support organization. Do not run ESD after a hard memory error.

Microcode Errors

If abnormal shutdowns recur, there may be a microcode problem. Use the microcode utility to verify processor microcode (if possible). For this, see the SCP command SPAD or VSPAD (or VERIFY) in your SCP manual. If there are microcode verification errors, reload microcode via a cold start. If abnormal shutdowns and microcode verification errors recur often, note the verification results and contact your Data General support organization.

If microcode is not the culprit, check the SCP log or SYSLOG (explained in *Managing AOS/VS and AOS/VS II*). If neither of these identifies the problem, contact your Data General support organization.

Disk and Tape Errors

If AOS/VS encounters a hardware error on a disk, it will write one or more error messages to the system console; then it may either panic or continue. The error message is

HARD error, device dd, unit u
Statuses: DIA=n, DIB=m, DIC=l
Retries r

- *dd* is the device code, for example, 67.
- *u* is the unit number, for example, 0.
- *n, m, l* are hardware status codes, described in *AOS/VS and AOS/VS II Error and Status Messages*, under *Hard error* message, and in the disk drive operator's manual. The code(s) may indicate a bad sector (bad disk block), ECC, or other error. On units that have a digital display, the display will show a status code.
- *r* is the number of retries AOS/VS made before it gave up and signaled a hard error. Usually, it will retry 15 times. But on certain errors (for example, if a disk goes off line), it can't retry at all.

To recover, proceed as follows.

1. If AOS/VS is still running, and the disk is nonessential (a nonmaster LDU), try to RELEASE the disk, using the LDU name given by the Disk Formatter. Run FIXUP on the LDU.
2. If AOS/VS is still running and the disk *is* essential, warn users to log off immediately, get back to the master CLI, and shut the system down by entering DOWN then BYE as shown in "Normal Shutdown." If AOS/VS panics, note the panic code and run ESD.

3. When AOS/VS is down, examine the disk for obvious problems. For example, it may have gone off line or may be write protected; you can correct this with disk switches. If you fix the problem, and ESD succeeds, you can warm start AOS/VS.

4. If a status code *s* indicates a bad sector (bad block), or if you suspect a new bad block, run a Disk Formatter Partial format on the LDU, changing nothing; and specify read-only surface analysis. If the Formatter finds one or several new bad blocks, enter Y when it asks *Update bad block table?* You may need to use FIXUP on the LDU before reusing it. But if the Formatter finds *many* new bad blocks (say 20 or more), do not let it update the bad block table; the problem may well be head alignment. Turn disk power off and call your Data General support organization.

5. If you cannot identify and solve the problem, turn disk power off and call your Data General support organization. If possible, run without the disk until it is fixed.

If a hard error occurs on a tape unit, AOS/VS will usually stay up. Try cleaning the unit heads, or try another tape. If the hard error recurs, call your Data General support organization, and run without the tape unit until it is fixed.

While AOS/VS is running, if system logging is on, it will try to record most hardware errors in the system error log file, :ERROR_LOG. Using SYSLOG is described in *Managing AOS/VS and AOS/VS II*.

The FIXUP Disk Fixer

Abnormal shutdown leaves the master LDU (and other initialized LDUs, if any) in an unpredictable state, with open files that may not have been updated. ESD, if it succeeds, writes system buffers to update open files, closes the files, and restores disk integrity.

But if ESD fails, it could not close files on one or more LDUs. You must run FIXUP to fix the pertinent LDU(s). If an LDU does not need fixing, FIXUP will tell you that fixing is not necessary, and allow you to skip the fix. You may want to do the fix anyhow if you suspect errors in the LDU. You should always run FIXUP on an LDU about which AOS/VS displays *FIXUP RECOMMENDED.*

Even if you are not forced to run FIXUP, you should run it periodically—at least monthly—to clean up and verify the file structure on your LDUs.

A *hard error* on an LDU may not cause abnormal shutdown. But a hard error often means that part of the LDU is inaccessible—perhaps with an unreadable bad block in the middle of a file. After a hard error, you should run a Disk Formatter Partial format on the LDUs(s) to check for new bad blocks, and let the Formatter update the bad block table. Then, if the Formatter gives a *MUST RUN FIXUP* message, you must run FIXUP to correct the file structure. FIXUP may be able to rebuild—thus save—part of the pertinent file.

There are two FIXUP programs: stand–alone FIXUP, in the root directory, and stand–among FIXUP, in directory :UTIL. Stand–among FIXUP runs under AOS/VS control: you can use it while AOS/VS is up. Also, stand–among FIXUP lets you create FIXUP *script files.* A script file is usable by stand–alone *or* stand–among FIXUP. It streamlines the fixing procedure by eliminating dialog, and—for stand–among FIXUP—by allowing you to run multiple FIXUP jobs concurrently. You can tell SYSBOOT the name of the script file, and then run FIXUP easily by choosing option 7, "Run FIXUP," from the Technical Maintenance Menu. (If SYSBOOT must be run when you bring the system up, option 7 is the default.) See "Changing the FIXUP Default Script Filename" later in this chapter.

Stand–among FIXUP works only on LDUs that are not opened. This means it can't run on the master LDU, since AOS/VS has this LDU open. Stand–alone FIXUP works on any LDU.

Starting Stand–Among FIXUP

You can start stand–among FIXUP—with :UTIL in the search list—using the form

XEQ FIXUP[/*BUILDSCRIPT=file* /*DEFAULT=existing–file* /*SCRIPT=existing–file*]

/BUILDSCRIPT=file This switch tells FIXUP to create the script file *file*, with the suffix .FXP, then asks questions and stores your answers in the script file. When you include this switch, FIXUP simply builds the script file; it does not execute the file. Any script file can be used by either stand–alone or stand–among FIXUP. A script file for stand–alone FIXUP must be in the root directory for stand–alone FIXUP to execute it. If you don't specify a pathname with *file*, FIXUP creates the file in the working directory.

If the *file* already exists, FIXUP will give you the choice of replacing it or restarting FIXUP. Any script file FIXUP creates has the suffix .FXP. For example, if you type the name FIX_ROOT, the script filename will be FIX_ROOT.FXP. You never use the .FXP suffix when you tell FIXUP to *use* a script file. The suffix serves simply to identify a FIXUP script file.

For example, to start building a script file named FIX_DPJ0.FXP, you'd type

```
) X FIXUP/BUILD=FIX_DPJ0↵
```

/DEFAULT=existing–file Used alone, this switch tells FIXUP to display the settings in script file *existing–file* (omit the .FXP suffix). If you also use the /BUILDSCRIPT switch, FIXUP will ask the dialog questions, using the responses in *existing–file* as the defaults, and build a new script file using the responses you enter. You can use these switches to create a different version of a script file; or if you use the same name with both switches, to edit a script file. For example, the command

```
) X FIXUP/BUILD=FIX_DPJ0/DEF=FIX_DPJ0↵
```

starts a session to edit script file FIX_DPJ0.FXP.

/SCRIPT=existing–file Tells FIXUP to run on one or more LDUs, using the values in script file *existing–file*. Do not include the FXP suffix.

NOTE: It's easy to tell SYSBOOT the name of a script file. See "Changing the FIXUP Default Script Filename" later in this chapter.

For a FIXUP session without a script file, omit switches. For example, you could enter XEQ FIXUP at the CLI prompt. FIXUP will then ask questions, and run using your answers, without building or consulting a script file.

Starting Stand–Alone FIXUP

You can start stand–alone FIXUP when you bring up your system. At startup, when SYSBOOT displays the Operating System Load Menu, enter 2 .

Technical Maintenance Menu

. . .

7 Run FIXUP

. . .

Enter choice [1]:

Then enter 7 to run stand–alone FIXUP:

7↵

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Later in this chapter, we explain how to build a script file and tell SYSBOOT its name. Then, FIXUP can use the script file to run without operator interaction.

You can also start FIXUP—without a script file—from an AOS/VS system tape (enter BOOT 22, or other tape unit device code, then enter 1); or from AOS/VS diskette number 1 (enter BOOT 64 , DPJ10, and FIXUP). Press NEW LINE after each entry.

If You Make a Mistake

If you make a typing mistake before pressing NEW LINE, press the DEL key to erase characters one–by–one; or enter CTRL–U to erase the entire line.

If you have already pressed NEW LINE after typing an incorrect answer, FIXUP may recognize your error and repeat the question. If so, type the desired answer.

If you decide to abort stand–alone FIXUP, type the break sequence and enter RESET, then reboot FIXUP. To abort and restart stand–among FIXUP, press CTRL–C CTRL–B and repeat the command that started FIXUP.

On a CRT display console, you can suspend display by pressing CTRL–S and resume display by pressing CTRL–Q.

Running FIXUP

To run FIXUP interactively, you must use an upper– and lowercase console, because FIXUP dialog is upper– and lowercase.

To run FIXUP, follow these steps.

1. If you want to fix disks (instead of create or edit script files), make sure that all disks are mounted in their units (if removable), write–enabled, and ready.

2. Decide what you want to do, as follows:

2a. To run stand–alone FIXUP (perhaps to fix the system LDU), skip to step 3.

2b. Decide where you want the script file. For stand–among FIXUP, :UTIL is a good directory, since it's in most search lists. For stand–alone FIXUP, the script file must be in the root directory, but you can always move it there from :UTIL.

Then, to run stand–among FIXUP and create or edit a script file, use the format XEQ FIXUP/BUILD=name or XEQ FIXUP/DEFAULT=name/BUILD=name. And skip to step 5.

2c. To run stand–among FIXUP, using a script file, use the format

XEQ FIXUP/SCRIPT=name

FIXUP will then run using the script file. FIXUP may display messages on the console screen; this depends on the script file log selection. At the end, FIXUP will display *DONE!* as shown in step 22.

2d. To run stand–among FIXUP interactively, using no script file, enter XEQ FIXUP and skip to step 5.

3. See if the SCP–CLI is active on the system console, by typing a period (.) and pressing NEW LINE. If nothing happens, do a cold start as described earlier in this chapter. If the SCP–CLI is active, type the following:

SCP–CLI> RESET↵

SCP–CLI> BOOT 27↵ (Or other disk device code, like 24, instead of 27.)

Operating System Load Menu

1 Continue immediately with operating system load
2 Enter the Technical Maintenance Menu

. . .

Enter choice [2]:

4. Press NEW LINE or outwait the time–out delay to display the Technical Maintenance menu:

Technical Maintenance Menu

. . .

7 Run FIXUP

. . .

Enter choice [1]:

Type 7 and press NEW LINE to run stand–alone FIXUP:

7↵

(Later in this chapter, we explain how to build a script file and tell SYSBOOT its name. Then FIXUP can use the script file to run without operator intervention. See "Changing the FIXUP Default Script Filename.")

5. The previous steps read FIXUP into memory. It asks

AOS/VS Disk Fixer Rev. n

Verbosity [1]?

6. FIXUP can write messages to a log file, covered in the next question. Your answer to this question sets the amount of detail in each message.

0↵	tells FIXUP not to log messages.
↵ or 1↵	tells FIXUP to log the message and file pathname for each file that it deletes, rebuilds, renames, closes, or finds incomplete. If you choose certain options later in the dialog, FIXUP will also log messages that pertain to these options. This is a good general–purpose answer.
2↵	tells FIXUP to log the following for each disk error: message, file pathname, LDU unique ID, file address, index level, disk unit, and logical and physical disk addresses of the error. FIXUP reports all multiply allocated blocks, rebuilding FNB and FIB chains, invalid pointers, and empty chain anchor blocks.
3↵	tells FIXUP to log everything it does: all actions included in verbosity 2, plus replacement of directory bitmaps, updates of file lengths, and deallocation of empty directory blocks.

A verbosity of 0 produces the fastest fix, but yields no error information; so you should enter 0 only when you don't care about error information. If you answer 0, go to step 11. Verbosity 1 gives user–oriented messages, on which you can act. In most cases, you will want verbosity 1 and a line printer log.

Verbosities 2 and 3 are intended for Data General personnel. If you want to submit a Software Trouble Report to Data General, please enter 3.

If you answer anything but 0, or are building a script file, FIXUP asks

Error log file [console]?

or

Error log file for standalone [console] :

7. Your answer determines the error log file—or, if you're building a script file, the log file for stand–alone FIXUP.

   For stand–alone FIXUP, the most common log file is the line printer (device names LPB, LPB1, LPD, LPD1, LPJ0). A slower option is the console (default). A console is most useful as a log file only if the console is a hardcopy device.

   For stand–among FIXUP, you can specify the console (default), @LPT, or a disk file (which FIXUP will create if it doesn't exist or append to if it does exist). Preferably, specify the printer; e.g.,

   LPB⟩ (or @LPT⟩ for stand–alone)

   If you're building a script file, remember that the log file you specify must be available later on, when FIXUP runs the script file.

8. If you're building a script file or running stand–alone FIXUP interactively, it asks

   Device code [17]

   Press NEW LINE if the printer you want as log file is on the default device code of the first line printer. If the desired printer is on another device code, type that code and then press NEW LINE.

9. If you're building a script file, it asks

   Error logfile for standamong [console]?

   For stand–among FIXUP, you can specify your console (default), @LPT, or a disk file (which FIXUP will create if it doesn't exist or append to if it does exist). Preferably, specify the printer queue; e.g.,

   @LPT⟩

10. *Should I report closing files and deleting transients [n]?*

    Reporting on each open and transient file adds time to the fix —especially if the log file is a hardcopy console. (Transients are files that would normally have been deleted by other programs. FIXUP normally deletes them in the course of cleaning up.) The closing and deleting information is not normally needed for diagnostic purposes. If you want FIXUP to report open files and deleting transients, enter Y. But unless you really need to know which files were open, press NEW LINE.

11. *May I fix it [n]?*

This question determines whether FIXUP will fix the LDU(s) or simply report errors. Unless you enter Y, the LDU(s) remains inaccessible to AOS/VS. If you *do* enter Y, FIXUP will act to correct the LDU; if any disk blocks are multiply allocated, or contain bad information, this might involve the loss of files.

If you press NEW LINE to answer no, FIXUP will not write to the LDU. You will see the same messages as if you said Yes, but FIXUP will not try to rebuild files and won't display *FILE REBUILT* messages. You might press NEW LINE if you suspect disk controller hardware problems, and don't want your LDU(s) fixed on the basis of hardware problems. If you press NEW LINE, FIXUP will say *DONE, BUT NOT FIXED!* after it runs on the LDU.

Generally, answer

Y⟩

12. *Would you like to select any options [n]?*

Options include confirmation if fixing will cause deletions; deleting temporary files, cancellation of queued requests on serious errors, and output to the console in addition to the log file.

If you decline options and have told FIXUP to fix it, FIXUP will correct the LDU even if fixing will cause deletions; it will delete temporary files (usually a productive thing to do); it will proceed with queued requests regardless of errors; and it will send messages to the log file only (but abort messages will go to the console in any case).

Options add time and steps to the fix. But some options—like the one in step 12c—may be desirable, especially if you're creating a script file. Any option you choose will be carried over into the next request, if you queue multiple requests.

If you don't want to select any options, press NEW LINE and go to step 13.

To select one or more options, enter Y. FIXUP then asks one or more of the following questions.

12a. *Confirm fixing if an error will cause deletion(s) [n]?*

FIXUP asks this only if you chose verbosity 2 or 3 and said Y to *May I fix it?*. If you answer Y, when FIXUP finds an error where fixing would cause a deletion, it reports the error, stops, and asks

May I continue fixing [n]?

To have FIXUP continue, which will mean the loss of at least part of a file and may mean the loss of multiple files, you will need to enter Y. FIXUP will then delete something and continue fixing until it finds another error that requires deletion to fix.

If you answer Y to this *Confirm fixing...* question, FIXUP sends messages to the console as well as the log file.

If you choose to say No by pressing NEW LINE, FIXUP will stop fixing the LDU and proceed as if you had said No to *May I fix it?*. The LDU will remain inaccessible to AOS/VS.

12b. *Delete? +.TMP files [y]?*

Temporary files, whose names have the form ?name.TMP, are created and used by Data General utility programs; the utility programs delete them after completing their jobs. But if a utility is interrupted before finishing, its temporary files remain on the LDU.

Normally, unless you know that the LDU has important files of the form ?name.TMP, answer Yes by pressing NEW LINE. If you want to keep all ?+.TMP files, enter N.

12c. *Should I cancel queueing on serious errors [n]?*

This is asked only if you answered Y to *May I fix it?*.

By default, FIXUP continues fixing queued LDU requests, regardless of errors on the current LDU, even if it aborts on the current LDU. If you answer Y, FIXUP will fix the LDUs in sequence. If it finds a serious error on one LDU, it will finish fixing that LDU, then (if not running a script file), will ask

May I continue fixing [n]?

If you see this question, you will know that the current LDU has been fixed (unless FIXUP aborted). If you say No by pressing NEW LINE, FIXUP will cancel the remaining requests and terminate; the remaining LDUs will remain inaccessible to AOS/VS. If you enter Y, FIXUP will continue with the next queued request; if it encounters another serious error, it will ask for confirmation again as above.

If FIXUP is running from a script file that specifies *cancel queuing on serious errors*, FIXUP will cancel all remaining requests on a serious error—without asking this question.

A *serious* error is any read/write error (even if retries succeeded), deletion of any whole file or a multiply allocated block, or an invalid pointer in an index block.

The option to cancel queueing on serious errors requires a person at the console to confirm—eliminating the main advantage of queueing. But, under some circumstances (perhaps in a script file, to make sure the system operator consults someone on serious errors), you might want to cancel queuing. If so, enter Y. Otherwise—to retain the request queue—say No by pressing NEW LINE.

12d. *Send output to console in addition to logfile [n]?*

FIXUP asks this only if you specified a log file other than the console and said No to *Confirm fixing....*

If you chose a log file other than the console, and want error messages to appear on the console as well as the log file, enter Y. Otherwise, say No by pressing NEW LINE. Abort messages are repeated on the console in any case.

13. *Specify each disk unit in the LDU*

Enter disk unit name :

Now, you need to identify each disk in the LDU. The order in which you give the unit names doesn't matter, but you must specify each disk. If you are building a script file, FIXUP cannot check to make sure LDU is complete; but otherwise, it does.

With stand–alone FIXUP, for the master LDU, the disk unit name is often DPJ0 or DPF0. With stand–among FIXUP, under AOS/VS, the name(s) can be unit names (e.g., @DPF10); or, if the LDU was mounted under EXEC in a user MOUNT request, the link name used in the MOUNT command. For example,

DPF0⟩ (or DPJ0)

For a mirrored LDU, type the LDU names separated by a !. For example

DPJ2!DPJ3

14. *Device code [default]?*

This is asked only if needed. Unless you know that the disk unit is connected to a nonstandard device code, select the default by pressing NEW LINE.

15. If you're building a script file, continue with this step. If you're running FIXUP interactively, skip to step 17.

For a script file, after you give the device code, FIXUP asks

Is there another disk unit in this LDU [n]?

If the LDU includes another disk, enter Y; and answer the *Enter disk unit name* and *Device code* questions for the next disk. For any multiple–disk LDU, it's essential to describe all disks; if you don't, the script file won't work.

15a. *Is disk mirrored [n]?*

FIXUP asks whether the disk is part of a mirror, whether or not you've specified one disk (or image) or two. If the disk(s) is part of a mirror, answer Y. Otherwise, press NEW LINE.

15b. *Enter the preferred image unique ID [default] :*

This question is only asked if you answered Y to 15a. Enter the preferred LDU unique ID, as given to the Disk Formatter. For example, enter DPJ2.

If you've described all disks in the LDU, press NEW LINE.

16. *If fixing is not needed for this LDU, would you like to cancel this request [n]?*

This question—asked for script files only—allows you to have FIXUP skip fixes on LDUs that don't need fixing. (An LDU that doesn't need fixing is one on which all files were closed normally). FIXUP will then proceed to the next request (if any) or terminate.

Fixing an LDU that doesn't need fixing does no harm, and may streamline access by cleaning up the file structure—but it does take time. Generally, for script files, you will want to enter Y to skip unnecessary fixes. Regardless of your answer, though, all disks you specify in steps 13 and 14 must be on line and ready before FIXUP runs with this script file. (This is true because FIXUP must consult all disks in the LDU before deciding that fixing isn't necessary.)

If this is a mirrored LDU, FIXUP prompts

LDU (DPJn,...) has been selected for FIXUP
Do you want to continue fixing [y]?

16a. FIXUP will store the answer you give to this question in the script file. Usually, you do want FIXUP to continue fixing the LDU, so press NEW LINE.

Since you're creating a script file, skip to step 20.

17. FIXUP cycles the *Enter disk unit name* and *Device code* questions until you specify all disks in one LDU.

18. FIXUP now checks the LDU you identified in steps 13 and 14. If it does not *need* fixing, FIXUP advises

**** This LDU was not in use, fixing is not necessary ****

This means that the LDU (and all files on it) were closed normally by AOS/VS. The LDU is accessible to AOS/VS, so you need not run FIXUP on it. However, there might be other errors FIXUP will fix if you run it on the LDU.

19. Then, for each LDU, FIXUP asks

Would you like to cancel this request [n]

To cancel this request (perhaps because FIXUP said fixing wasn't needed, or for any reason), enter Y. To have FIXUP run on the LDU, press NEW LINE.

20. Next, FIXUP asks

Would you like to queue up another request [n]?

If you want to specify another LDU fix, answer Y. FIXUP allows up to 16 requests to be queued. If you answer Y, FIXUP asks about the LDU as in steps 13 and 14. If you have specified all the LDUs you want, press NEW LINE.

21. Now, if you're creating a script file, FIXUP terminates with the message *SCRIPTFILE BUILT.* Just for good measure, especially if you have any questions about the way the script file will work, we suggest you try the script file
(X FIXUP/SCRIPT=file or shut down and specify FIXUP/SCRIPT=file to *SYSTEM PATHNAME?*.) Before you can use a script file for stand-alone FIXUP, the file must be in the root directory (:); so, if you want to use the script file for stand-alone work, move the file to the root with the CLI MOVE command.

If you're running FIXUP interactively, it starts on the LDU(s). For a request that involves more than one LDU, it displays a *—REQUEST n—* message as it fixes each LDU.

22. However you run FIXUP (via script or interactively), a typical fix takes about 10 minutes for an average 190–Mbyte LDU. You need not stay at the console unless you chose options (or the script file specifies options) that require confirmation. As FIXUP finishes with each LDU, it advises

    DONE! (Or *DONE, BUT NOT FIXED!* if you told FIXUP not to fix the LDU.)

    When FIXUP has run on the last LDU specified, control returns to either the SCP–CLI or—for stand–among FIXUP—the CLI.

    To rerun FIXUP, return to step 2. Otherwise, you're done with FIXUP. You can warm start AOS/VS (RESET, BOOT device code, etc.) and/or continue with system operations.

If FIXUP hits a disk error that it can't correct, it aborts. Make sure the disk is write enabled and try again. If the abort recurs, the cause is usually hardware. See the *DISK ERROR* message in Table 6–3.

If you suspect disk alignment problems or surface damage, don't put a back–up pack in the unit (if this applies). FIXUP verbosity 1 error messages, and all abort error messages, are shown in Table 6–3.

Script File Hints

Script files have two main benefits:

- They simplify recovery after abnormal shutdown. FIXUP script files make running FIXUP easy. (See the next section.)
- They can be useful for fixing multiple LDUs concurrently, perhaps from different terminals enabled with PROCESS/DEF/IOC=@CONn CLI commands. In a system with many LDUs, this can shorten recovery time.

To take advantage of these features, minimize the number of settings where FIXUP will require console interaction. In very serious error conditions, FIXUP will abort anyway—doing no harm. If you have many LDUs, you can specify a fix for all of them in one or two script files (which makes it easy for the operator but requires all LDUs to be ready). Or, you can have a script file to fix each LDU; for example, FIX_DPJ10, FIX_DPJ11, and so on.

Generally, you should test each script file (using settings that allow the fix to occur even if fixing is not necessary) before making the script file a part of your routine system procedures.

Changing the FIXUP Default Script Filename

Once you've created a script file and tested it, it's a good idea to make it the default. Then, when you must run FIXUP, FIXUP will run from the script file without operator intervention. It's easy to change the FIXUP default script filename. Follow these steps.

1. Shut the system down as you would normally.

2. Bring the system up again (cold or warm start), but when SYSBOOT displays the Operating System Load Menu, enter 2.

3. Choose option 10, "View or change the FIXUP default script filename," from the Technical Maintenance Menu:

   Technical Maintenance Menu

   . . .

   10 View or change the FIXUP default script filename

   . . .

   Enter choice [1]: 10↵

   SYSBOOT prompts

   Default FIXUP script filename []:

4. Type the name of the script file you created, with or without the .FXP extension, and press NEW LINE. The first time you run FIXUP, there is no default. But let's suppose you built a script file named FIX_DPJ0.FXP. You'd type

   FIX_DPJ0↵

5. SYSBOOT has stored the script filename (here FIX_DPJ0). To run FIXUP with this script file, you must finally choose option 7, "Run FIXUP":

   Enter choice [1]: 7↵

In the future, when you choose to run FIXUP, FIXUP will run with the script file you've made the default.

FIXUP Examples

A nonscript FIXUP example with the simplest dialog follows in Figure 6–4.
A nonscript example with multiple requests and options appears in Figure 6–5.
A FIXUP example session that creates and uses two script files follows in Figure 6–6.

```
(Run FIXUP from the Technical Maintenance Menu or enter XEQ FIXUP)

AOS/VS Disk Fixer, Rev 7.70.00.00

Verbosity [1]? ↵
Error logfile [console]? ↵
Should I report closing files and deleting transients [n]? ↵
May I fix it [n]? Y ↵
Would you like to select any options [n]? ↵

        --- REQUEST 1 ---
Specify each disk unit in the LDU

Enter disk unit name: DPJ0 ↵     (Or @DPJ0 for stand-among FIXUP)
Device code [24]? ↵              (Omitted for stand-among FIXUP)

Would you like to cancel this request [n]? ↵
Would you like to queue up another request [n]? ↵

REQUEST 1 (DPJ0), FIXING LDU 'ROOT' NOW...
... (Time passes as FIXUP fixes LDU) ...

REPAIR IN FILE :XDIR:TEST -- PART OF FILE MAY BE MISSING
... (Time passes) ...

DONE!
```

Figure 6–4 Simple FIXUP Dialog Example

```
(Run FIXUP from the Technical Maintenance Menu or enter XEQ FIXUP.)

AOS/VS Disk Fixer, Rev 7.70.00.00

Verbosity [1]? ↵
Error logfile [console]? LPB ↵        (Or @LPT for stand-among FIXUP)
Device code [17]? ↵                   (Skipped for stand-among FIXUP)
Should I report closing files and deleting transients [n]? ↵
May I fix it [n]? Y ↵
Would you like to select any options [n]? Y ↵

Delete ? +.TMP files [y]? ↵
Should I cancel queueing on serious errors [n]? Y ↵
Send output to console in addition to logfile [n]? Y ↵

--- REQUEST 1 ---
Specify each disk unit in the LDU

Enter disk unit name: DPJ0 ↵          (@DPJ0 for stand-among FIXUP)
Device code [27]? ↵                   (Omitted for stand-among FIXUP)

Would you like to cancel this request [n]? ↵
Would you like to queue up another request [n]? Y ↵

--- REQUEST 2 ---

Enter disk unit name: DPJ21 ↵         (@DPJ21 for stand-among FIXUP)
Device code [no default]? 44 ↵        (Omitted for stand-among FIXUP)

*** This LDU was not in use, fixing is not necessary ***

Would you like to cancel this request [n]? Y ↵

--- REQUEST 2 CANCELLED ---
Would you like to queue up another request [n]? Y ↵

-- REQUEST 2 --
Specify each disk unit in the LDU
Enter disk unit name: DPJ11 ↵         (@DPJ11 for stand-among FIXUP)
Device code [67]? ↵                   (Omitted for stand-among FIXUP)

Would you like to cancel this request [n]? ↵
Would you like to queue up another request [n]? ↵

--- 2 REQUESTS QUEUED ---

REQUEST 1 (DPJ0), FIXING LDU 'ROOT1' NOW...
```

Figure 6-5 Multiple-Request FIXUP Dialog, with Options (continued)

REPAIR IN FILE :XDIR:TEST -- PART OF FILE MAY BE MISSING

DONE!

**** QUEUING CANCELLED – FIXING OF REMAINING REQUESTS MUST BE CONFIRMED ****

May I continue fixing [n]? Y ↵

REQUEST 2 (DPJ11), FIXING LDU 'STRS' NOW...
DONE!

FIXUP displays the *QUEUING CANCELLED...* message because the "Cancel queuing" option was chosen and a serious error occurred.

The line printer listing from this FIXUP session would show request, option, and message information.

Figure 6–5 Multiple–Request FIXUP Dialog, with Options (concluded)

```
) XEQ FIXUP/BUILD=FIX_DPJ0 ↵

AOS/VS Disk Fixer, Rev 7.69.00.00

Verbosity [1]? ↵
Error logfile for standalone [console]? LPB ↵
Device code [17]? ↵
Error logfile for standamong [console]? @LPT ↵
Should I report closing files and deleting transients [n]? ↵
May I fix it [n]? Y ↵
Would you like to select any options [n]? ↵

--- REQUEST 1 ---
Specify each disk unit in the LDU

Enter disk unit name: DPJ0 ↵
Device code [24]? ↵

Is there another disk unit in this LDU [n]? ↵

If fixing is not necessary for this LDU, would you like to cancel this request? [n] Y ↵
Would you like to queue up another request [n]? ↵

SCRIPTFILE BUILT!

) SUPERUSER ON ↵                    (Superuser is needed to move the file
                                     to the root directory.)

Su) MOVE/V/R : FIX_DPJ0.FXP ↵       (Script files for stand-alone
FIX_DPJ0.FXP                         FIXUP must be in the root directory.)
Su)
```

The dialog above builds the script file. Next, shut down AOS/VS. And try the script file:

```
SCP-CLI> BOOT 24 ↵

            Operating System Load Menu

 Enter choice [2]: ↵                (Choose option 2)

            Technical Maintenance Menu

 Enter choice [1]: 6 ↵              (Choose option 6)

Pathname? FIXUP/SCRIPT=FIX_DPJ0 ↵   (Type script filename)
  ... (FIXUP runs on the LDU. If it doesn't need fixing, FIXUP will cancel the request
       and terminate.) ...

-- REQUEST 1 (DPJ0), FIXING LDU 'ROOT' NOW

  ... (Minutes pass) ...
```

Figure 6-6 Multiple-Request FIXUP Example, with Script Files (continued)

```
-DONE!
```

The test above ensures that the script file for the master LDU works. The next steps are to create another script file for two other LDUs:

```
) DIR :UTIL ↵
) XEQ FIXUP/BUILD=FIX_DPF0_DPF1 ↵

AOS/VS Disk Fixer, Rev 7.69.00.00

Verbosity [1]? ↵
Error logfile for standalone [console]? LPB ↵
Device code [17]? ↵
Error logfile for standamong [console]? @LPT ↵
Should I report closing files and deleting transients [n]? ↵
May I fix it [n]? Y ↵
Would you like to select any options [n]? Y ↵

  Delete ?+.TMP files [y]? ↵
  Should I cancel queueing on serious errors [n]? Y ↵
  Send output to console in addition to logfile [n]? Y ↵

--- REQUEST 1 ---

Specify each disk unit in the LDU
Enter disk unit name: DPF0 ↵
Device code [27]? ↵

Is there another disk unit in this LDU [n] ↵

If fixing is not necessary for this LDU, would you like to cancel this request [n]? Y ↵
Would you like to queue up another request [n]? Y ↵

SCRIPTFILE BUILT!
```

The dialog above builds the script file for two additional disks in :UTIL. To test the file, type

```
Su) XEQ FIXUP/SCRIPT=FIX_DPF0_DPF1 ↵

--- 2 REQUESTS QUEUED ---

REQUEST 1 (DPF0), FIXING LDU 'UDD' NOW...

*** This LDU was not in use, fixing is not necessary ***

*** REQUEST 1 CANCELLED ***

REQUEST 2 (DPF1), FIXING LDU 'UDD1' NOW

DONE!
```

Figure 6–6 Multiple–Request FIXUP Example, with Script Files (concluded)

Figure 6–6 shows that one LDU didn't need fixing, thus was skipped. The other LDU (DPF10, UDD1) did need fixing and was fixed.

The line printer log file from this FIXUP session would show FIXUP request, option, and message information.

When you've had some experience using both of these script files, run FIXUP with the /BUILDSCRIPT switch again, creating one script file with dialog for all of the LDUs needed to come up on your system. Then bring the system down and make the new script file the default.

What FIXUP Does

When FIXUP is told to "fix it," FIXUP performs the following tasks on an LDU.

- Closes all open files.
- Checks for multiple allocation of disk blocks. For each multiply allocated block, FIXUP deletes all but the first use of the block. Only the block itself (or the file element, if the block is part of a data file) is deleted.
- Verifies that each directory data block and each index element is correct; and corrects it if needed.
- Shrinks directories by deallocating (freeing) empty directory blocks.
- Verifies that the directory data blocks in each directory are correctly linked; and rebuilds directory data block chains if needed.
- Deletes temporary files in every directory. Temporary files are used by system utilities and are normally deleted when the utilities finish their jobs. Their names have the form ?name.TMP
- Deletes all transient files from the peripherals directory (:PER or @) if :PER is on the LDU. These include device entry files, user tape volumes (if any), names of nonmaster LDUs initialized (if any), and IPC files created by other Data General software (if any). The next AOS/VS system will recreate the device entry files when it comes up. The tape volume files represented outstanding user tape MOUNT requests: users will need to reissue any outstanding tape MOUNT requests when EXEC is running. The nonmaster LDUs will need to be initialized (INITIALIZE command) when AOS/VS is running; this is often done in the UP macro.
- Recomputes the count of subordinate directories for every directory, the length of every file, and the current size for every control point directory.
- Builds an updated bit map for the LDU.

All this action cleans up the file structure and frees disk space. (When AOS/VS is running, you can use the CLI command SPACE : to verify the amount of free space in the master LDU.)

Interpreting FIXUP Messages

FIXUP verbosity 1 messages are designed for user action; they are described in Table 6–3.

FIXUP verbosity 2 and 3 messages concern directory–file structures: chains, disk addresses, multiply allocated blocks, and invalid or incorrect file block entries (e.g., FIB, FNB). These messages are really intended for Data General personnel; you can't do anything about them, so they are not included in Table 6–3.

Table 6–3 FIXUP Error Messages, Verbosity 1

Message	Description and Action
ABORT message	The word ABORT may precede any of several messages. If the message *is xxx is off–line,* a device specified in the script file is off line. Put the device on line and restart FIXUP. For a message other than *xxx is off–line,* find "message" in this table and take the action described.
ABOVE VALUE IS INVALID	FIXUP found an invalid value in a script file. You must edit the script file before you can use it.
ACL DELETED (FILE filename)	The access control list (ACL) information for this file has been deleted because FIXUP found inconsistencies. FIXUP may rebuild the file, with a *FILE REBUILT (FILE filename)* message, with a new ACL. If FIXUP doesn't rebuild the file, it will be left with a null ACL. Whether or not FIXUP rebuilds the file, you can assign the desired ACL later, from AOS/VS, if you want.
CAN'T DELETE ROOT DIRECTORY, ...	The first index block for the root directory contains invalid addresses. FIXUP will not delete this block, because doing so would effectively destroy the LDU directory structure. Run FIXUP again. If this message recurs, then this LDU cannot be fixed *in this unit.* There may be alignment or other hardware problems. MV/ADEX diagnostics are needed; run them on a scratch pack if pack is removable. If there is a correctable hardware problem, the LDU file structure may be intact. If diagnostics show the hardware is okay, the LDU can't be fixed. It may need hardware formatting; in any case, a Disk Formatter Full format must be run on the pertinent disk(s) to recreate the LDU.

(continued)

Table 6–3 FIXUP Error Messages, Verbosity 1

Message	Description and Action
DEVICE ALREADY IN USE	The disk unit you specified is in use by AOS/VS. Abort FIXUP; release the unit (RELEASE ldu–name); or, for the master LDU, shut down AOS/VS. Then, if you are running FIXUP after a hard error, run a Disk Formatter Partial format on the LDU, and update the bad block table. Then run FIXUP again.
DEVICE IS OFF LINE	A disk or printer you specified is off line. Put it on line and answer the question again.
DISK ERROR,DEVICE d STATUS n, RETRIES n, LDU ID = id, LOGICAL ADDRESS=n PHYSICAL ADDRESS=n	FIXUP encountered a disk error. It retries up to 20 times (24 octal) before aborting. You might want to note the disk status code *s* for later reference in the Peripherals manual (see Preface). Even if FIXUP can correct the error and continue, there may be a potential bad block at logical address *n;* you may want to run a Disk Formatter Partial format later to verify (or enter the bad block). (The numbers *n* are octal.) If FIXUP cannot correct the error in 20 retries, it aborts. Make sure the disk unit is write–enabled if this applies; if not, write–enable the unit and rerun FIXUP. If the unit *is* write–enabled, see the *FATAL DISK ERROR* message, next, for recovery action.
Disk is not mirrored	You specified a mirrored LDU but the disks in the LDU are not mirrored. Rerun FIXUP, specifying only one image.
DPJn is not part of a mirrored set of images	One of the images you specified is mirrored but the other is not. Rerun FIXUP, specifying the correct images, or specify only one image.
FATAL DISK ERROR	If this message follows a *DISK ERROR* message, FIXUP hit a new bad block (or the disk unit was not write–enabled). If not write–enabled, write–enable the unit and run FIXUP again. Otherwise, run a Disk Formatter Partial format, with read–only surface analysis, on the LDU. The Formatter should find a new bad block at logical address *n*. Answer Y to the *UPDATE BAD TABLE* question. Then, run FIXUP again. If this *FATAL* message does NOT follow a *DISK ERROR* message, it means that FIXUP couldn't read the same block twice. This means hardware problems in the disk controller or unit. Try FIXUP again. If it fails the same way, MV/ADEX diagnostics may be needed on the disk unit (with a scratch pack in the unit, if removable); contact your Data General support organization.

(continued)

Table 6–3 FIXUP Error Messages, Verbosity 1

Message	Description and Action
FILE file IS NOT A DISK UNIT	The name you entered is not a disk unit name. Respecify.
FILE ACCESS DENIED	You do not have Write access to the disk unit you specified. Abort FIXUP, turn Superuser on, and try again.
FILE CLOSED (FILE pathname)	FIXUP found this file open and has closed it.
FILE DELETED (FILE filename)	(FIXUP deleted this file. Possible reasons: the File Information Block data was inconsistent; "delete on close" was specified when the file was opened; the file was a link entry with bad directory information; or a data block in the file's parent directory was unreadable. If you want the file, load it from back–up media when AOS/VS is running.
FILE DOES NOT EXIST	The file does not exist. Try adding the @ prefix to the device name. Perhaps the unit was not identified to VSGEN (stand–among FIXUP only).
FILE REBUILT (FILE filename)	FIXUP rebuilt this file, which means that FIXUP tried to rejoin the file with its File Name Block, ACL block, or other descriptor block. If *filename* is a normal AOS/VS filename, then FIXUP gave the file its original name. But if the association between *filename* and file was bad, and FIXUP could not let the file keep its original name, then FIXUP assigned a *filename* of the form ?AAAAAAAAAC. The next file rebuilt in this directory could be renamed ?AAAAAAAAAD, the next ?AAAAAAAAAE, and so on. If the FIXUP log shows one or more *FILE REBUILT (FILE ?AAAA...)* messages, you should verify the files from AOS/VS. Get into the pertinent directory, and type) FILES/AS/S ?AAA– ↵ If only one ?AAA– filename appears, examine the FIXUP log for an *INVALID FILENAME DELETED* message before the *FILE REBUILT* message, in the same directory. INVALID filename, if shown, is usually the original filename, If so, you can rename the ?AAAAAAAAAC file to the invalid filename.

(continued)

Table 6–3 FIXUP Error Messages, Verbosity 1

Message	Description and Action
FILE REBUILT (file filename) (cont.)	If more than one ?AAA– filename appears from the FILES command, examine the FIXUP log for multiple *INVALID FILENAME DELETED* messages. The ?AAA– original filenames are usually the invalid filenames. You can rename the ?AAA– files to the invalid filenames, as appropriate. Don't worry if you see duplicate ?AAA– filenames after the FILES command; just rename each ?AAA– file until you have renamed them all. (FIXUP might have needed to create duplicate ?AAA– names, but renaming the files will make them accessible as usual.) Any file to which FIXUP assigns a new name retains its original type, creation date, and creation time. Lastly, a file mentioned in a *FILE REBUILT* message may be missing its ACL or User Data Area. Examine and correct, if needed, from AOS/VS.
FILE(S) MAY BE MISSING	FIXUP found one or more multiply allocated blocks in this directory, and deleted these; so filenames that FIXUP cannot know about may have been deleted. When AOS/VS is up, verify for missing files in this directory (perhaps using the last dump listing); load the missing file(s) from backup media.
FIXUP CHECKSUM ERROR	FIXUP (or a script file) was not read into memory correctly. Try reloading microcode via a cold start. If you're trying to use a script file (/SCRIPT=), skip it and run an interactive FIXUP session. If this error recurs, you must load FIXUP from tape or diskette. For tape, get an AOS/VS system tape, mount it on unit 0, enter RESET and BOOT 22 (or 62 for an MTD unit); then enter 1 and run this FIXUP on the LDU. For diskette, get AOS/VS system diskette number 1, insert it in unit 0, enter RESET and BOOT 64; then enter DPJ10, press NEW LINE, and enter FIXUP; and run FIXUP on the LDU.
FIXUP INTERNAL ERROR –– message	Run FIXUP again. If this message recurs, reload microcode (power off and on for MV/8000s, a Y answer to the *uCODE ALREADY LOADED...* question for other machines). Then run FIXUP again. If it fails again, contact your Data General support organization.

(continued)

Table 6–3 FIXUP Error Messages, Verbosity 1

Message	Description and Action
INCORRECT DISK FORMAT REVISION NUMBER OF m, FIXUP'S REVISION NUMBER IS n	If *n* is not *m*, this message means that the Disk Information Block (DIB) is bad, and this disk cannot be fixed. A Disk Formatter Full format is required to make the disk usable by AOS/VS.
INCORRECT FORMAT FOR DISK INFORMATION BLOCK	The Disk Information Block (DIB) for one of the disks in the LDU is bad. A Disk Formatter Full format is required to make the disk usable by AOS/VS.
INSUFFICIENT MEMORY FOR BIT MAP, FIXUP NEEDS nK WORDS MORE.	There is not enough main memory for FIXUP to rebuild the LDU bit map. verify the CPUID and correct if needed to specify the amount of memory in the machine. Then run FIXUP again.
INVALID FILE NAME DELETED (FILE filename)	FIXUP found inconsistencies in the filename–file structure; and it has dissociated the filename from the file. The filename is stored outside the file, so the file itself has *not* been deleted. Later, within this directory, FIXUP will either reassign *filename* to the original file, or it will assign a filename of the form ?AAAAAAAAAC to the file. If the latter, this message will be followed by a *FILE REBUILT* message. Proceed as described under the *FILE REBUILT* message.
INVALID FIRST LOGICAL ADDRESS, FILE EMPTIED	The starting logical address for this file is too great for the LDU. FIXUP zeros the logical address, effectively emptying the file. Later, from AOS/VS, load the file (or the contents of the directory, if the file named in the message is a directory) from backup media.
LDU (DPJn,...) has been selected for FIXUP	FIXUP has selected the specified image for fixing. (FIXUP selects the more recent and consistent image, and leaves the mirror in an unsynchronized state.)
LDU sequence number mismatch – not a valid mirror	You specified two or more multiple–disk LDUs, but then typed the corresponding disk units in each LDU in an inconsistent order. Rerun FIXUP, specifying the disk units in the right order.
Mirror should be specified	In a multidisk LDU configuration, you specified a mirrored pair for the *Disk unit name* prompt but not for a subsequent prompt. Specify both images of the mirror.
Mirror should not be specified	In a multidisk LDU configuration, you specified a single image for the *Disk unit name* prompt but then specified two images for a subsequent prompt. Specify only one image.

(continued)

Table 6–3 FIXUP Error Messages, Verbosity 1

Message	Description and Action
Mirror synchronization was in progress – FIXUP cannot run on these disks	You attempted to run FIXUP, and both images have the synchronization–in–progress bit set. Run a Disk Formatter Full format to reclaim the disks. (This error is highly unlikely.)
Mirror synchronization was in progress – FIXUP cannot run on LDU–id	You attempted to run FIXUP, but one image was in the process of being synchronized at the time of the failure. Specify the other image of the mirror.
NAME BLOCK ADDR. =n *ACL BLOCK ADDR. =n* *SYSBOOT ADDR. =n,...* *BITMAP AREA ADDR. =n* *OVERLAY AREA ADDR. =n* *unit REMAP ... ADDR.=n.* Followed by one of these messages: *The NAME BLOCK message* *The ACL BLOCK message* *SYSBOOT message* *The BITMAP area message* *The OVERLAY area message* *unit REMAP area message*	This abort sequence of messages means that one of the LDU disk's Disk Information Block (DIB) has bad information. (All *n* numbers are octal.) If one of the messages suggests moving the BITMAP, OVERLAY, or REMAP areas, note all addresses; then run a Disk Formatter Partial format and move the area to a free space on the LDU (or, for REMAP area, to a free space on the disk). Then run FIXUP again. If FIXUP succeeds, you should dump all LDU material and run a Disk Formatter Full format on the LDU; then reload the LDU material. If a Disk Formatter Partial format cannot move the offending area, then the LDU cannot be fixed; a Full format is needed. If the addresses and sizes that FIXUP reports seem reasonable, try FIXUP again. If it fails again, reload microcode (described under *FIXUP INTERNAL ERROR* message) and try FIXUP again. If it fails again, contact your Data General support organization.
NEW SIZE = #n BLOCKS, #n BLOCKS RECOVERED	FIXUP has calculated a new size for the LDU. If you chose the option to shrink directories, FIXUP also reports the total number of blocks reclaimed on the LDU.
NO ROOM TO REBUILD FILE, verify FOR A FILE MISSING	FIXUP could not find a valid filename for this file, and tried to create a new filename. But FIXUP could not find an unused "slot" for the new name, so it had to delete the file. If FIXUP reported an *INVALID FILE NAME DELETED (FILE filename)* message for this directory, the invalid filename may be the file FIXUP deleted. Verify from AOS/VS that this is so; then load the missing file from backup media.
Not a valid mirror	You specified a mirror for FIXUP to fix, but FIXUP has determined that the images are not normally mirrored. Specify the correct set of images.

(continued)

Table 6–3 FIXUP Error Messages, Verbosity 1

Message	Description and Action
ONLY 602MB MODEL 6214 DISKS MAY BE IN THIS LDU, DEVICE unit	Any LDU that includes a 602–megabyte model 6214 disk can include *only* such disks. The Disk Formatter enforces this restriction. Retry FIXUP and be sure you enter the correct disk unit names. If FIXUP fails again, the LDU cannot be fixed; a Disk Formatter Full format is needed.
PART OF FILE MAY BE MISSING	FIXUP found one or more multiply–allocated file elements in this file, and has deleted them. From AOS/VS, see if the file has the correct length and content. If it is not intact, load it from backup media.
QUEUEING CANCELLED – FIXING OF REMAINING REQUESTS MUST BE CONFIRMED May I continue fixing [n]?	The last LDU you specified has been fixed (unless FIXUP aborted), but FIXUP encountered a noteworthy error on it. If the log shows that only a few errors (like recoverable disk errors or one or two file deletes) occurred, enter Y to have FIXUP fix the next LDU(s). If there are many serious errors, there may be disk controller hardware problems; and you may want to have FIXUP stop by pressing NEW LINE.
RENAMED TO newfilename (FILE oldfilename)	The file named in *oldfilename* didn't hash correctly. FIXUP renamed it to *newfilename,* of the form ?AAAAAAAAAC. You can rename the file to its original name later, from AOS/VS. (If, from AOS/VS, you see duplicate ?AAA– filenames in this directory, rename the FIXUP–renamed files as described in the *FILE REBUILT* message.)
REPAIR IN DIR pathname –– message	This message precedes one of several other messages shown in this table. Read message and take the action described.
REPAIR IN FILE pathname –– message	This message precedes one of several other messages shown in this table. Read message and take the action described.
Script file already exists. Replace old copy [n]	This occurs when you want to build a script file whose name already exists. If you want to edit this file, enter Y. If you want to keep the file as is and create a different file, press NEW LINE; FIXUP will terminate and you can specify a different script filename (/BUILD=filename switch).
Script file does not exist. Enter script filename [console]:	The script file whose name you specified with the /SCRIPT= switch does not exist. If you remember the correct filename, type it and press NEW LINE. If you can't remember the name, just press NEW LINE and FIXUP will lead you through an interactive session, then do the fix.

(continued)

Table 6–3 FIXUP Error Messages, Verbosity 1

Message	Description and Action
SCRIPT FILE HAS BEEN CORRUPTED	FIXUP cannot use the script file you specified. Run an interactive session.
Script file must be in the root	For stand–alone use, a script file must be in the root directory. Run an interactive FIXUP session; then move the script file to the root from AOS/VS.
The xxxx BLOCK ...	See the *NAME BLOCK* message.
The LDU is not mirrored as stated in script file	You ran FIXUP using a script file for input, but the disk is not mirrored. Either build a new script file, or run FIXUP interactively.
The LDU selected for fixing differs from preferred image	You ran FIXUP using a script file for input. FIXUP aborted because the LDU selected in the script file is less recent than the LDU that FIXUP has determined needs fixing. Rerun FIXUP interactively, specifying the other image.
TOO MANY DISKS IN USE	An LDU cannot include more than eight disks, but you have entered more than eight disk unit names, and FIXUP has verified that each disk has the same LDU ID. Retry FIXUP, making sure that you enter only the correct disk unit names for the LDU. If this message recurs, this LDU cannot be fixed; a Disk Formatter Full format is needed.
TRANSIENT FILE (FILE filename DELETED)	FIXUP has deleted transient file *filename*. A transient file is a file that would have been deleted anyway in the course of normal system operations (further defined in section "What FIXUP Does").
USER DATA AREA DELETED FILE (filename)	FIXUP found inconsistencies in this file's User Data Area (often used for printer formatting), and it has deleted the User Data Area. From AOS/VS, you can either LOAD/DELETE the file from backup media or recreate the User Data Area with the FCU utility (in directory :UTIL:FORMS).
Warning -- disk is normally mirrored	You specified only one image of a mirrored LDU. In order to determine which image is *preferred,* FIXUP needs to know about both images. Continue if you know the image you have specified is more recent, or rerun FIXUP and specify both images.

(concluded)

Power Failures

Unless your computer has a back–up battery, it will lose the contents of volatile memory on a power failure. With a serious power drop (brownout) or very high temperature, the computer may cut its own power to prevent damage. In either case, without battery backup, the state of main memory and all registers is lost; microcode must be reloaded, and someone must run FIXUP on all initialized LDUs when full power returns.

There are two types of back–up battery. One type (Model 8746) provides full back–up (power to all computer boards, asynchronous/synchronous controllers, and fans). The other provides partial back–up (power to main memory and SCP). Each type can provide power for only a limited time.

With full back–up, AOS/VS will try to restart all critical devices (like disks and asynchronous controllers) when power returns; if this attempt succeeds, the system will continue running as before the power failure. For full back–up to work, all the following conditions must be true:

- The computer must have a full back–up battery.
- Power must return before the battery is exhausted.
- BBU with full back–up and autorestart must have been chosen at VSGEN.
- The computer LOCK switch (if any) must have been in the on or lock position when power went down.

With partial battery back–up, AOS/VS will start its ESD routine when power returns. For partial back–up to work, the computer LOCK switch (if any) must be in the ON or LOCK position when power goes down.

Power Failure Recovery

When power returns, look at the system console.

- If the system console shows messages like

  There has been a POWERFAIL

  Now restarting device n unit n
  . . .

  and then displays the AOS/VS CLI prompt or the prompt of another program running under CLI), this means that your system has full back–up, and AOS/VS has fully recovered. The power failure is recorded in the :ERROR_LOG log file.

  If AOS/VS cannot restart a device, it will tell you so. If the device is a disk, you probably need to run FIXUP on it.

- If the system console is displaying messages like

  Power back to normal

  Do you want a memory dump (to submit a Software Trouble Report) (Y or N)? [Y]

Someone generated the system and deleted Full BBU. Wait until your disk's READY lamps are lit; and enter N. The ESD program will run as described under "About ESD," earlier in this chapter. If ESD succeeds, you can bring up AOS/VS immediately as shown under "Warm Start." The power outage is recorded in the :ERROR_LOG log file. Tape units and printers will need attention as above.

- If you see the SCP–CLI prompt, try to reset and start at 50:

  SCP–CLI> RESET↵
  SCP–CLI> START 50↵

  AOS/VS processing aborted
  Do you want a memory dump (to submit a Software Trouble Report) (Y or N)? [Y]

  Enter N. The ESD program will run as described above. If it succeeds, you can restart immediately as shown above under "Warm Start:" RESET, REBOOT device–code, etc. If ESD fails, run FIXUP on the LDU.

- If the system console is displaying power–up messages like

  Operating System Load Menu

  1 Continue immediately ...
  ...
  Enter choice [1]:

  or

  MV/4000 READY

  power to the computer has stopped and the contents of volatile memory have gone away. You must cold–start the system; then run FIXUP on all initialized LDUs as described under "Running FIXUP." Tape units and line printers will need to be put back on line, and any aborted tape writes restarted.

Any power failure, regardless of recovery, has the following effects:

1. It eliminates vacuum to magnetic tape units; so if tape units that use vacuum were active on your system, someone must press BOT on them to recreate the vacuum, and then press ON LINE.
2. It takes line printers off line, and someone must put them back on line.
3. It takes the system clock off line for the duration of the failure; so someone must update the system time, using the TIME command from the master CLI process (from PID 2) or from a process with System Manager privilege.

What Next?

This chapter described common SCP commands, CPU switches, system startup, and normal shutdown. It also covered abnormal shutdown: deadlocks, panics, hardware errors, and power failures—and it showed how to handle these with ESD and FIXUP. In short, this chapter covered the basic steps to start, run, stop, and restart the system.

At first, startup and shutdown might seem complex—but they are really not. To warm start: reset, BOOT device–code, wait for time–out, set date/time if asked, and accept the default answers for everything else. On abnormal shutdown, enter N and let ESD run; if ESD fails, run FIXUP on your LDUs. When power returns, proceed as usual (if you had full battery back–up), run ESD and warm start the system (if you had partial back–up), or load microcode and run FIXUP (if you had no back–up).

Now that you know how to start up and shut down your AOS/VS system, you may want to learn more about installing new AOS/VS releases (described in the next chapter) or PREDITOR, EXEC, other runtime tools, or system management, as described in *Managing AOS/VS and AOS/VS II*.

End of Chapter

Chapter 7
Handling Updates and New Revisions from Data General

Read this chapter

- When you want to install a new AOS/VS update or revision received from Data General;
- When you want to install new computer microcode received from Data General; or
- When you want to revert to an old revision of AOS/VS or microcode.

Data General continually improves its software and microcode products. It sends the new software products (with new manuals) to all customers who are on the *Software Subscription Service*. And it sends new revisions of microcode and emulator software to customers on the *Microcode Subscription Service*.

So, if you subscribe to one or both services, you will periodically get tapes or diskettes and new manuals. You should install the new products. In nearly all cases, they will run your existing applications even better than your current revision.

AOS/VS software and microcode revisions have revision numbers, each greater than the last. For AOS/VS, the numbers go 7.00, 7.50, 7.60, 7.70, and so on. Data General usually issues multiple *updates* for each revision. Update numbers proceed from the revision number; for example, for AOS/VS, the updates go 7.65, 7.66, 7.67, 7.68, 7.69 and 7.70.

Revisions and updates are shipped on reel–to–reel tape, cartridge tape, or diskettes, depending on your system. Revisions and updates have the same logical file format: for tape, tape file 0 is the tape bootstrap that loads files 1, 2, and 3; file 1 is the FIXUP disk fixer utility; file 2 is the Disk Formatter utility, and so on. (There are tables in Chapters 2 and 3 showing the file contents of release diskettes and release tapes.)

If you receive a multiple–tape AOS/VS revision or update, files 0–6 of all tapes will be identical; only the AOS/VS programs in file 7 will be different.

This chapter tells how to update your system software and microcode with new releases of those products from Data General. The major sections are

- Installing a New AOS/VS Revision or Update
- Computer Microcode, SCP, and Emulator Updates
- Reloading an Old AOS/VS Revision or Update

Usually, you'll need to install one or more updates before installing a revision or new microcode. When you get a new AOS/VS revision, you'll probably get a new revision of this manual.

Installing a New AOS/VS Revision or Update

Each AOS/VS revision or update includes new versions of all AOS/VS program and support files, on an AOS/VS system tape or on diskettes. A revision or update also includes a printed Release or Update Notice—also supplied as a disk file in :UTIL. The filename of a Release or Update Notice is the same as its part number, with underscores instead of hyphens. (The AOS/VS Revision 7.70 Release Notice is 085_000147_16.)

If, as might happen, you receive a *microcode* update with an AOS/VS revision or update, load the microcode file into the computer and on the disk before loading the AOS/VS software. Microcode updates are described later in this chapter.

To load a release or update, follow the steps described next. The steps advise you to install the new starter system—overwriting the current installed system, if any—but you can always install your new tailored system over this with little effort.

1. To start, read the Release or Update Notice "Notes and Warnings" section and look for any interrevision incompatibilities.

2. By default, each file loaded will overwrite its older version on your LDU (if there is an older version). So you will want to protect certain files during the update. The files you will want to protect include :UTIL:LINK_ERMES.CLI, and any other Data General-supplied files that you have tailored for your system. (If you created a TAILORED_ERMES.CLI macro, as described in Chapter 5, you don't have to rename LINK_ERMES.CLI.)

   From the CLI, rename any file you want to protect from being overwritten. For example:

   ```
   Su) DIR :UTIL↵
   Su) RENAME LINK_ERMES.CLI LINK_ERMES1.CLI↵
   ```

3. Shut down AOS/VS.

4. Mount the new AOS/VS system tape or diskette number 1 on unit 0 on the first controller.

Proceed to the appropriate section: "Loading from Tape" or "Loading from Diskettes."

NOTE: The AOS/VS starter system (SYS.PR) supports a limited number of tape and disk units on reserved device codes. For example, both MTB and MTC tape drives are assigned device code 22. If your configuration includes any nonstandard devices that use one of these reserved device codes, the starter system will not be able to use them. Shut down units on reserved device codes before booting the starter system.

Loading from Tape

Boot from tape and install the new bootstraps and starter system (SYS.PR) as follows.

5. *SCP-CLI>* RESET↵ (Restart the system.)

6. *SCP-CLI>* BOOT 22↵ (Enter 62 if tape is on an MTD unit; 23 if it is an MTJ unit.)

7. *Tape file number?* 3↵ (Specify tape file 3.)

8. *AOS/VS Installer Rev n*
   Specify each disk in the LDU
   Disk unit name? DPF0↵ (Type master LDU unit name.)

9. *Device code [default]?*↵ (Press NEW LINE to accept the default, or enter the device code; specify all the units in the LDU.)

10. *-- Disk bootstrap installed*
    Do you want to install a System Bootstrap [Y]?↵ (Press NEW LINE.)

11. *Install from which unit [MTC0]?*↵ (Indicate the tape unit.)

12. *Device code [22]*↵ (Or *62*, or *23*.)

13. *File number [4]?*↵ (Accept the default value.)

14. *-- System Bootstrap installed*
    Do you want to install a System [Y]?↵

15. *Install from which unit [MTC0]?*↵ (Accept the default, or enter MTD or MTJ.)

16. Device code [22]↵ (Or 62, or 23.)

17. *File number [5]?*↵ (Accept the default value.)

    -- System installed
    Done!

18. *SCP-CLI>* RESET↵

19. *SCP-CLI>* BOOT 27↵ (Use device code of master LDU unit.)

    Operating System Load Menu
    . . .

20. *Enter choice [1]:*↵ (Load and start the newly-installed starter system.)

21. *AOS/VS Rev n*
    Date (MM/DD/YY)? 11 22 92↵ (Enter the current date.)

Time (HH/MM/SS)? 15 01↵ (Enter the current time.)

Offset from universal time [+00:00]?↵ (Press NEW LINE.)

22. *Override default specs [N]?* Y↵ (Since you are installing a new AOS/VS revision or update, enter Y.)

23. *Automatic reboot [N]?*↵
Number of buffers ...↵
Swap directory ...↵
Page directory ...↵
(For the next four prompts, select the default; or, refer to Chapter 4 for system parameter details.)

24. *Initial load [N]* Y↵ (Enter Y for initial load.)

25. *Filename [@MTC0:6]?*↵ (Select the default, file number 6 on the tape.)

26. The system will try to load the new files from tape file 6 into the root directory. For each file that already exists in the root, it will ask whether or not you want to replace the old copy. Since you are updating, type Y and press NEW LINE. For example:

Warning: File name already exists, File: AGENT.PR
Replace old copy [Y]?↵

Warning: File name already exists, File: ALPHARS.PR
Replace old copy [Y]?↵
...

27. When you've finished, the AOS/VS CLI prompt will come up on the system console. Since you are updating, use the LOAD_II program with the /DELETE switch, which automatically replaces each file with the revised version, where this applies. Type

) SUPERUSER ON↵

28. Su) LOAD_II/V/DEL @MTC0:7↵ (Use @MTC0:7 with tape on an MTB or MTC unit; use @MTD0:7 with tape on an MTD unit; or use @MTJ0:7 or @MTJ10:7 on MTJ units.)

Deleted ...
Deleted ...

29. Su) REWIND @MTC0↵ (Or @MTD0, or @MTJ0, or @MTJ10.)

Su)

Mount the next tape, if any; repeat steps 28 and 29.

If you have an ECLIPSE MV/4000 with hardware floating point, change the default microcode filename to MV4000FP.MCF as described in Chapter 6.

Dismount the tape and skip to the section "Generating a New System and Updating AOS/VS."

Loading from Diskettes

Boot from diskette and install the new bootstraps and starter system (SYS.PR) as follows. Make sure that the first diskette is *not* write protected since the system tries to write to the diskette.

30. *SCP-CLI>* RESET↵ (Restart the system.)

31. *SCP-CLI>* BOOT 64↵ (Boot the operating system load menu from diskette.)

Operating System Load Menu

. . .

32. *Enter choice [1]:* 2↵ (Choose option 2, the Technical Maintenance Menu.)

Technical Maintenance Menu. . .

33. *Enter choice [1]:* 6↵ (Choose option 6, *Run a specified program.*)

34. *Pathname?* INSTL↵ (Type the Installer file name, INSTL.)
AOS/VS Installer Rev n
Specify each disk in the LDU
Disk unit name?

35. Remove AOS/VS diskette 1 from unit 0 and insert diskette 2. Enter the name of your system disk, DPJ0, then press NEW LINE; press NEW LINE again to accept the default device code.

DPJ0↵

Device code [default]↵
-- Disk bootstrap installed
Do you want to install a System Bootstrap [Y]?

36. Press NEW LINE to install the System Bootstrap.

37. *Install from which unit [MTB0]?* DPJ10↵ (Enter the system disk name, DPJ10.)

38. *Device code?*↵ (Press NEW LINE.)

-- System Bootstrap installed
Do you want to install a System [Y]?

39. Remove the diskette from unit 0 and insert AOS/VS diskette number 3. Press NEW LINE.

40. *Install from which unit [DPJ10]?*↵ (Press NEW LINE to accept the default.)
Device code?↵ (Press NEW LINE again for the default device code.)

-- System installed

Done!

41. Now, bring up the newly-installed starter system and specify an initial load.

SCP-CLI> RESET↵ (Restart the system once more.)

42. *SCP-CLI>* BOOT 24↵ (Reboot, this time from the LDU.)

Operating System Load Menu
...

43. *Enter choice [1]:*↵ (Load and start operating system.)

44. *AOS/VS Rev n*

Date (MM/DD/YY)? 11 22 92↵ (Enter the current date.)

Time (HH/MM/SS)? 15 01↵ (Enter the current time.)

Offset from universal time [+00:00)?↵ (Press NEW LINE.)

45. *Override default specs [N]?* Y↵ (Since you are installing a new AOS/VS revision or update, enter Y.)

46. *Automatic reboot [N]?*↵
Number of buffers ...↵
Swap directory ...↵
Page directory ...↵
(For the next four prompts, select the default; or, refer to Chapter 4 for system parameter details.)

47. *Initial load [N]* Y↵ (Enter Y for initial load.)

48. *Filename [@DPJ10]?*↵ (Select the default.)

49. Remove the diskette from unit 0 and insert AOS/VS diskette number 4. This is the first diskette of the AOS/VS first dump file. Type the pathname @LFD:VOL1:FIRST_DUMP_FILE and press NEW LINE.

50. *PLEASE INSERT A DISKETTE IF NOT ALREADY INSERTED*
UNIT [@DPJ10] VOLUME ID [VOL1]? [Y]↵
(Press NEW LINE to accept the default unit and volume IDs.)

51. The system will try to load the new files from the diskette into the root directory. For each file that already exists in the root, it will ask whether or not you want to replace the old copy. Since you are updating, enter Y.

For example:

Warning: File name already exists, File: AGENT.PR
Replace old copy [Y]?↵

Warning: File name already exists, File: ALPHARS.PR
Replace old copy [Y]?↵

52. When all files have been copied from diskette, the system will ask for another diskette. Insert the next diskette in the set, and press NEW LINE. There are four diskettes in the first dump file set. Continue with diskettes until you see

PLEASE REMOVE THE DISKETTE
)

53. The AOS/VS CLI prompt has come up on the system console. To load from labeled diskettes, turn Superuser and Operator mode on. Then, since you are updating, use the LOAD command with the /DELETE switch, which automatically replaces each file with the revised version, where this applies. Type

) SUPERUSER ON↵
Su) OPERATOR ON↵
Su) LOAD/V/DELETE @LFD:VOL1:SECOND_DUMP_FILE↵

(The pathname is @LFD:VOL1:SECOND_DUMP_FILE.)

54. The CLI prompts for a diskette. Remove the diskette from unit 0 and insert the next diskette (first diskette in the second dump file) in unit 0. Then press NEW LINE.

Deleted ...
Deleted ...
Deleted ...

55. When all files have been loaded from this diskette, the CLI prompts for another diskette. Insert the next diskette in the set, and press NEW LINE. The second dump file contains 24 diskettes. Continue feeding diskettes as prompted until you see

PLEASE REMOVE THE DISKETTE
Su)

56. Remove the last diskette.

If your machine has hardware floating point or the graphics instruction set, change the default microcode filename as described in Chapter 6.

Generating a New System and Updating AOS/VS

The next step is to generate a new AOS/VS system from your old system.SSF file and update AOS/VS (apply system patches). This is easily done with the update tool.

57. Run VSGEN if necessary (if you want to specify a new device or a different host parameter). Use the /DEFAULT switch, with the name of your tailored AOS/VS system, as follows: VSGEN/DEFAULT=SYS_7.00. For example,

```
Su) SEARCH :UTIL⏎
Su) DIR :SYSGEN⏎
Su) VSGEN/DEFAULT=SYS_7.00⏎
```

Use VSGEN as described in Chapter 4 to edit or add the devices and parameters you want. Then create a new spec file with the S command.

58. After leaving VSGEN, run the update tool to build and update the new AOS/VS system file. Go to directory :UPDATE, then run the update tool in the form UPDATE/REV=n.nn system−pathname, where n.nn is the update revision, and system−pathname is the SYSGEN directory and the .PR or .SSF file of the AOS/VS system to be updated. For example,

```
Su) DIR :UPDATE⏎
Su) UPDATE/REV=7.70 :SYSGEN:SYS_7.69.PR⏎
```

The update tool updates the system file by running VSGEN and patching the system file. If you receive an error message, see the section, "Correcting Update Errors," later in this chapter.

When the CLI prompt returns, shut down the starter system and, when SYSBOOT comes up, choose option 2, "Enter the Technical Maintenance Menu." Make the tailored system the default system, and bring it up, as explained in steps 59−67.

59. Su) BYE⏎
Do you really want to shut the system down? Y⏎

60. *SCP−CLI>* RESET⏎
SCP−CLI> BOOT 27⏎ (Enter the correct device code.)

Operating System Load Menu
. . .

61. *Enter choice [1]:* 2⏎ (Choose option 2.)

Technical Maintenance Menu
. . .

8 View or change the default operating system filename
. . .

62. *Enter choice [1]:* 8↵ (Choose option 8.)

    Default operating system [INSTALLED SYSTEM]: :SYSGEN:newsysname.PR↵

63. Now, choose option 1, *Load and start the default operating system*, by pressing NEW LINE.

    Enter choice [1]:↵

64. *Date (MM/DD/YY)?* 11 22 92↵ (Enter the current date.)
    Time (HH:MM:SS)? 16 01↵ (Enter the current time.)
    Offset from universal time [+00:00]?↵ (Press NEW LINE or enter the offset from Greenwich mean time and then press NEW LINE.)

65. *Override default specs [N]?*↵

66. After the new system comes up, compare your LINK_ERMES1.CLI macro and the new LINK_ERMES.CLI macro. Modify your macro to incorporate changes in the new one. Then, delete the LINK_ERMES.CLI macro and rename LINK_ERMES1.CLI to LINK_ERMES.CLI. Finally, build a new error message file by executing LINK_ERMES.CLI. The new ERMES won't become effective until you shut down and restart AOS/VS.

Updating to AOS/VS Revision 7.70

If you are installing AOS/VS Revision 7.70 as an update to a revision 7.66 or earlier system, run the queue cleanup program QCMP.PR after installing the revision but before typing your UP.CLI macro or running EXEC. The version of EXEC used with AOS/VS 7.67 and later revisions uses two new files named :QUEUE:QUEUES and :QUEUE:JOBS in place of the files named :QUEUE:QUEUE_DESCRIPTORS and :QUEUE:QUEUE_ENTRIES; running QCMP.PR converts the old files to the new versions. QCMP.PR is in the :UTIL directory.

67. Bring up EXEC and the multiuser environment:

    Su) :UP↵
    ...

68. If there were no errors, make a system tape or diskette (as described in Chapter 4) and you're done. LDUs that you've built with the older Disk Formatter will work with the new AOS/VS software (such programs are designed to be revision-independent).

If, for any reason, you want to reload the *old revision*, get out the old AOS/VS system tape or diskette set and follow the appropriate procedure above.

As you can see, the update procedure isn't difficult. Restrictions and possible problems with it are as follows.

- The update procedure assumes that you haven't reconfigured the directory structure shipped by Data General Corporation. For example, if the old revision of SED is not in directory :UTIL, the new revision will not overwrite it; there will be two revisions of the program on the LDU.

- Your master LDU cannot include disks other than those on the first controller, because the starter system supports only the primary controller.

- The new LOCK_CLI and the 32-bit CLI file :PASSWORD, with the original password, PASSWORD, will overwrite your old passwords; so, if you want to lock the CLI, you must insert a new password. (This process is covered in *Managing AOS/VS and AOS/VS II.*)

- Data General utility programs whose preambles you've edited (to take advantage of PID-size type, for example) will be overwritten by newer versions. You must use SPRED on them again. (SPRED is described in *Managing AOS/VS and AOS/VS II.*)

Note that you *can* load new files selectively; for example, with the LOAD command:

```
) LOAD/V/DEL/BUFF=8192 @MTC0:7 :UTIL:SED.PR
```

However, this is not recommended because the error message (ERMES) file may differ between the revisions. Better to load all the files at once.

Correcting Update Errors

The update tool reports errors to the terminal from which you run it; also, the tool logs errors and status messages in a file named UPDATE.LOG in a directory named in the form :UDPATE:n.nn_date_time.LOG. In the log directory filename, n.nn is the update revision, date is the date—day, month, year—and time is hour and minute—for example, :UPDATE:7.70_22NOVEMBER92_1715.LOG. The tool runs a verification pass to detect errors before it actually does anything. If the tool encounters an error during the verification pass, it will stop, allowing you to correct the error and restart the verification process.

Most errors occur because file access is denied or because permanence is set on for a file the update tool needs to replace. (The tool does not turn Superuser on or permanence off.) To overcome access errors, turn Superuser on and run the tool again. To overcome a permanence error, turn permanence off for the pertinent file(s).

Updating Your Manuals

Data General ships the Release Notice both in printed form and as a disk file. Updates to your *manuals* are provided only as disk files. The pathnames are :UTIL:sss_pppppp_rr, where sss is the series, pppppp is the part number, and rr is the revision. For example, for manual 093-000675-01, the pathname is

:UTIL:093_000675_01

To keep your manuals up to date, we suggest that you read these files, print the ones you want, and correct the pertinent manuals. Then—if you need the disk space—delete the files. You can always reload any or all of them, if needed, from the AOS/VS system tape or diskette set.

Computer Microcode, SCP, and Emulator Updates

Microcode is the foundation of your MV/Family CPU. It's important to run the current revision of both microcode and the SCP–OS.

Data General maintains a microcode subscription service, similar to its software subscription service. New customers get membership automatically for a certain amount of time. If your membership has expired, we suggest that you renew it.

With the microcode subscription service, you will periodically receive new revisions of microcode, the SCP operating system, and FRU diagnostics. For original MV/8000s, these are shipped on diskette in a format the SCP can can read. When you get the diskette, simply remove the old diskette from the CPU diskette unit, insert the new one, and turn CPU power off and on again to try it.

For MV/Family machines other than MV/8000s, the microcode, the SCP–OS, and the FRUs are shipped on tape or on a set of two diskettes. For tape, this is usually a 1600–b/in tape; and file 0 is the SCP–DTOS system, bootable from tape. File 1 is the combined microcode/SCP–OS file, in AOS/VS dump format.

For diskettes, the second diskette (AOS FMT) has the microcode file in DUMP format.

To load the new microcode file:

1. Mount the tape or diskette on unit 0.

2. Type the following commands

) SUPERUSER ON↵
   Su) DIR :↵
   Su) RENAME MVn.MCF MVn.rev.MCF↵

   (n is the name of your computer; rev is the revision of old microcode. For example, the new name might be MV6000.5.0.MCF. The rename step saves the old microcode file, which you would otherwise need to delete to load the new one.)

3. For tape, type

   Su) LOAD/V @MTx0:1↵ (x is B, C, or D, depending on the tape unit.)

   For diskette, type

   Su) LOAD/V @DPJ10↵

   MVn.MCF (CLI verifies load of the new file.)

4. For tape, type

   Su) REWIND @MTx0↵

Dismount the tape or diskette and store it safely.

5. To try the new microcode or SCP–OS, shut down AOS/VS. Then restart and reboot it:

```
RESET⏎
BOOT nn⏎
```

6. Choose option 2 from the Operating System Load Menu:

```
        Operating System Load Menu
...
Enter choice [1]: 2⏎
```

7. This brings up the Technical Maintenance Menu. Choose option 2, *Load and verify microcode.*

```
        Technical Maintenance Menu
...
2  Load and verify microcode
...
Enter choice [1]: 2⏎
```

SYSBOOT loads and verifies new microcode.

If—for whatever reason—you ever want to load an older or different revision of microcode or SCP-OS, you can tell SYSBOOT that you want to view or change the microcode filename, then type the microcode filename. For example, on warm start:

```
        Operating System Load Menu
...
Enter choice [1]: 2⏎                          (Choose option 2.)
        Technical Maintenance Menu
...
9  View or change the microcode filename

Enter choice [1]: 9⏎                          (Choose option 9.)

Default microcode filename [:MV4000FP.MCF] :MV4000FP.5.0.MCF⏎

Enter choice [1]: 2⏎                          (Choose option 2.)
```

... (SYSBOOT loads and verifies microcode.) ...

If you have a machine that uses emulator firmware (for example, an MV/4000 DC, which runs an emulator in its IOC), you may also receive new emulator revisions. If you receive an new emulator, install it via the dialog shown in Chapter 2, taking steps that include the "I/O CB EMULATOR" diskette.

Keep all the system tapes and diskettes you receive from Data General and those you make yourself in a safe place. See "Managing AOS/VS and AOS/VS II" for details.

Disk Microcode Updates

Model 6236 and 6239 disk units have their own microcode, which is independent of CPU microcode. Disk microcode is stored on part of the disk that's invisible to AOS/VS. It's loaded into disk controller memory automatically the first time AOS/VS accesses a disk on the controller.

Data General installs an initial version of microcode on each model 6236 and 6239 disk before shipment. However, the current revision of AOS/VS, or a program like MSCOPY, may require updated disk microcode. If updated microcode is needed, AOS/VS will display the *CONTROLLER MICROCODE NEEDS TO BE UPDATED* message.

A program to update disk microcode is shipped on tape, along with the disk controller. The updating program is called the *Peripheral Microcode Installer*—its model number is 30976. You can read about the disk microcode installer in the manual *Operator's Reference, Peripheral Microcode Installer*. You can run this program, when AOS/VS is not running, by mounting the tape on unit 0 of your primary tape controller and entering BOOT nn at the SCP CLI prompt. For example,

SCP-CLI> BOOT 22↵ (Or 23, or 62)

... (Peripheral microcode installer prompt) ...

The peripheral microcode installer program will then lead you through the steps needed to update your disk microcode. Afterward, it will return to the SCP CLI and you can bring up AOS/VS. You need not update disk microcode again unless you see the *CONTROLLER MICROCODE NEEDS TO BE UPDATED* message.

Reloading an Old AOS/VS Revision or Update

If, for any reason, you want to reload an old revision of AOS/VS, you'll need to find and use the old system tape set. To reinstall AOS/VS rev 7.60 or an earlier revision, use the manual *How to Generate and Run AOS/VS*, Chapter 2 or 3.

To return to an old *update* (for example, to return to 7.69 from 7.70), you must reinstall the original update (described in "Installing an AOS/VS Revision or Update," earlier). Then install the update you want instead of the update you are currently using.

What Next?

This chapter explained how to update your AOS/VS software and microcode with new revisions of these products you received from Data General. The next two chapters explain how to run the Disk Formatter and Installer programs.

To read about management issues, including file backup, process management, and security, see *Managing AOS/VS and AOS/VS II*.

End of Chapter

Chapter 8
The Disk Formatter

Read this chapter

- When you want some background on AOS/VS logical disk units (LDUs) and how to use them;
- When you want to format one or more new (blank) disks, or reformat old ones;
- When you want to check for new bad blocks (noted as hard errors by AOS/VS or disk errors by FIXUP) on an LDU;
- When you want to rename a logical disk unit or change its access control list.

The Disk Formatter is an AOS/VS utility program that formats one or more physical disks into one or more logical disk units (LDUs). If you brought up your own first system (Chapter 2 or 3), you already have some experience with the Disk Formatter. This chapter explains the rest, in the following sections:

- About the Disk Formatter
- About LDUs
- Starting the Stand–Alone Disk Formatter
- Starting the Stand–Among Disk Formatter
- The Full Format
- The Partial Format
- Disk Formatter Error Messages

About the Disk Formatter

There are two versions of the Disk Formatter—a stand–alone version that runs only when AOS/VS is *not* running; and a stand–among version, that runs under AOS/VS. Each version offers two formats, Full and Partial.

The practical differences between the *versions* are that you must use the stand–alone version for disk(s) in the master LDU. You can use the stand–among version for any LDU that is *not* the master.

There's a big difference between the Full and Partial *formats.* The Full format ignores all AOS/VS file structure and writes a new bitmap on the LDU, effectively destroying all AOS/VS files on it; it can also write patterns to check the disk surface for flaws. The Partial format retains the old bitmap and uses read–only surface analysis. So—if there are AOS/VS files that you want on the disk—you should use the Partial format of the pertinent Disk Formatter.

Neither version of the Disk Formatter lays down a hardware format on a disk. Certified Data General disks are shipped formatted; but if you ever need to reformat a disk, you can use DTOS hardware diagnostics to do so. Consult your Data General support organization or engineer for details on DTOS for peripherals.

About LDUs

This section explains some things about logical disk units (LDUs), and how you use them.

Single– and Multiple–Disk LDUs

You can create a single– or multiple–disk LDU with a Disk Formatter Full format. A multiple–disk LDU can include up to eight disks. The disks can be different models, unless one of them is a model 6214 602–megabyte disk. An LDU built with a 602–megabyte disk cannot include other disk models. For any LDU, all disks involved must be ready before you can access the LDU.

The disk unit(s) in which you *format* an LDU are irrelevant to the LDU. For example, with removable disk packs, you can format an LDU in unit DPF0 and run it in unit DPF11; or you can format a two–disk LDU in DPF12 and DPF23 and run it in DPF1 and DPF2. This is why—during startup—you are asked to specify each additional disk in the LDU and its device code. It's also why, when you initialize an LDU from the CLI, you do it by disk unit name. Operations are simpler if each disk in an LDU has a "home" unit, but this is not required. Startup is easier if you have a system LDU in unit 0—but even this is not mandatory for a tailored AOS/VS system.

Single–disk LDUs are easier to use because they involve only one disk unit. Also, FIXUP and PCOPY disk–to–disk operations are simpler with single–disk LDUs.

Nearly always, your primary *system* LDU will be a single–disk LDU. With a single–disk system LDU, someone need only type one disk unit name when bringing up AOS/VS. After AOS/VS is up, other LDUs can be grafted onto the system LDU with CLI INITIALIZE commands. You can put these commands in the macro UP.CLI. These LDUs can be released with CLI RELEASE commands; and you can put the RELEASE command(s) in the DOWN.CLI macro.

There's one good reason to make your system LDU a multiple–disk LDU. It is that you expect a file to span more than one disk when you own only two disk units.

The real advantage of a multiple–disk LDU is that it allows a contiguous file to span more than one physical disk. Some Data General data management products—like INFOS II and DG/DBMS—may need such huge contiguous files. If your site will use such a file, you will need to build a multiple–disk LDU for it. Ideally, you'd run this LDU in *addition* to a single–disk system LDU.

Also, you may want to designate an LDU for the AOS/VS SWAP and PAGE directories, or one LDU for each of these directories. If so, each must be a single–disk LDU—named BOTH (for both directories), SWAP (for the swap directory), or PAGE (for the page directory). If you decide to have a separate LDU for either SWAP or PAGE, don't store user or system files there: the system deletes files not in a specified format from SWAP and PAGE each time the system is initialized.

An example of a system with a single–disk system LDU and multiple–disk other LDUs named BOTH and DATABASES is shown in Figure 8–1.

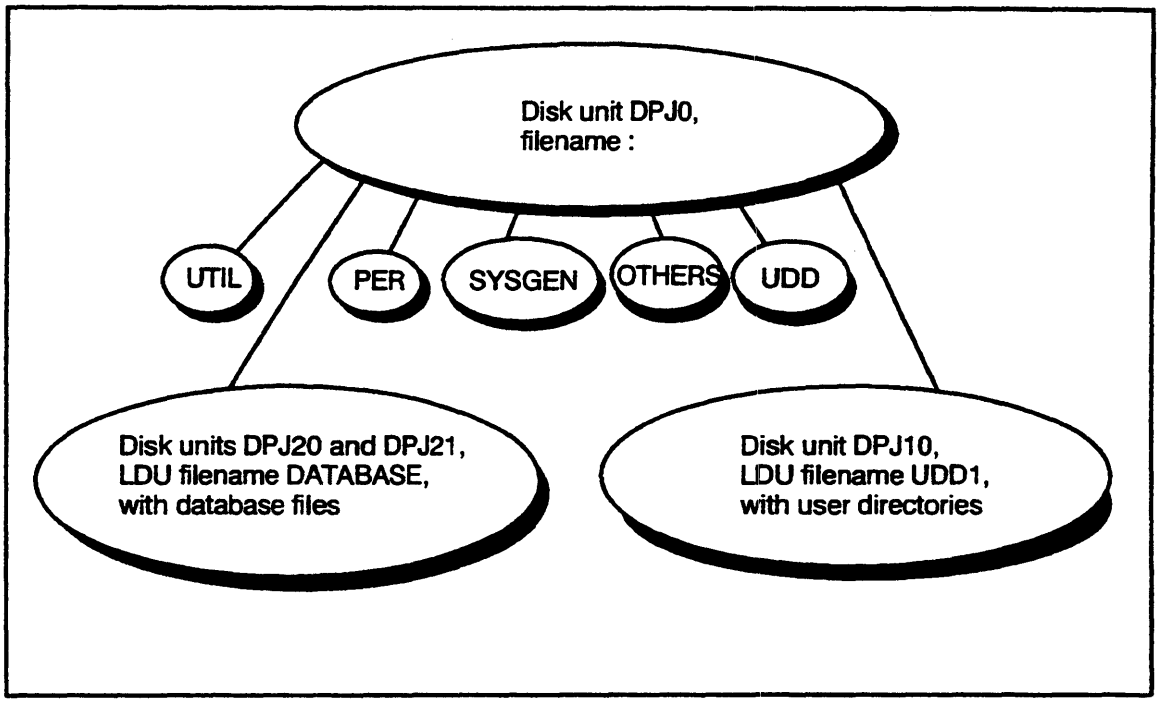

Figure 8–1 A Multiple–LDU AOS/VS System

To set up the system in Figure 8–1, you would do the following things:

- Use the Disk Formatter to create LDUs named BOTH and DATABASES.
- Bring up AOS/VS. From the CLI, initialize the disk units that hold the LDU by entering INITIALIZE @DPJ20 @DPJ21 . AOS/VS then sees the LDU as directory DATABASES.
- For each username you want on DATABASES, use the CLI MOVE command to move the user directory to DATABASES. For example, for user Jack:

  Su) DIR :UDD↵
  Su) MOVE/V DATABASES JACK:#↵
  ... (CLI displays the names of the directories and files moved) ...

- Delete the user directory in :UDD. For example,

  Su) DELETE/V JACK:#↵

- Create a link named username in :UDD to :DATABASES:username. For example, to create a link to JACK type the following.

  Su) CREATE/LINK JACK DATABASES:JACK↵

Thereafter, when DATABASES was initialized, any user whose directory had been moved to DATABASES would have the whole LDU available for database operations. The user directory pathname would be :DATABASES:username, but otherwise the user would be treated exactly as if he or she were in :UDD.

At startup, after AOS/VS was brought up from DPJ0, the UP.CLI macro could use the following commands to initialize the LDU:

```
DIR :
INITIALIZE/S @DPFJ0 @DPJ21
WRITE/L=LDU.NAME [!STRING]
```

The DOWN.CLI macro would need only the following command(s) to release DATABASES:

```
RELEASE :[LDU.NAME]
DELETE :LDU.NAME
```

This technique works for any nonmaster LDU. For example, assume that you have a lot of users and want to put some of them on their own LDU—perhaps named UDD1. You'd use the Disk Formatter to create UDD1, initialize it from the CLI, DIR into :UDD, move each directory you wanted over to UDD1, delete each of these directories from :UDD, and create links in :UDD to :UDD1:username. Then you'd put the appropriate INITIALIZE and RELEASE commands in the UP and DOWN macros.

No CLI commands are needed to initialize an LDU named BOTH, or SWAP, or PAGE. Such LDU(s) are initialized automatically if specified to VSGEN; or you can give the disk unit name(s) during bootstrapping if you override default specifications. While AOS/VS runs (in the system in Figure 8–1), it would have a whole disk for swapping and paging I/O.

If—at any point—you want to change the physical disk configuration in an LDU, you must run a Disk Formatter Full format on all physical disks involved. Dump all files from each LDU involved; run a Full format on the LDU; then load the files onto the new LDU.

LDU Access Control Lists (ACLs)

When you run the Disk Formatter on an LDU, you can specify an access control list (ACL) or take the default, which creates a null ACL. For the master LDU, AOS/VS ignores the ACL, so that it can execute programs (like the CLI) for users. (If, at VSGEN, access control was not enabled for this system, then this system ignores *all* ACLs when it runs. But generating and running a system without access control is useful only when you want all users to have access to all files.)

For each nonmaster LDU, the ACL you specify (or default) with the Disk Formatter becomes effective when the LDU is initialized from the CLI. If the LDU has the default (null) ACL, some kind of access must be specified before anyone but a Superuser can access the LDU. You can do this with the CLI command ACL any time after the LDU is initialized. The easiest way to do it is in the UP macro; for example

```
DIR :
INITIALIZE/S @DPJ10
WRITE Initialized :DPJ10 as [!STRING]. ACL is OP WARE,,,,+ E
ACL[!STRING] OP,WARE +,E
WRITE/L=LDU.NAME [!STRING]
```

When you assign a multiple–user ACL, proceed from specific usernames to general usernames (templates). For example, the ACL

```
+,RE OP,WARE $+,
```

gives all users (which includes OP) read and execute access—and *only* read and execute access. The W and A privileges for OP are ignored. The ACL also tries to establish null

access to usernames beginning with $, but this is overridden by the +,RE. The ACL defeats itself. But rearrange the username groups as follows:

```
OP,WARE $+,, +,RE
```

This ACL gives OP the privileges WARE, gives usernames beginning with $ no access (null), and gives all remaining users read and execute privileges. When you define more than one username group in an ACL, place specific username(s) first and the most general username template last.

The ACL assigned in an ACL command is effective only while the LDU is initialized. The Disk Formatter–specified ACL returns when the LDU is released. So, if you know what ACL you want, you might want to assign it via a Disk Formatter Full or Partial run. This would eliminate the need for an ACL command in the UP.CLI macro. If you needed to change the ACL at runtime, you could do it at will, as shown above.

Formatting a Shared (Dual–Ported) LDU

Certain disk models can be connected to two MV/Family computers at once. (Each computer must, in addition, have a system disk of its own.) The main advantage of a shared LDU is fast recovery if one system fails—a big advantage for important database files.

On each computer, the system disk must be formatted and a system built—just as if the computers were not connected (doing this is described in Chapters 3, 4, and 5). You can format the shared LDU from either system, and, via the Disk Formatter, give it a unique ID and meaningful logical disk name. Give the LDU a restrictive ACL (for example, null). This will help prevent unauthorized people from initializing the LDU.

After the LDU has been formatted, you will need to protect its unit name entries in the :PER directory. (If this isn't done, a user might read or write to the LDU as a physical device; for example, by entering DUMP @DPJ1 MYFILE. The UP.CLI macro can protect a unit entry by including a command like ACL @DPJn +, , which assigns a null ACL to the shared LDU.

When one system wants to use the LDU, it can turn Superuser on, initialize the LDU, and change the Disk Formatter–assigned ACL as needed. Then, users and programs can access it like any LDU, by directory name. After initialization, the LDU is part of the file system, and access controls remain in force.

An LDU cannot be initialized if it's already initialized—this prevents the second system from initializing the shared LDU while the first system is using it. After a system has released the shared LDU, it can be initialized by *either* system. Be careful, however, and prevent both systems from trying to access the LDU at the same time.

For more information about shared LDUs, refer to *Managing AOS/VS and AOS/VS II.*

Formatting an LDU for Mirroring

Some disks permit logical disk mirroring. In logical disk mirroring, the operating system maintains two logically identical images of an LDU. Disk mirroring provides high data availability, but means giving up disk space. It may also have a performance cost. For more about logical disk mirroring, see *Managing AOS/VS and AOS/VS II.*

You can mirror any LDU, including multiple–disk LDUs, except an LDU named BOTH (used for SWAP and PAGE directories).

When you format a mirrored LDU, the Disk Formatter requires that the disks be the same size and on the same controller. You must also make the following the same for both images: LDU name, bad block table entries, remap area size and address, and diagnostic area. You must, however, make the LDU unique IDs different.

Tell the Disk Formatter that the disks you are formatting are to be mirror images by separating them with the ! associator. The Disk Formatter prompts

Specify each disk in the LDU (press NEW LINE when done)
Disk unit name?

Type the LDU names separated by an exclamation point (!). For example, to format disks DPJ1 and DPJ2 for mirroring, you would enter

Disk unit name? DPJ1!DPJ2↵

At runtime, to initialize this mirrored LDU, you would type

) INITIALIZE @DPJ1!@DPJ2↵

To format a multiple-disk mirrored LDU, tell the Disk Formatter about each set of paired images. For example, the four disks—DPJ10, DPJ11, DPJ12, and DPJ13—are the same size and on the same controller. You want to create a mirrored LDU where each image is a two-disk LDU: DPJ10 and DPJ11 constitute the first image; and DPJ12 and DPJ13 constitute the other second image.

When the Disk Formatter asks

Specify each disk in the LDU (press NEW LINE when done)
Disk unit name?

Answer

Disk unit name? DPJ10!DPJ12↵ (Mirror the first disk in the first LDU with the first disk in the second LDU.)

The Disk Formatter repeats

Specify each disk in the LDU (press NEW LINE when done)
Disk unit name?

Answer

Disk unit name? DPJ11!DPJ13↵ (Mirror the second disk in the first LDU with the second disk in the second LDU.)

The third time the Disk Formatter asks *Disk unit name?*, press NEW LINE. Finish the Disk Formatter dialog, and you have created a mirrored LDU similar to the one in Figure 8–2.

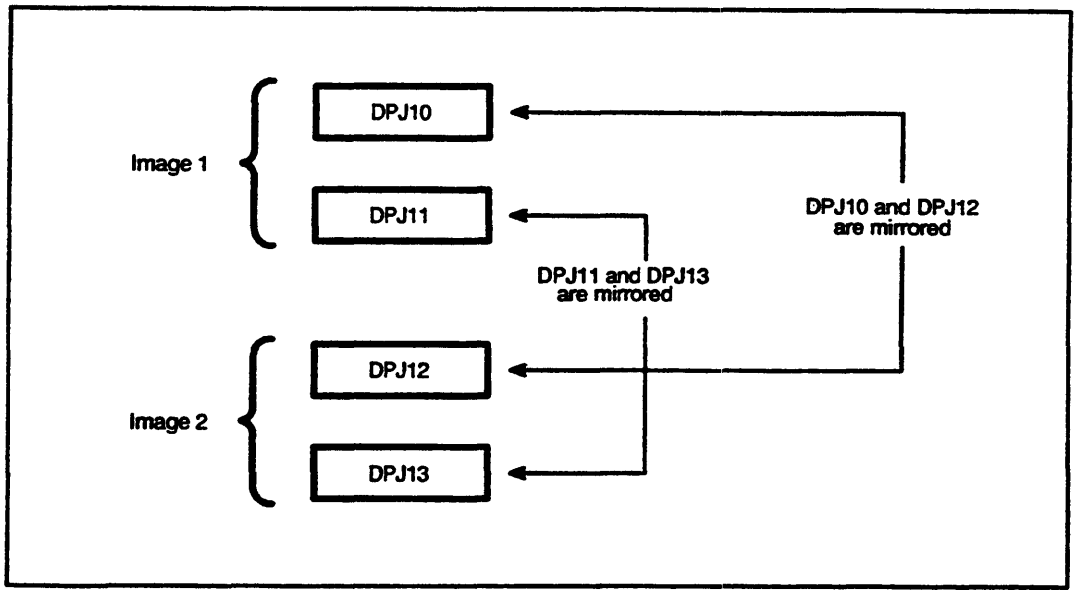

Figure 8–2 A Finished Two-disk Mirrored LDU

In Figure 8–2, DPJ10 and DPJ12 are mirrored; and DPJ11 and DPJ13 are mirrored.

At runtime, to initialize this two–disk mirrored LDU, you would type

```
) INITIALIZE @DPJ10!@DPJ11 @DPJ12!@DPJ13↵
```

Reformatting a Mirrored LDU Following a Disk Failure

If a hard disk error occurs while the system is writing to a mirrored pair of disks, the system will "break" the mirror. In such a case, a normal resynchronization cannot succeed. What you must do depends on whether the disk is a system disk or not. Determine what kind of disk has failed, and then follow the steps outlined below.

If the disk that failed *is not* the system disk:

1. Run a Disk Formatter Full format on the broken mirror, performing a surface analysis (run patterns).
2. Run a Disk Formatter Partial format on both images, making sure you specify the good image first; then the newly formatted image.

If the disk that failed *is* the system (or root) disk:

1. Boot the Disk Formatter from tape and run a Disk Formatter Full format on the bad image of the system disk only.
2. Install both a bootstrap and a system bootstrap, using the Installer program.
3. Run a Disk Formatter Partial format on both images, making sure you specify the good image first; then the newly formatted image.
4. Bring up the system and resynchronize the images. This will restore the system root LDU to its state before the mirror break.

The Bitmap/Overlay Areas and System Performance

The *bitmap* is an area on each LDU that describes which blocks are free and which are used for data storage. The overlay area contains the overlays of the currently running AOS/VS system. There is a bitmap on every LDU; there is an overlay area only on an LDU that includes a system disk.

AOS/VS must access the bitmap every time it creates or deletes a file. It must access the overlay area whenever it needs nonresident code to perform an operation. So the location of these two areas on the LDU can affect system performance.

The default bitmap and overlay area addresses are often chosen when an LDU is created. The default bitmap address is 3/8 the distance across the first disk in the LDU; and the default overlay area address follows the bitmap. These are good general–purpose addresses for a single–disk LDU: they are close to the center, which gives fast access if the LDU is nearly full of files. And they are closer to the beginning, which gives relatively fast access if the LDU has few files.

For a multiple–disk LDU that will hold (or does hold) very large contiguous files (for example, INFOS II or DG/DBMS database files), you *might* want to select nondefault addresses. In such a case, specify 0 (start of LDU) for the bitmap, and specify the bitmap size (given by the Disk Formatter) as the overlay area address. Contiguous file space will then stretch from nearly the beginning of the LDU to the end.

Generally, though, you should take the Disk Formatter defaults on bitmap and overlay area addresses.

If You Make a Mistake

If you type a response to the Disk Formatter and want to change it before pressing NEW LINE, press the DEL key as needed, or press CTRL–U to erase the line. If you are beyond the line containing the mistake and you want to abort, do this in one of two ways.

- If the Disk Formatter is asking a question, you can restart the Disk Formatter by pressing CTRL–C CTRL–A (or abort the stand–among Disk Formatter by pressing CTRL–C CTRL–B). The Disk Formatter does not alter the disk until surface analysis begins (Full format) or until you change a value (Partial format).
- If the Disk Formatter is running surface analysis, pressing CTRL–C CTRL–A won't work. If you *must* abort the stand–alone Disk Formatter, press the break sequence (CMD and BREAK, or BRK, or BREAK, depending on your system console). To abort the stand–among Disk Formatter, press CTRL–C CTRL–B.

  If you abort the Disk Formatter, restart it from the beginning.

If you receive any Disk Formatter error message, see Table 8–4, near the end of the chapter.

Starting the Stand–Alone Disk Formatter

If you want to run the Disk Formatter on the master LDU, you must use the stand–alone version. This is file DFMTR in the root directory. (If you *cannot* boot from disk, you must use an AOS/VS system tape or diskette, as shown below. But if you're rebuilding the master LDU from scratch, read Chapter 2 or 3 instead of this one.)

First, go to the system console—the stand–alone Disk Formatter runs only from this console.

If CPU microcode is not loaded, cold start the computer as described in Chapter 6.

Make sure each disk you want to format is in its unit, and that all units are write–enabled (if they can be write–disabled) and ready.

To start the Disk Formatter from the master LDU, type

SCP–CLI> RESET↵
SCP–CLI> BOOT 27↵ (Or BOOT 24 or BOOT 33)

Operating System Load Menu

Enter choice [1]: 2↵ (Choose option 2, *Enter the Technical Maintenance Menu.*)

Technical Maintenance Menu

Enter choice [1]: 6↵ (Choose option 6, *Run a specified program.*)

Pathname? :DFMTR↵

AOS/VS Disk Formatter Rev n

To boot the Disk Formatter from tape or diskette, get an AOS/VS system tape or AOS/VS system diskette number 1. Mount it on unit 0, and type (for tape)

SCP–CLI> RESET↵
SCP–CLI> BOOT 22↵

Tape file number? 2↵ (File 2)

AOS/VS Disk Formatter Rev n

For diskette, type

SCP–CLI> RESET↵
SCP–CLI> BOOT 64↵

Operating System Load Menu

. . .
Enter choice [1]: 2↵ (Choose option 2, *Enter the Technical Maintenance Menu.*)

Technical Maintenance Menu

. . .

Enter choice [1]: 6↵ (Choose option 6, *Run a specified program.*)

Pathname? :DFMTR↵

AOS/VS Disk Formatter Rev n

You must run a Full format

- if the Disk Formatter has never run on the physical disk(s); or
- if you want to change an LDU's physical disk configuration; for example, make two existing LDUs into one, or vice versa; or
- if you want to add, remove, or change the size of the diagnostic area.

In nearly all other cases, you will want a Partial format. Skip to the pertinent section: "Full Format" or "Partial Format." For information on running the Disk Formatter on disks that are not part of the master LDU, read the next section.

Starting the Stand–Among Disk Formatter

You can run the stand–among Disk Formatter on any disk that is not part of the master LDU. It's not as fast as the stand–alone Disk Formatter, but it does allow AOS/VS to remain up while you run it. You can run it from the system console or any user console enabled by EXEC.

The stand–among Disk Formatter, filename DFMTR.PR, is in directory :UTIL (loaded there during the initial load).

First, make sure each disk you want to format is in its unit, that each unit is write–enabled and ready, and that the disk is not in use.

With directory :UTIL in your search list, type

) SUPERUSER ON↵
Su) XEQ DFMTR↵

AOS/VS Disk Formatter Rev n
Full format destroys any AOS/VS file, Partial retains it.

You must run a Full format

- if the Disk Formatter has never run on the physical disk(s); or
- if you want to change an LDU's physical disk configuration; for example, make two existing LDUs into one, or vice versa; or
- if you want to add, remove, or change the size of the diagnostic area.

In nearly all other cases, you will want a Partial format. Go to the pertinent section: "Full Format" or "Partial Format."

The Full Format

The Disk Formatter asks whether you want a Full or Partial format.

AOS/VS Disk Formatter Rev n

Full format destroys any AOS/VS file structure, Partial retains it.

Full (F) or Partial (P or NEW LINE)?

A Full format writes a new bitmap to the LDU, effectively destroying all files by overwriting pointers to them. It also can run surface analysis patterns to check disk surfaces for bad blocks—this overwrites the files themselves. So, before you proceed with a Full command, if there is material on the LDU that you want to try to dump, abort the Disk Formatter. For the stand–alone Disk Formatter, use the break sequence; for the stand–among Disk Formatter, press CTRL–C CTRL–B. From the AOS/VS CLI, dump the files from the LDU. Then restart the Disk Formatter as shown above.

To specify a Full format, type

Full (F) or Partial (P or NEW LINE)? F↵

Full format

Specify each disk in the LDU (press NEW LINE when done):

Disk unit name?

Type the unit name that holds the disk you want formatted as the first (or only) disk in the LDU. Table 8–1 shows the disk unit names and device codes of all disks supported by AOS/VS, by model number, in ascending order. For example,

Disk unit name? DPJ1↵

For a mirrored LDU, type the LDU names separated by the ! character. For example

Disk unit name? DPJ2!DPJ3↵

The stand–among Disk Formatter knows—via AOS/VS—the device code of the disk unit. So it skips the next question and asks for another *Disk unit name?*. (If the disk controller was not generated into the current AOS/VS system, you *must* run the stand–alone Disk Formatter.)

Device code [default]?

Type the device code of the disk unit you just specified. If the disk unit you specified is on the default device code for its controller, you can press NEW LINE in response to the *Device code?* query.

Table 8–1 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name	
A 5.25–inch diskette, used in DESKTOP GENERATION and other systems. 4314, 4514. 4514 = 368 Kbytes; 4314 = 737 Kbytes.	20	First	DPM0	
		Second	DPM1	
	60	First	DPM10	
		Second	DPM11	
6030. This is a diskette, single or dual slot. Capacity per diskette is 0.3 Mbyte.	33	0 on dial	DPD0	
		1 on dial	DPD1	
		2 on dial	DPD2	
		3 on dial	DPD3	
	73	0 on dial	DPD10	
		1 on dial	DPD11	
		2 on dial	DPD12	
		3 on dial	DPD13	
			Removable	**Nonremovable**
6045 **. This is a moving head unit with two disks: one removable, one nonremovable. Unit capacity is 10 Mbyte. It also supports diskettes.	33	0 on dial	DPD0	DPD4
		1 on dial	DPD1	DPD5
		2 on dial	DPD2	DPD6
		3 on dial	DPD3	DPD7
	73	0 on dial	DPD10	DPD14
		1 on dial	DPD11	DPD15
		2 on dial	DPD12	DPD16
		3 on dial	DPD13	DPD17
6060, 6061, 6067, and 6122; 6160 and 6161; 6214. All are moving head disks. The 6060, 6061, 6067, and 6122 are freestanding and use a removable pack; a controller can run four units. The 6160, 6161, and 6214 are sealed with nonremovable disks; a controller can run two units. A 6060 holds 96 Mbyte; a 6061 holds 190 Mbyte, a 6067 holds 50 Mbyte; and a 6122 holds 277 Mbyte. A 6160 holds 73 Mbyte and a 6161 holds 147 Mbyte. A 6214 is a freestanding unit and holds 602 Mbyte.	27	First (0)	DPF0	
		Second(1)	DPF1	
		Third (2)	DPF2	
		Fourth(3)	DPF3	
	67	First (0)	DPF10	
		Second(1)	DPF11	
		Third (2)	DPF12	
		Fourth(3)	DPF13	
	*	First (0)	DPF20	
		Second(1)	DPF21	
		Third (2)	DPF22	
		Fourth(3)	DPF23	
	*	First (0)	DPF30	
		Second(1)	DPF31	
		Third (2)	DPF32	
		Fourth(3)	DPF33	

(continued)

* There is no default device code for the third, fourth, or subsequent disk controllers. These device codes are chosen at installation.

** A model 6045 controller can run both 6045 disk units and 6030 diskette units. To format diskettes on the first 6045 controller, dial 1, 2, or 3 on the diskette unit; this makes the diskette names DPD1, DPD2, or DPD3, respectively. To format diskettes on the second 6045 controller, dial 1, 2, or 3 on the diskette units; this makes the diskette names DPD11, DPD12, or DPD13, respectively.

Table 8–1 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name
6063, 6064, 6066. Each is a fixed head disk. The 6063 holds 1 Mbyte, the 6064 holds 2 Mbytes, the 6066 is two 6064 units and one controller.	26	First(0) Second(1) Third(2) Fourth(3)	DKB10 DKB11 DKB12 DKB13
	66	First(0) Seond(1) Third(2) Fourth(3)	DKB0 DKB1 DKB2 DKB3
6067. See 6060 description.			
			Removable / Nonremovable
6070. This is a moving head unit with two disks: one removable, one nonremovable. Unit capacity is 20 Mbyte.	33	0 on dial 1 on dial 2 on dial 3 on dial 0 on dial 1 on dial 2 on dial 3 on dial	DPG0 / DPG4 DPG1 / DPG5 DPG2 / DPG6 DPG3 / DPG7 DPG10 / DPG14 DPG11 / DPG15 DPG12 / DPG16 DPG13 / DPG17
6097. This is a diskette unit, single or dual slot. Diskette capacity is 1.26 Mbyte.	33	First Second	Left: DPI0; right: DPI1 Left: DPI2; right: DPI3
	73	First Second	Left: DPI10; right: DPI11 Left: DPI12; right: DPI13
6098. This is a moving head sealed disk with diskette. A toggle switch makes the disk unit 0 and diskette unit 1, and vice versa. Capacity: Disk 12.3 Mbyte, diskette 1.26 Mbyte.	33	Only	Disk DPI0 and diskette DPI1; or vice–versa.
	73	Only	Disk DPI10 and diskette DPI11; or vice–versa.
6099. This is the same as 6098, but without the diskette.	33	Only	DPI0
	73	Only	DPI10
6100. This is the same as 6098, with twice the disk capacity; disk 24.6 Mbyte, diskette 1.26 Mbyte.	33	Only	Disk DPI0 and diskette DPI1; or vice–versa.
	73	Only	Disk DPI10 and diskette DPI11; or vice–versa.
6103. This is the same as the 6100, without the diskette; capacity is 24.6 Mbyte.	33	Only	DPI0
	73	Only	DPI10

(continued)

Table 8–1 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name
6122. See 6060 description. 6160, 6161. See 6060 description. 6214. See 6060 description.			
6227. A sealed, moving head disk, capacity 15 Mbyte. There can be a 1.26 Mbyte diskette on the same controller. If so, a toggle switch under the front panel makes the disk unit 0 and diskette unit 1, and vice versa.	33 73	Only Only	Disk DPI0 (with diskette, DPI0 or DPI1) Disk DPI10 (with diskette, DPI10 or DPI11)
6234. A sealed, moving head disk, rack mounted. It holds 50 Mbytes.	33 73	Only Only	DPI0 DPI10
6236, 6237, and 6357; 6239, 6240, and 6290; 6398, 6399, and 6400. A rack–mounted sealed, moving head unit with power switch on the right. It has a LED display that shows the number and can show the current cylinder or disk fault code. A controller can run four units. Models 6236–6299 are 14–inch disks. Model 6236 (354 Mbytes); a 6237 is three 6236 units in one cabinet, on one controller. Model 6239 (592 Mbytes); a 6240 is three 6239 units in one cabinet, on one controller; a 6290 is two 6239 units in one cabinet, on one controller. Model 6297 (862 Mbytes); a 6298/6299 is two or three 6297 units in one cabinet on one controller. Model 6357 (862 Mbytes); a 6398 is two 6357 units in one cabinet, on one controller. A 6399 is three 6357 units in one cabinet, on one controller. A 6400 is six 6357 units in two cabinets, on two controllers. Models 6716 and 6718 are 5 1/4–inch SCSI disks that hold 1.4 Gbytes. Models 6796 and 6799 are 3.5–inch disks that hold 520 Mbytes.	24 64 * *	First(0) Second(1) Third (2) Fourth(3) First(0) Second(1) Third (2) Fourth(3) First (0) Second(1) Third (2) Fourth(3) First (0) Second(1) Third (2) Fourth(3)	DPJ0 DPJ1 DPJ2 DPJ3 DPJ10 DPJ11 DPJ12 DPJ13 DPJ20 DPJ21 DPJ22 DPJ23 DPJ30 DPJ31 DPJ32 DPJ33

(continued)

* There is no default device code for the third, fourth, or subsequent disk controllers. These device codes are chosen at installation.

Table 8–1 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name
6309. This is a 737 Mbyte, 5–1/4 inch, minidiskette unit. It is an add–on to the primary diskette on MV/4000 SC and Data General DS/4000 series systems.	64	Second(1)	DPJ11
6310, 6328, 6329, 6363. This is a 5 1/4 inch, sealed disk, an add–on to the primary disk on packaged systems like the MV/4000 DC and the MV/2000 DC and on engineering workstations like the DS/7500. Model 6310 holds 38 Mbytes. Model 6328 holds 70 Mbytes. Model 6329 holds 120 Mbytes. Model 6363 holds 160 Mbytes.	24	Second(1)	DPJ1
6446–M, 6429, 6430, 6432, 6453, 6464, 6465, and 6467 are 5–1/4 inch disks that hold 234 Mbytes. These disks work from a CSS/2 or a CSS/2 DC. Model 6491 is a 5–1/4 inch disk that holds 322 Mbytes in a CSS/2, a CSS/2 DC, or a Peripheral Housing Unit (PHU). Model 6539 is a 5–1/4 inch disk that holds 179 Mbytes in a PHU. A controller can run seven units. Models 6554, 6662, 6685, and 6740 are 5–1/4 inch disks that hold 662 Mbytes, 332 Mbytes, 1 Gbyte, and 1 Gbyte respectively in a CSS/2, a CSS2/DC, or a Peripheral Housing Unit (PHU). A controller can run seven units. Models 6492, 6578, and 6579 are 8–inch disks; one disk holds 727 Mbytes. A 6492 has one disk; 6578 two disks; and 6579, four disks.	24	First(0) Second(1) Third(2) Fourth(3) Fifth(4) Sixth(5) Seventh(6)	DPJ0 DPJ1 DPJ2 DPJ3 DPJ4 DPJ5 DPJ6

(continued)

Table 8–1 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name
Models 6581, 6582, 6584, 6621, 6622, 6624, 6631, 6632, and 6634 are Rapid Access Mass Storage (R.A.M.S.) disks. Model 6581 holds one 500–Mbyte disk; Model 6582 holds two 500– Mbyte disks; and Model 6584 holds four 500–Mbyte disks. A controller can run as many as eight units. Model 6621 is one 1.2–Gbyte disk; a controller can run up to four units. Model 6622 holds two 1.2 Gbyte disks; and Model 6624 holds four 1.2 Gbyte disks. Models 6631, 6632, and 6634 hold one, two, and four disks, respectively, of 600 Mbytes each. Model 6627 is a 5–1/4 inch erasable magneto–optical disk that holds 600 Mbytes.	24	First(0) Second(1) Third(2) Fourth(3) Fifth(4) Sixth(5) Seventh(6) Eighth(7)	DPJ0 DPJ1 DPJ2 DPJ3 DPJ4 DPJ5 DPJ6 DPJ7

(concluded)

The Disk Formatter repeats the question(s) *Disk unit name?* (and *Device code?* for stand-alone) so that you can specify more than one disk. A maximum of eight physical disks is allowed in an LDU. After you describe the last physical disk, press NEW LINE in response to *Disk unit name?* For example,

Disk unit name?⟩

Do you want to allocate a diagnostic area? [Y]

This question lets you reserve an area on disk for later installation of Data General's Advanced Diagnostic Executive System (ADEX). ADEX can run from a medium other than disk, but it runs much faster from disk. Also, diagnostics are easier to run remotely if ADEX is on disk. To use ADEX, you must purchase it and have it installed on the disk by a Data General field engineer. ADEX for MV/Family machines requires a minimum of 8,000 disk blocks—4.1 Mbytes. This space is lost for AOS/VS file storage.

ADEX runs only from an AOS/VS system disk (like DPJ0, DPJ10, or DPF0). So, unless you will install AOS/VS and run it from the LDU you're formatting, answer No by entering N . You should also say No if you have total disk storage of 50 Mbytes or less. If you say No, skip the next question, *LDU unique ID*.

If you want to reserve an area for ADEX, press NEW LINE. Then, the Disk Formatter asks

Enter the number of blocks (1750 to 35230) required. [23420]

The displayed figures are octal. ADEX needs at least 8,000 blocks (17500 octal). A good minimum figure is the default, 23420 (10,000) blocks. Decide on the number of disk blocks needed for the diagnostics you want installed; then either take the default (press NEW LINE) or type the number in octal. The Disk Formatter will now assume that this disk is a system disk.

The Disk Formatter now displays each disk number with octal start and end logical block addresses. The Disk Formatter deals only with octal numbers (except that it accepts 8 as the number of the last physical disk in the LDU). For example, it might display

Disk number 1: 00000000000 through 00001325657

Disk number 2: 00001325660 through 00002653535

And it asks for the LDU's unique ID.

LDU unique ID (1 to 6 characters)?

AOS/VS uses the logical disk unique ID to determine which physical disks belong to this LDU.

For simplicity, you might want to use an ID that is as close as possible to the LDU name, which you'll specify next. The LDU name will be the filename of the LDU. For example, if you plan to name the LDU UDD1, you would type UDD1 and press NEW LINE. If you plan to name it DATABASE, you'd enter a six-character abbreviation; e.g., DATABA.

Create an ID from one to six characters long, and type it in. Any filename character is legal: A through Z (uppercase and lowercase are treated the same), 0 through 9, period (.), dollar sign ($), question mark (?), and underscore (_). Each ID should be unique among LDUs.

(If you are formatting a mirrored LDU, the Disk Formatter prompts for the LDU unique I.D. for image 1 and will later repeat the dialog for image 2. The LDU unique I.D.s *must* be different. Mirroring requires however, that the LDU name, bad block table entries, remap area size and address, and diagnostic area be the same.)

(If you are creating a destination LDU for the PCOPY program, you may choose to give it the same ID and name as the source LDU, or not. LDU names and IDs are irrelevant for disk-to-disk PCOPY. But PCOPY requires that a destination LDU's bitmap, overlay, and remap area addresses be the same as the source LDU's.)

Whatever ID you decide on, note it for future use.

After you type the ID, the Disk Formatter asks

LDU name (1 to 31 characters)?

For any nonmaster LDU, the name you type here will be the filename of the LDU. This name will be displayed when you initialize the LDU from the CLI, or boot it (if a system disk).

Both users and AOS/VS can use the LDU name just as any other directory pathname. An LDU's pathname is the directory it was initialized from. For example, an LDU named DATABASES, initialized from the root directory, would have the full pathname :DATABASES. If you need more background on this, read "Single- and Multiple-Disk LDUs," earlier in this chapter.

As mentioned before, you may want to designate one LDU for the system SWAP and PAGE directories, or one for each directory. For both directories, use a logical disk name of BOTH, but remember that you cannot mirror this LDU. For the PAGE directory, use PAGE; or for the SWAP directory, use SWAP. Then—later in the Disk Formatter dialog—assign a username of + and an access control list of E. Afterward, when you bring up AOS/VS, it will use this LDU for both SWAP and PAGE, or for the one you specified. An LDU you designate for both, or either, directory should be a DPJ- or DPF-type disk to be large enough; and it should, ideally, be on its own controller.

After deciding on the LDU name (1 to 31 filename characters), type it. The Disk Formatter asks

Access Control List

Username or template (1 to 15 characters)?

AOS/VS maintains an access control list (ACL) for each initialized LDU. The ACL lists usernames of users who can access the LDU and the type(s) of access each user has. To create the ACL, you specify usernames and the access privilege types you want these users to have.

Whatever ACL you specify is ignored if this LDU runs as the master LDU: all users have execute (E) access to the root directory.

If you don't know exactly which usernames and access types you want for this LDU, a good secure, general-purpose ACL is +,E. This gives all users execute access. For a null ACL, press NEW LINE. This will prevent anyone but a superuser from initializing or accessing the LDU.

Later, if needed, you can override the LDU ACL with the CLI command ACL after initializing the LDU; or you can change the LDU ACL with a Partial format.

The next section reviews templates and the ACL issue. If you don't want a review, skip the next section.

Username Templates and Access Types

You can specify a username literally (e.g., ADAM for a user who will log on as ADAM), or you can specify one or more username templates. A username template allows a group of users with a variety of usernames to access the LDU. A username template uses one or more template characters to represent other filename characters. The template characters are hyphen (−), plus (+), and asterisk (*).

+ represents any string of filename characters;

− represents any string of filename characters, except periods;

* represents any single character, except a period.

For example, the template

*FORTRAN

matches username AFORTRAN, but not AMFORTRAN, nor .FORTRAN.

The template −FORTRAN

matches username BOBFORTRAN, but not BOBFORT, nor BOB.

The template FORTRAN+

matches username FORTRANA and FORTRAN.USER, but not .FORTRAN, nor AFORTRAN.

The template −FORTRAN+

uses two template characters and matches usernames BOBFORTRAN.XX and FORTRAN, but not FORT.RAN, nor .FORTRAN.

Each time you supply a username or template, the Disk Formatter asks about the access privileges. A user can have five types of access to a directory (which an LDU is); or a user can have no access. The access privilege types are O, W, A, R, or E. Table 8−2 explains their meanings.

Table 8–2 Access Privilege Types

Access	A User Who Has	Can
O	Owner access	Initialize the LDU and change its ACL.
W	Write access	Insert, delete, and rename files in the LDU's primary directory.
A	Append access	Add new files to the LDU's primary directory.
R	Read access	List the files in the LDU's primary directory.
E	Execute access	Use the LDU's filename in a pathname.

You can assign combinations of these privileges. For example, RE allows the specified user(s) to use the LDU's name in a pathname and list the files in its primary directory (R).

To initialize an LDU, a user needs the following privileges (unless he or she has Superuser on):

- Write access to the directory in which he or she wants to initialize the LDU;
- Execute access to the device entry (like @DPJ10) in directory :PER (often set by the UP macro);
- Owner access to the LDU (set with the Disk Formatter).

The Disk Formatter is asking for an

Access Control List

Username or template (1 to 15 characters)?

The Disk Formatter will ask for a username or template, then for access privileges, until you press NEW LINE at the username prompt. It allows up to seven username–privilege groups. This allows you to set up quite a specific ACL. Or, you can press NEW LINE to assign a null ACL, which denies access to all but superusers.

Decide on the usernames and access privileges you want for the LDU. For multiple user groups, remember to type the specific usernames first, and the most general usernames (templates) last, as covered earlier in the chapter. For the first username, you might enter OP. The Disk Formatter then asks about that user's access privileges:

Access (O, W, A, R, E, or NEW LINE)?

Describe the privileges you want for the user(s); for example, type E and press NEW LINE. Pressing NEW LINE by itself explicitly gives the user(s) no privileges; this is useful when you want to give the user(s) *no* access to an LDU.

For example, assume you want to give all usernames—except those beginning with $—Execute access to an LDU.

Type

$+↵	(covers the $ usernames)
↵	(Press NEW LINE for no privileges).

Then type

+↵	(covers the usernames not beginning with $)
E↵	(for Execute privilege).

After you describe access privileges, the Disk Formatter repeats

Username or template (1 to 15 characters)?

If you have another username to specify, type it. Otherwise, press NEW LINE.

Access (O, W, A, R, E, or NEW LINE)?

Describe the access privileges for user(s); for example, type E and press NEW LINE.

When you press NEW LINE in response to the *Username or template* prompt, the Disk Formatter asks

Surface analysis?[N]

The Disk Formatter can test for bad blocks (flawed areas on the disk surface that won't hold information). It's important to identify these areas so AOS/VS will bypass them. The controllers of many disk models can detect and bypass bad blocks without notifying the operating system. Unless these disks are brand new, however, we suggest that you run a surface analysis on these disks, choosing to run three patterns and never less than one. Table 8–3 shows disks whose controllers can detect and bypass bad blocks by marking them with asterisks.

Other disk controllers (not marked by asterisks in Table 8–3) cannot detect bad blocks. For these disk(s), we *strongly* suggest that you run a surface analysis on these disks, choosing to run five patterns and never less than three.

You should run all five test patterns on each new disk, and whenever you suspect that a disk may have developed one or more new bad blocks.

If you are formatting a mirrored LDU, the Disk Formatter prompt for *Surface analysis* is preceded by a prompt *For image 1* the first time through the dialog, and *For image 2* the second time through. If you *know* that either disk has been formatted recently, you can skip running patterns.

If you don't want any patterns run on this disk, type N and press NEW LINE; the Disk Formatter then skips to the *For disk #n* bad block sequence below.

If you want one or more of the checkout patterns run, type Y and press NEW LINE.

Disk number?

To have patterns run on all disks in the LDU, press NEW LINE. (You *can* specify disk numbers individually, but omitting patterns on a disk isn't recommended.)

Now, the Disk Formatter says

You may run up to five (5) patterns. How many would you like to run?

Choose the number you want and enter it.

Table 8–3 shows the approximate time required for surface analysis on each type of disk supported by AOS/VS.

The Disk Formatter requires no interaction as it runs the patterns, so you can leave the system console as they run.

Table 8–3 Surface Analysis Times per Disk

Disk Model	Capacity (Megabytes)	Approximate Time per Test Pattern (Minutes)
6060	96	13
6061	190	17
6122	277	26
6160	73	11
6161	147	22
6214	602	52
6236*, 6237*	354	35
6239*, 6290*, 6240*	592	50–60
6297*, 6298*, 6299*	862	70–85
6357*, 6398*, 6399*	862	70–85
6446 or 6491	234 or 322	20–40
6492	737	80–100
6581*, 6582*, 6584*	500	30–60
6621*, 6622*, 6624*	1.2 Gbytes	60–90
6631*, 6632*, 6634*	600	30–60
6716*, 6718*	1.4 Gbytes	80–100
6796*, 6799*	520	50–60

* Even though these disk controllers can detect and remap bad blocks, we suggest that you run three patterns on these disks and never less than one. Capacity and time are for single units of these disk controllers.

Analyzing Disk #n

The Disk Formatter now runs the pattern(s) on the current disk. As each pattern runs, the Disk Formatter displays

-- Running pattern n

where *n* is the octal value of the pattern that's running.

As the Disk Formatter finishes the pattern(s) on each disk, it updates the disk's bad block table. Each disk that isn't analyzed retains its existing bad block table. If an existing table is invalid, the Disk Formatter prints the message *Invalid bad block table* and deletes the data in the bad block table. The Disk Formatter issues an error message and terminates if it finds more than 126 bad blocks on one physical disk. (It allows up to 1022 bad blocks on a model 6214 disk.) All error messages are explained in Table 8-4.

When the Disk Formatter completes the surface analysis on this disk, it says

n bad disk blocks

If there are bad blocks, it asks

Display bad block statistics? [N]

You may want to see the bad block statistics. If so, type Y and press NEW LINE; and the Disk Formatter displays the address of each bad block. You might want to note these for future reference (on any but a 6214 disk). To skip the statistics, press NEW LINE or type N and press NEW LINE.

Next, the Disk Formatter asks for any additional bad block numbers.

Additional bad block number (press NEW LINE when done):

Generally, on a Full format, you will have no additional bad blocks to enter; if this is true, press NEW LINE and skip to the *Bitmap size* question. If you want to enter one or more bad blocks, type each block's address. You can do it by typing the logical block number (in octal). Or, on any disk except a DPJ-type disk, you can type the disk-number, cylinder, head, and sector numbers of each block in this format:

disk-number:cylinder-number,head-number,sector-number

(Omit the head number for a bad block in a fixed-head disk). Press NEW LINE to signal the end of your bad block entries. Now the Disk Formatter asks if it should display the updated bad block statistics.

Display bad block statistics? [N]

Press NEW LINE or enter Y. If you enter Y, the Disk Formatter displays the updated bad block statistics. Then, if there is another disk in the LDU, the Disk Formatter returns to run patterns (if specified) on it; then, it runs through the bad block statistics again.

If you are formatting a mirrored LDU, the Disk Formatter merges the bad block tables if they differ. When it does this, the Disk Formatter prompts *Bad block tables have been merged for disk # n* before the prompt *Display bad block statistics? [N].*

When the Disk Formatter has asked about bad blocks tables for all disks in the LDU, it displays the bitmap size and asks for the bitmap address:

Bitmap size: n

Bitmap address? [default]

The default address (displayed in brackets) is 3/8 of the distance across the first disk in the LDU. This is a good general–purpose choice; we recommend it. To select the default, press NEW LINE.

There may be a reason to start the bitmap at the beginning of the LDU (described near the beginning of this chapter). If you know that you want the bitmap at the beginning of the LDU, type 0 and press NEW LINE.

If the bitmap area you specify or default contains bad blocks, the Disk Formatter issues a warning and asks you to confirm the address. Do *not* confirm it. Instead, type N and press NEW LINE; then add 100 octal to the original bitmap address and try again. Keep doing this until the Disk Formatter accepts your answer.

The Disk Formatter then writes the bitmap to the LDU. Then—unless you reserved a diagnostic area earlier—it asks

System LDU? [Y]

If you will ever want to bootstrap a program (like AOS/VS or PCOPY) from this LDU, press NEW LINE or enter Y. This tells the Disk Formatter to reserve space for a system bootstrap on the LDU.

LDUs aside from your master LDU need not be system disks. But, since space for an AOS/VS system represents a small portion of total disk space (on most hard disks), you can generally default the answer to yes. Of course, if you're formatting a diskette or if you know that you will never want to bootstrap from this LDU, answer no; the Disk Formatter then skips the next two questions. If you press NEW LINE (or enter Y), or if you allocated a diagnostic area earlier, the Disk Formatter asks you to specify

Overlay area size? [default]

The overlay area is reserved for AOS/VS overlays—parts of the system that AOS/VS needs to perform system operations. The default size is about 400 (decimal) blocks.

Generally, you should accept the default value for this question by pressing NEW LINE. But if this is a diskette, or if you know it will never have an AOS/VS system on it, enter 0 and skip the next question. For any overlay area, the Disk Formatter asks

Overlay area address? [default]

The default address is as close as possible to 3/8 of the distance across the first disk in the LDU. (It immediately follows the bitmap, if you defaulted the bitmap address.) If you defaulted the bitmap address, you should default the overlay area address. To do so, press NEW LINE.

If you put the bitmap area at the beginning of the LDU, then the overlay area should follow the bitmap. To do this, type the size that the Disk Formatter gave for the bitmap (e.g., enter 251 for a 354–megabyte LDU).

If the overlay area that you default or specify contains a bad block, the Disk Formatter will issue a warning and ask you to confirm your response. Don't confirm; performance will suffer if AOS/VS has to go all the way to the remap area to pick up an overlay. Instead,

type N and press NEW LINE. Then add 100 octal to the original address and type this value. Repeat until the Disk Formatter accepts your answer without a warning.

Finally, the Disk Formatter asks you to specify the size and starting address of remap areas for each physical disk in the LDU.

Disk number n remap area size? [default]

Generally, you should accept the default value for this question by pressing NEW LINE. (But for a diskette, save space by specifying a smaller area. Take the number of bad blocks, add 10 to it, and type this figure.) The Disk Formatter then asks for the

Disk number n remap area address? [default]

To take the default, press NEW LINE. If you take the default, the Disk Formatter uses the first free, 126–block area on this physical disk as the disk's remap area. Generally, you should take the default unless there are a lot of bad blocks (i.e., more than 50—except for a model 6214 disk unit, which can handle as many as 1000).

For a large, multiple–disk LDU that will hold big contiguous files, you should put the first disk's remap area at the beginning of the first physical disk (default), and put the last disk's area at the end of the last physical disk.

For every bad block AOS/VS needs to access, it must go to the remap area to find a substitute. If this disk has a lot of bad blocks, you may want to put the remap area on the middle of the disk. To do it on a single–disk LDU, specify the address right after the bitmap and overlay area (if this LDU is formatted as a system disk).

The Disk Formatter does not allow bad blocks in the remap area. If you specify or default an area containing bad blocks, the Disk Formatter issues an error message and repeats the question. As above, add 100 octal to the default or your specified value and try again. Repeat until the Disk Formatter accepts your answer.

This is the last question; the Disk Formatter now says

–– LDU created

Done!

From the stand–alone Disk Formatter, you return to the SCP–CLI. If you want to format another LDU, enter CONTINUE and return to the beginning of this section. Or, you might want to install an AOS/VS system on it, as described in the next chapter.

From the stand–among Disk Formatter, you return to the AOS/VS CLI. To format another LDU, enter XEQ DFMTR again and return to the beginning of this section. Or, you might want to install an AOS/VS system on it, as described in the next chapter.

In any case, if the disks in the LDU involve one or more new disk controllers, you will want to run VSGEN and create a tailored system to support the new controller(s). If your current tailored system supports the new LDU's controller(s), you might try the new LDU from AOS/VS (using the CLI command INITIALIZE).

If you ever need to change the name, ACL, or bitmap, overlay, or remap areas on this LDU, or to identify new bad blocks in it, you can run a Disk Formatter Partial format on it, as described in the next section.

Note that whenever you build an LDU, be sure to write the LDU ID and name on a paper label, and stick it on the disk cover or unit. If the disk is part of a multiple–disk LDU, this label should also describe the other disks in order, and sequence number of this disk. For example, the label might say

```
LDU ID is: DATABA LDU name is: DATABASE
This LDU includes three model 6239 disks.
This is disk number: 2
LDU created: 22 NOVEMBER 1992
```

Without the label, it's easy to lose track of disk IDs/names and sequence numbers—especially on removable disks.

Figure 8–3 shows a sample Disk Formatter Full dialog, for a two–disk LDU.

```
SCP-CLI> RESET ↵                (For stand-among Disk Formatter, this is
                                XEQ DFMTR; and skip to AOS/VS DISK
                                FORMATTER banner.)

SCP-CLI> BOOT 24 ↵              (or BOOT 27)

        Operating System Load Menu

Enter choice [1]: 2 ↵           (Choose option 2)

        Technical Maintenance Menu

Enter choice [1]: 6 ↵           (Choose option 6)
Pathname? :DFMTR ↵

AOS/VS Disk Formatter Rev n

Full format destroys any AOS/VS file structure, partial retains it.
Full (F) or partial (P or NEW LINE)? ↵

Full format

Specify each disk in the LDU (press NEW LINE when done):
Disk unit name? DPJ10 ↵
Device code [64]? ↵
Disk unit name? DPJ11 ↵
Device code [64]? ↵
Disk unit name? Do you want to allocate a diagnostic area? [Y] ↵

Disk number 1: 00000000000 through 00002506727
Disk number 2: 00002506730 through 00005215656

LDU unique I.D. (1 to 6 characters)? DATABA ↵
LDU name (1 to 31 characters)? DATABASE ↵

Access Control List
Username or template (1 to 15 characters)? + ↵
Access (O, W, A, R, E, or NEW LINE)? E ↵
Username or template (1 to 15 characters)? ↵
Surface analysis? [N] Y ↵
Disk number? ↵

You may run up to five (5) patterns. How many would you like to run? 3 ↵
Analyzing disk #1
-- Running pattern nnnnnn
-- Running pattern nnnnnn
-- Running pattern nnnnnn
0 bad disk blocks
```

Figure 8-3 Full Disk Formatter Dialog for a Two-Disk LDU

```
Additional bad block number (press NEW LINE when done): ↵
0 bad disk blocks

Analyzing disk #2
-- Running pattern nnnnnn
-- Running pattern nnnnnn
-- Running pattern nnnnnn
0 bad disk blocks
Additional bad block number (press NEW LINE when done ): ↵
0 bad disk blocks

Bitmap size: 522
Bitmap address? [00000772361] ↵
System LDU?: [Y] ↵
Overlay area size? [000620] ↵
Overlay area address? [00000772632] ↵
Disk number 1 remap area size? [000176] ↵
Disk number 1 remap area address? [00000000174] ↵
Disk number 2 remap area size? [000176] ↵
Disk number 2 remap area address? [00002507126] ↵

-- LDU created
Done!

SCP-CLI>                          (For stand-alone Disk Formatter)

or

)                                 (For stand-among Disk Formatter)
```

Figure 8–3 Full Disk Formatter Dialog for a Two–Disk LDU

The Partial Format

When you start up the Disk Formatter (by specifying pathname DFMTR for the stand–alone version, or by entering XEQ DFMTR for the stand–among version), it says

AOS/VS Disk Formatter Rev n

Full format destroys any AOS/VS file structure, Partial retains it.

Full (F) or Partial (P or NEW LINE)?

For a Partial format, type

Full (F) or Partial (P or NEW LINE)? P↵

Partial format

Specify each disk in the LDU (press NEW LINE when done):

Disk unit name?

Enter the name of the disk unit that holds the first disk in the LDU. Table 8–1 (earlier) shows the disk unit names and device codes of all disks supported by AOS/VS. For example,

Disk unit name? DPJ1↵

For a mirrored LDU, type the LDU names separated by the ! character. For example

Disk unit name? DPJ2!DPJ3↵

The stand–among Disk Formatter knows—via AOS/VS—the device code of the disk unit. So it skips the next question and asks *Disk unit name?.*

The stand–alone Disk Formatter asks

Device code [default]?

Type the device code of the disk unit you just specified. If the unit is on the default device code for its controller, press NEW LINE in response to the *Device code?* query.

The Disk Formatter repeats the question(s) *Disk unit name?* (and *Device code* if stand–alone) so that you can specify all physical disks that were fully formatted into the LDU. When you have identified them all, press NEW LINE in response to *Disk unit name?*

The Disk Formatter now displays each disk number with octal start and end logical block addresses. The Disk Formatter deals only with octal numbers (except that it accepts 8 as the number of the last physical disk in the LDU). For example, it might display

Disk number 1: 00000000000 through 00001325657

Disk number 2: 00001325660 through 00002653535

If you are formatting an unsynchronized LDU, you can get one of the following two messages. You might get

LDU image 'LDU ID' is the preferred image
Do you want to continue? [Y]

or

This LDU is not normally mirrored

LDU image 'LDU ID' is the preferred image

Do you want to continue? [Y]

Continue by typing Y and pressing NEW LINE, or say No by entering N and pressing NEW LINE.

The Disk Formatter asks if you want to change the logical disk's unique identification (ID).

New LDU unique I.D. (1 to 6 characters)? [default]

The *[default]* is the value assigned when this LDU was created via a Full format run. If you are satisfied with the default, press NEW LINE; the Disk Formatter then goes on to the next question.

The ID can be from 1 to 6 characters long; any filename character is legal. Each ID should be unique among all your LDUs. (If you want this LDU to serve as a destination LDU for the PCOPY program, it can—but need not—have the same ID and name as the source LDU. LDU names and IDs are irrelevant for disk–to–disk PCOPY. But PCOPY requires that a destination LDU's bitmap, overlay, and remap area addresses be the same as the source LDU's.)

For simplicity, you may want to use an ID that is as close as possible to the LDU name (if you plan to change the current name). After choosing an ID, type it and press NEW LINE.

(If you are formatting a mirrored LDU, the Disk Formatter prompts for the LDU unique I.D. for image 1 and will later repeat the dialog for image 2. The LDU unique I.D.s *must* be different.)

After you type or default the ID, the Disk Formatter asks

New LDU name (1 to 31 characters)? [default]

As with the ID, if you are satisfied with the default, press NEW LINE and skip to the next question.

If you want to change the LDU name, remember that for any nonmaster LDU, the LDU name is its filename. This name is displayed when you initialize the LDU from the CLI, or boot it (if a system LDU). People and AOS/VS can use the LDU name just as any other directory pathname. If you change the LDU name, any macros that use the old name must also be changed. If you need more background on this, see "Single– and Multiple–Disk LDUs," earlier in this chapter.

You may want to designate one LDU for the system SWAP and PAGE directories, or an LDU for each directory. For both directories, use a logical disk name of BOTH. For the PAGE directory, use PAGE; or for the SWAP directory, use SWAP. Then, later in the Disk Formatter dialog, assign a username of + and an access control list of E. Afterward, when you bring up AOS/VS, it will use this LDU for both SWAP and PAGE, or for the one you specified. An LDU you designate for both, or either, directory should be a DPJ– or DPF–type disk; and it should, ideally, be on its own controller.

After deciding on the LDU name (1 to 31 filename characters), type it.

Next, the Disk Formatter asks

New Access Control List? [N]

If you don't want to change the current LDU access control list (ACL), press NEW LINE; the Disk Formatter then skips to the *Read only surface analysis* question.

To change the ACL, enter Y. The Disk Formatter will then ask for the username (or template), then the access privileges for that username. It allow up to seven username–privileges specifications. For multiple usernames, the order in which you specify the usernames may be important (described earlier, under "LDU Access Control Lists"). It will repeat the two questions until you press NEW LINE in response to *Username or template* or until you specify seven usernames. For example,

New Access Control List? [N] Y↵
Username or template (1 to 15 characters)? OP↵
Access (O, W, A, R, E, or New LINE)? OWARE↵
Username or template (1 to 15 characters)? SARAH↵
Access (O, W, A, R, E, or NEW LINE)? ARE↵
Username or template (1 to 15 characters)? +↵
Access (O, W, A, R, E, or NEW LINE)? E↵
Username or template (1 to 15 characters)?↵

This gives OP all access to the LDU primary directory, gives user SARAH Append, Read, and Execute access, and gives all users Execute access. Username templates and access privilege types are explained earlier in this chapter.

If needed, you can override the LDU ACL given here with the CLI command ACL after you initialize the LDU. After you specify or default the access control list, the Disk Formatter asks

Read only surface analysis? [N]

Read only surface analysis involves reading each disk block twice and comparing the data read. This is not as thorough a test as the write/read sequence used in a Full format. To do it, the Disk Formatter requires about as much time as to run a single test pattern on all disks in the LDU (times are shown in Table 8–3).

(If you are formatting a mirrored LDU, the Disk Formatter asks whether you want to run a read only surface analysis for the first image. It repeats the question for the second image.)

If you press NEW LINE, the Disk Formatter goes to the *Display bad blocks ...* question. If you answer Y, the Disk Formatter asks

Disk number?

You can press NEW LINE to have analysis done on all disks; the Disk Formatter then proceeds. Or, you can specify the number of each disk on which you want the analysis done; for example, enter 1 or 2. If you specify numbers, press NEW LINE in response to this question when you are done.

The Disk Formatter now does the read analysis. If the data read is not the same for the two reads, or if it cannot read a block, it notes the block as bad.

The Disk Formatter now describes the bad blocks for this disk:

For disk #n
n bad disk blocks

If there are any bad blocks, it asks

Display bad block statistics? [N]

To see the details on old and new bad blocks, type Y and press NEW LINE. To skip the details, press NEW LINE; the Disk Formatter then summarizes old and new bad blocks and skips to *Update bad block table*. A sample bad block display looks like this.

```
    Addr: 00000574537  Cyl: 000653  Head: 000010 Sect: 000017
    Addr: 00000747566  Cyl: 001043  Head: 000014 Sect: 000006
*   Addr: 00000747570  Cyl: 001043  Head: 000014 Sect: 000006
```

* *New bad block which was not allocated*
** *New bad block which was allocated (must run FIXUP!)*

n old bad blocks.
n new unallocated bad blocks.
n new allocated bad blocks.

For DPJ-type disks, only the block number (*Addr*) is displayed.

If *n new allocated bad blocks* is not 0, one or more new bad blocks have developed in AOS/VS file(s). (AOS/VS will prompt you to run FIXUP the next time you try to access this LDU.) If you have a recent full backup, you may be able to save a file, directory or database. See the Caution below.

But if the Disk Formatter finds *many* new bad blocks (allocated or unallocated) during read-only analysis, this may mean disk hardware problems. ("Many" bad blocks in most cases is more than 50; a Model 6214 disk unit can handle as many as 1000.) In such cases, you might want to abort the Disk Formatter with CTRL-C CTRL-B (stand-among) or the break sequence (stand-alone); then consider running diagnostics on the disk unit with a different pack (if possible). After all, you don't want bad blocks noted on the disk if the disk is fine and the unit *heads* are out of alignment.

Next, the Disk Formatter asks if you want to

Update bad block table? [N]

Press NEW LINE if you don't have any new bad blocks to enter, or if you don't want the Disk Formatter to enter any bad blocks it found during the read-only analysis. If you press NEW LINE, the Disk Formatter skips to the *Display bad block statistics* question.

Generally, if the Disk Formatter found only a few new bad blocks, you should enter Y.

CAUTION: The Disk Formatter marks as "bad" any block it cannot read twice with the same results; it does not try to correct errors. The CLI DUMP command or the DUMP_II or PCOPY programs, on the other hand, may be able to correct errors and read a file. But if you answer Yes to the question Update bad block table?, none of the file backup programs will be able to read the bad block. If you don't have a recent full backup, abort the Partial format now (BREAK for stand-alone; CTRL-C, CTRL-B for stand-among) and take a full backup. Then run a Partial format again and answer Yes to this question. Finally, reload the full backup using the /R or /DEL switch.

The Disk Formatter then enters the new bad blocks it found; and it asks you to enter other bad blocks.

Additional bad block number (press New LINE when done):

Specify each bad block by typing its logical block number (in octal); or (except on DPJ–type disks) type the disk number, cylinder, head, and sector number in this format:

disk–number:cylinder–number,head–number,sector–number

(Omit a head number for a bad block on a fixed–head disk.) Press NEW LINE to signal the end of your bad block entries.

Now the Disk Formatter asks if it should display the updated bad block statistics:

Display bad block statistics? [N]

Press NEW LINE or enter Y. If you enter Y, the Disk Formatter displays the updated bad block statistics. Then, if there is another disk in the LDU, it does the read–only analysis (if specified) and runs through the bad block sequence again.

If you are formatting a mirrored LDU, the Disk Formatter merges the bad block tables if they differ. When it does this, the Disk Formatter prompts *Bad block tables have been merged for disk # n* before the prompt *Display bad block statistics? [N]*.

When the Disk Formatter has asked about bad block information for all disks in the LDU, it displays the LDU's bitmap size, the maximum amount of contiguous disk space available, in octal blocks, and information about the octal number of contiguous disk blocks of various sizes available. In the display of contiguous disk blocks, each value includes the contiguous members of the preceding sets. For example, four 64–block areas would also appear as eight 32–block areas. Finally, the Disk Formatter asks about the bitmap address.

Bitmap size: n
Maximum disk contiguous space is n blocks
The number of contiguous
32. blocks available = n
64. blocks available = n
128. blocks available = n
256. blocks available = n
512. blocks available = n
1024. blocks available = n
New bitmap address? [default]

There is one bitmap for all physical disks in the LDU.

You can always take the default bitmap address, assigned when this LDU was fully formatted, by pressing NEW LINE.

By default—during the Full format that creates an LDU—the Disk Formatter puts the bitmap 3/8 of the distance across the first disk in the LDU. This is a good general-purpose address.

There may be reason to move the bitmap to the beginning of the LDU—as described near the beginning of this chapter. However, if the LDU has been used with AOS/VS, the desired area probably has files in it; if so, the area won't be available for the bitmap. You can check by entering 0; then, if the Disk Formatter rejects your answer, you can retain the old address.

If you really want to have the bitmap at the beginning of the LDU, and this area is already allocated to files, the best course is to dump all files from the LDU, run a Full format and put the bitmap where you want, and reload the files. This will also reduce fragmentation on the LDU.

If the bitmap area you specify or default contains bad blocks, the Disk Formatter issues a warning and asks you to confirm the address. Do not confirm; type N and press NEW LINE. If the area has AOS/VS files in it, the Disk Formatter will say *Specified area already allocated.* For either error, add 100 octal to the address typed and try again. Keep doing this until the Disk Formatter accepts your answer.

Depending on your answer, the Disk Formatter leaves the bitmap in its original spot, or moves it to a new one.

If the LDU was formatted as a system disk, the Disk Formatter skips the next question. Otherwise, it asks

Allocate a System Bootstrap area? [N]

This question allows you to set up the LDU as a system disk, from which you can start and run an AOS/VS system.

If you enter Y, the Disk Formatter will reserve a 126-block area for SYSBOOT. It will also ask about overlay area size and address. To be able to boot and run AOS/VS from this LDU, you must enter Y to this question, and specify the correct overlay area size to the next question. (The size is 620 octal.) Then you must use the Installer to install a disk bootstrap, system bootstrap, and system on the LDU. Next, from AOS/VS, you must copy the CLI, Agent, PMGR, and microcode (.MCF) files to the LDU (CLI MOVE command).

Thereafter, if this LDU includes a disk on unit 0, you will be able to start and run AOS/VS on it as if it were your original LDU.

If you don't want to be able to start and run AOS/VS from this LDU, press NEW LINE and skip to the *Remap area* questions.

New Overlay area size [default]

Generally, you should take the default by pressing NEW LINE. But if the default is 0, and you want to set up the LDU as a system disk, type the appropriate value, described three paragraphs back, and press NEW LINE.

New Overlay area address [default]

To take the default, given when the LDU was fully formatted, press NEW LINE. (But if you moved the bitmap in the previous step, move the overlay area to start immediately after the bitmap. To do this, add the bitmap size given by the Disk Formatter to the bitmap address you typed—octal arithmetic—and type this number.)

As with the bitmap, if the overlay area you specify or default contains bad blocks, the Disk Formatter issues a warning and asks you to confirm the address; type N and press NEW LINE. If the area has AOS/VS files in it, the Disk Formatter will say *Specified area already allocated.* For either error, add 100 octal to the address last typed and try again. Keep doing this until the Disk Formatter accepts your answer.

Depending on your answer, the Disk Formatter leaves the overlay area in its original spot, or moves it to the new one.

Finally, the Disk Formatter asks you about the remap areas on each disk in the LDU.

New Disk number n remap area size? [default]

Generally, take the default by pressing NEW LINE. But note the size if you would like to specify a nondefault address for the remap area. The Disk Formatter then asks

New Disk number n remap area address? [default]

To take the default, given when the LDU was fully formatted, press NEW LINE. Generally, you should take the default unless there are a lot of bad blocks. If you press NEW LINE, the Disk Formatter then announces *Done* and stops.

If this disk has a lot of bad blocks, you might want to move the remap area to the middle of the disk. To do it, divide the total number of blocks on the disk by 2 (octal arithmetic), and type this number.

The Disk Formatter does not allow bad blocks in the remap area. If the area you specify (or default) contains a bad block, the Disk Formatter issues an error message and repeats the question. It also issues an error message if there are AOS/VS files in this area. As above, add 100 octal to the default or to your specified value and try again. Repeat this until the Disk Formatter accepts your answer.

This is the last question; the Disk Formatter now says

-- Partial format complete

Done!

From the stand–alone Disk Formatter, you return to the SCP–CLI. If you want to format another LDU, enter CONTINUE and return to the beginning of this section. Otherwise, you might want to bring up AOS/VS and try out your new LDU. Or, you might want to install an AOS/VS system on it, as described in the next chapter.

From the stand–among Disk Formatter, you return to the AOS/VS CLI. To format another LDU, enter XEQ DFMTR again and return to the beginning of this section. Otherwise, you might want to try your new LDU with the INITIALIZE command. Or, you might want to install an AOS/VS system on it, as described in the next chapter.

Note that whenever you change an LDU's name or unique ID, be sure to write the new ID and/or name on the paper label attached to the disk cover or unit. If the disk is part of a multiple–disk LDU, this label should also describe the other disks, and the LDU sequence number. Without the label, it's easy to lose track of disk IDs/names and sequence numbers.

Figure 8–4 shows a sample Disk Formatter Partial dialog, which changes the ID, name, and ACL, and bitmap address on the LDU in unit DPF1.

```
SCP–CLI> RESET ↵          (For stand–among Disk Formatter, enter XEQ DFMTR, and
         skip to AOS/VS DISK FORMATTER banner.)

SCP–CLI> BOOT 27 ↵        (Or BOOT 33)

         Operating System Load Menu

Enter choice [1]: 2 ↵     (Choose option 2,
                          Enter the Technical Maintenance Menu.)

         Technical Maintenance Menu

Enter choice [1]: 6 ↵     (Choose option 6, Run a Specified Program.)
Pathname? :DFMTR ↵

AOS/VS Disk Formatter Rev n

Full format destroys any AOS/VS file structure, partial retains it.
Full (F) or partial (P or NEW LINE)? P ↵

Partial format

Specify each disk in the LDU (press NEW LINE when done):
Disk unit name? DPF1 ↵
Device code [27]? ↵
Disk unit name? ↵

Disk number 1: 00000000000 through 00002042416

New LDU unique I.D. (1 to 6 characters)? [VULCAN] UDD2 ↵
New LDU name (1 to 31 characters)? [VULCAN] UDD2 ↵

New Access Control List? [N] Y ↵
Username or template (1 to 15 characters)? $+ ↵
Access (O, W, A, R, E, or NEW LINE)? ↵
Username or template (1 to 15 characters)? +
Access (O, W, A, R, E, or NEW LINE)? RE ↵↵
Username or template (1 to 15 characters)? ↵
Read only surface analysis? [N] Y ↵

Disk number? ↵
Analyzing disk #1

2 bad disk blocks
Display bad block statistics? [N] Y ↵
```

Figure 8–4 Partial Disk Formatter Dialog for a Single–Disk LDU (continued)

```
** Addr: 00000574537 Cyl: 000653 Head: 000010 Sect: 00017
*  Addr: 00000747566 Cyl: 001043 Head: 000014 Sect: 00006

*  New bad block which was not allocated
** New bad block which was allocated (must run FIXUP!)

0 old bad blocks.
1 new unallocated bad blocks.
1 new allocated bad blocks.

Update bad block table? [N]  ↵
Additional bad block number (press NEW LINE when done ):  ↵

2 bad disk blocks

Display bad block statistics? [N]  ↵

Bitmap size: 205
Maximum disk contiguous space is n blocks
The number of contiguous
        32. blocks available = n
        64. blocks available = n
       128. blocks available = n
       256. blocks available = n
       512. blocks available = n
      1024. blocks available = n
New bitmap address? [00000000000] 1021200↵

New overlay area size? [000620]  ↵
New overlay area address? [00000000174] 1021600  ↵

Specific area already allocated
New overlay area address? [00000000174] 1022100  ↵

New Disk number 1 remap area size? [000176]
New Disk number 1 remap area address? [00000000174]  ↵

-- Partial format complete
A bad block was allocated, must run FIXUP
Done!

SCP-CLI> (For stand-alone Disk Formatter)

or

)              (For stand-among Disk Formatter)

Run FIXUP on the LDU.
```

Figure 8–4 Partial Disk Formatter Dialog for a Single–Disk LDU (concluded)

Disk Formatter Error Messages

The error messages that you might receive from the Disk Formatter appear alphabetically in Table 8–4.

Table 8–4 Disk Formatter Error Messages

Message	Meaning and Action
(nothing)	You may have specified a nonexistent disk unit. Wait a few seconds. If nothing happens, enter the break sequence (CMD and BREAK, or BRK, or BREAK keys); enter RESET, BOOT n, and try again.
A bad block was allocated, must run FIXUP	One or more of the disk blocks that belongs to an AOS/VS file is bad. The block is "part" of the file. The Disk Formatter has assigned the block to the bad block table, but you must run FIXUP on the disk to correct the file structure. This message occurs on a Partial format only.
A disk can only be mirrored with a disk of the same size areas	Each disk in an LDU image must have the same size as its mirror. You can also get this message if the sizes of the diagnostic areas differ.
A disk cannot be mirrored with itself	You tried to mirror a disk with itself. Enter a valid mirror configuration.
Bad block in invisible space, can't format disk	One of the first eight blocks on the disk is bad; the disk is unusable in its current state. The problem may be head alignment or a flawed disk. Diagnostics or other recovery action is needed. Call your Data General support organization.
Both LDU images have inconsistent data -- Must run a Full format	The Disk Formatter has detected that the information on the images is inconsistent. Perhaps you specified incorrect images.
Cannot partial format an LDU image that was previously being synchronized	Someone aborted a command line that contained a MIRROR/WAIT command using this LDU image as an argument, or there was a panic or hardware failure. If you don't want to mirror this LDU image, start over, but do a Full format. If you do want to Partial format this image, either perform a Full format or see the message *Cannot init an LDU image that was previously being synchronized* in *AOS/VS and AOS/VS II Error and Status Messages.*
Can't expand specified area	AOS/VS files occupy some (or all) of the area specified. See the message *Specified area already allocated* in this table for action.
Can't open disk, <error message>	The Disk Formatter can't open the disk for I/O. *Error message* is an AOS/VS error message describing the error. If the message is *Device already in use,* this

(continued)

Table 8–4 Disk Formatter Error Messages

Message	Meaning and Action
Can't open disk, <error message> (cont'd)	means that you tried to run the Disk Formatter on a disk that is part of the master LDU, or on a disk that was grafted onto the current LDU via the CLI command INITIALIZE. If the former, you must run the *stand–alone* Disk Formatter. If the latter, release the disk using its LDU name from the CLI, then restart the Disk Formatter.
Disk error *Device d u* *Status= s*	The Disk Formatter encountered a disk block that it cannot read or write. It returns to the *Disk unit name?* query for this disk. Make sure the disk is write–enabled (if this applies; then restart the Disk Formatter. If the problem recurs, diagnostics may be needed; contact your Data General support organization.) The *d* is the device code; the *u* is the unit number; and *s* is the hardware status code. You can look up *s* in the Peripherals manual (Preface). In any case, record *s* for your Data General support organization when you report this problem.
Fatal disk error *Device d u* *Status s*	The Disk Formatter encountered an irrecoverable error while trying to read or write a disk block. The problem may be hardware failure. Diagnostics may be needed. Follow the recovery action suggested for *Disk error...* above.
Inconsistent DIB information, must run Full format	During a Full format, the Disk Formatter writes a Disk Information Block (DIB) to each physical disk in the LDU. The DIB contains the LDU unique ID, LDU name, sequence number, and name and sequence number of all disks in the LDU. This message (which appears on a Partial format only) can mean one of the following things. First, it may mean that the disk you just specified doesn't belong to the LDU at all. First look at the paper disk labels; then, mount the proper disk(s) or specify the proper unit numbers and retry. Second, it may mean that the *sequence* in which you specified the disk is wrong. For example, you typed the unit name of the disk formatted as the *second* disk first. Try changing the order in which you specify the disks. Third, it may mean that the revision and/or sequence numbers are invalid. This can mean that the DIB was damaged; if so, you will need to run a Full format on the disk(s).
Inconsistent LDU revision, must run a Full format	Disks in the specified LDU have different revision numbers. Only a Full format can correct this. If this error occurs during a Partial format, you need only run a Full format on the image being introduced.

(continued)

Table 8–4 Disk Formatter Error Messages

Message	Meaning and Action
Inconsistent mirrored LDU	The LDU you specified has inconsistent information in the Disk Information Block (DIB). Respecify the LDU.
Internal problems while merging bad block tables	The Disk Formatter encountered a problem it could not deal with while merging bad block information for a mirror. Report the problem to Data General.
Invalid bad block table	The bad block table is not valid. The table may have been overwritten. The Disk Formatter zeros the current table. If the disk contains valuable files, see if AOS/VS can access it; if so, dump all its files. Then run a Disk Formatter Full format on the disk, specifying at least one pattern; and reload the files.
Invalid disk number	The LDU you're working with does not contain the specified disk number. Retry.
LDU image 'LDU ID' is the preferred image	The Disk Formatter has selected the more recent image as the preferred image. You only get this message when running the Disk Formatter on an unsynchronized image.
Mirrored disks must reside on the same controller	Mirrored disks must reside on the same controller. Determine what your mirrored LDU configuration should be.
No space for name or ACL block	The LDU lacks a free block for name or ACL information. This may be a hardware problem; the disk may need diagnostics.
No space for System Bootstrap	The system bootstrap (SYSBOOT) requires 124 blocks in the first disk in the LDU. The Disk Formatter can't find this space. If the disk is really full, dump and reformat it; then reload the files and try again.
Not enough contiguous space for specified area	The contiguous disk space needed is not available. Add 100 octal to the area start address and retry. If this fails a few times, reboot AOS/VS, and type F/PACKET from its master directory. This shows logical disk addresses in entries 22 and 23 (octal). Files with lower logical addresses are earlier on the disk. Dump and delete some of them, run the Disk Formatter again, then reload the files.
Not enough remap area. Must increase remap area size before more bad blocks can be added.	During a Partial format, the Disk Formatter has detected that the remap area has run out of room. Before you can add any new blocks you must start over, perform a Partial format, and increase the remap area size.

(continued)

Table 8–4 Disk Formatter Error Messages

Message	Meaning
Only DPJ–type disks can be mirrored	You specified a disk for mirroring that is not a DPJ–type disk. You can only mirror DPJ–type disks.
Specified address is out of range	The LDU does not contain the specified address. This error message may also indicate that a disk in the LDU lacks a remap area. Try another address; check all disks in the LDU with a Disk Formatter Partial run.
Specified area is already allocated	AOS/VS files, or one of the special areas (bitmap, etc.) occupy part or all of this area. Add 100 octal to the disk address shown for the item (bitmap address, etc.) and type this figure. Repeat this until the Disk Formatter accepts your answer.
Specified area has a bad block in it, confirm	The area you specified (or defaulted) has a bad block in it. Do not confirm; enter N. Add 100 octal to the specified (or default) area and try again. Repeat this until the Disk Formatter accepts your answer.
The LDU unique I.D. must be different for each image	You have attempted to mirror two images that have the same LDU Unique ID. Make the LDU Unique IDs different.
There is a bad block in the remap area	The remap area you specified (or defaulted) contains a bad block. Add 100 octal to the remap area address specified or defaulted; then type this number as the remap address. If this doesn't work, try it again.
This LDU is not normally mirrored	The Disk Formatter has found that this is either a new mirror or that it was a mirror but someone initialized it with the /NOMIRROR switch to the INITIALIZE command.
Too many bad blocks for a mirrored disk	The bad block tables on a mirrored disk must be equivalent. The Disk Formatter has found more than 126. bad blocks, too many to permit mirroring. You should have a Data General representative hardware format DPJ (6236–class) disks to "remove" bad blocks.
Too many bad disk blocks. More than 126 [1022] bad blocks	The Disk Formatter found more than 126 (1022 on a model 6214) bad blocks on this disk during surface analysis. Retry from the beginning. If the message recurs during the second surface analysis, diagnostics may be needed. Call your DG support organization.
Too many physical units in LDU	There cannot be more than eight physical disks in an LDU. Retry. Do not specify more than eight physical disks per LDU.

(concluded)

What Next?

This chapter gave some background on creating and using LDUs, then it described the Full and Partial formats of the stand–alone and stand–among Disk Formatter.

If the LDU(s) that you built involve one or more new disk controllers, you will need to run VSGEN and generate an AOS/VS system that supports the controller(s). If not, you might want to install a system on the new LDU(s), described in the next chapter. Or, if you are ready, try running the new LDU(s) from AOS/VS—and perhaps put the CLI INITIALIZE commands for them in the UP.CLI macro.

End of Chapter

Chapter 9
Using the Installer

Read this chapter

- When you want to understand what the Installer does;
- When you want to install an AOS/VS disk bootstrap, system bootstrap, or operating system on a logical disk unit (LDU).

The Installer is a utility program that installs a disk bootstrap, system bootstrap (SYSBOOT), and/or an AOS/VS operating system on an LDU. If you brought up your own first system (Chapter 2 or 3), you already have some experience with the Installer. This chapter tells the rest, in the following major sections:

- Some Background
- About the Installer
- If You Make a Mistake
- Using the Stand–Alone Installer
- Using the Stand–Among Installer
- Installer Error Messages

Some Background

Three AOS/VS–based programs are needed to bring up an AOS/VS operating system from disk. The first, called the disk bootstrap, is on the first two blocks of an LDU. The second, the system bootstrap (SYSBOOT), follows in the area reserved for it by the Disk Formatter. Finally, the AOS/VS system itself is somewhere on the disk, usually in directory :SYSGEN.

When you boot AOS/VS from an LDU (e.g., by entering BOOT 24), the following things happen:

- the hardware reads the disk bootstrap from the LDU into main processor memory;
- the disk bootstrap executes and reads SYSBOOT into memory;
- SYSBOOT executes, loads microcode if needed, and allows you to interrupt its execution;
- SYSBOOT's Technical Maintenance Menu permits changing the default operating system;
- SYSBOOT copies the disk–based part of the default or installed AOS/VS system to the overlay area reserved for it by the Disk Formatter;
- SYSBOOT loads AOS/VS into memory; and
- the AOS/VS system executes.

The Installer is the program that writes the disk and system bootstraps—and, optionally, an AOS/VS system—to the LDU. An AOS/VS system *need not* be installed.

When you install an AOS/VS system, the Installer copies it to the LDU as a disk file outside the file system. Then, it creates a pointer to the system name in "invisible" space at the beginning of the LDU. Because this pointer is invisible and the file is outside the file system, you cannot delete the installed system, nor can you find out its name since it has none.

You *must* install the AOS/VS starter system, as you did in Chapter 2 or Chapter 3, and *can* install any AOS/VS system.

You *can* install any AOS/VS system, but it's not really necessary. Installing a tailored AOS/VS system overwrites the starter system. This means that, if you want to go back to the starter system, you must reload it from the AOS/VS system tape or diskette. Beginning with AOS/VS Revision 7.00, it is just as convenient to make the tailored system the default system. SYSBOOT will start it automatically, and still permit you to run the starter system that is still installed. So there's no advantage to installing a tailored system.

(If you want to run the starter system instead of the tailored system, choose option 2, "Enter the Technical Maintenance Menu", on the Load Operating System Menu. Then, choose option 8, "View or change the default operating system filename", on the Technical Maintenance Menu, and specify INSTALLED SYSTEM. Finally, choose option 1, "Load and start the default operating system," to run the starter system.)

Whether or not your primary AOS/VS system is installed, its name should be posted on the system console (perhaps on a paper tape label). If you install a system, you should write "Installed" and the date on the label.

About the Installer

The Installer can install a disk bootstrap, SYSBOOT, and/or AOS/VS system on any LDU formatted as a system disk.

There are two versions of the Installer: a stand–alone version that runs only when AOS/VS is not running; and a stand–among version that runs under AOS/VS.

The stand–alone Installer requires an AOS/VS system tape and works with any system LDU.

The stand–among Installer accepts disk file pathnames and doesn't use a system tape; it works only with a *nonmaster* LDU that has not been initialized (CLI command INITIALIZE).

If You Make a Mistake

If you type a response to the Installer and want to change it before pressing NEW LINE, press the DEL key as needed or press CTRL–U to erase the line.

If you are beyond the line containing the mistake, you can restart the dialog from the beginning by pressing CTRL–C CTRL–A.

If you receive any Installer error message, see Table 9–1, at the end of the chapter.

The Stand–Alone Installer

The stand–alone Installer is in file INSTL in the master LDU's root directory. You can boot it directly from this LDU.

To use the Installer, perform the following steps.

1. Make sure all disks in the LDU are mounted, and that their units are ready and write–enabled (if this applies).

2. Mount an AOS/VS system tape or diskette on/in unit 0, on the first controller. This tape/diskette can be either your own tailored system or the Data General–supplied AOS/VS starter system tape or diskette. (Making a tailored AOS/VS system tape or diskette is described near the end of Chapter 4.)

3. If AOS/VS is running, shut it down. Make sure the SCP–CLI is active on the system console. (You can run the stand–alone Installer only from the system console.)

4. Next to the SCP–CLI prompt, type RESET; then type the BOOT command followed by the device code of your master LDU.

   For the first DPF–type controller (controller name DPF), the default device code is 27; for the second DPF–type controller (controller name DPF1), the default device code is 67. For the first model 6236 through 6240, 6290, 6310, 6328, or 6329 controller (controller name DPJ),the default device code is 24; for the second of these controllers (controller name DPJ1), the default device code is 64.

   For the first fixed–head controller (DKB), the code is 26; and for the second fixed–head controller, 66. For all other types of disks, the default is 33 for the first controller, and 73 for the second controller. For a 737,000–byte diskette unit (DPJ10), the device code is 64; and for a 368,000–byte diskette unit (DPM0), the device code is 20.

For example,

SCP–CLI> RESET↵
SCP–CLI> BOOT 64↵

Operating System Load Menu

. . .

5. *Enter choice [1]:* 2↵ (Choose option 2, *Enter the Technical Maintenance Menu.*)

Technical Maintenance Menu

. . .

6. *Enter choice [1]:* 6↵ (Choose option 6, *Run a Specified Program.*)

Pathname?

7. Type the pathname of the Installer program (INSTL):

Pathname? :INSTL↵

SYSBOOT now finds and starts the Installer. The Installer displays

AOS/VS Installer Rev n
Specify each disk in the LDU
Disk unit name?

8 Type the unit name that holds the first physical disk in the LDU. The unit names and device codes of all disks supported by AOS/VS appear in Table 8–1. For example, for the first DPF–type unit on the second controller, type

Disk unit name? DPF10↵

8a. For a mirrored LDU, type the LDU names separated by an exclamation point (!). For example

Disk unit name? DPJ2!DPJ3↵

Device code [default]?

9. If this unit's controller is on the default device code, press NEW LINE to choose the default answer. Otherwise, type the device code and press NEW LINE.

Next, if the LDU was formatted to contain more than one physical disk, the Installer asks

Disk unit name?

9a. If you specified only one image of a mirror, the Installer will prompt

Disk is normally mirrored
Do you wish to continue with an incomplete mirror? [Y]

Press NEW LINE if you wish to continue or type N and press NEW LINE if you do not.

9b. If you specified an unsynchronized mirror, the Installer will prompt

Disk n is the preferred image
Do you wish to continue with the preferred image? [Y]

Press NEW LINE if you wish to continue or type N and press NEW LINE if you do not.

10. The Installer repeats *Disk unit name?* and *Device code?* until you have identified the units that hold all disks in the LDU, and their device codes.

Then, the Installer writes a disk bootstrap to the LDU and displays

-- Disk bootstrap installed
Do you want to install a System Bootstrap [Y]?

11. Press NEW LINE if you want a copy of the system bootstrap (SYSBOOT) written to the LDU. Or type N and press NEW LINE if you do not. Installing the system bootstrap overwrites the existing bootstrap (if any) but does not affect the installed AOS/VS system (if any).

For tape, you should generally press NEW LINE—especially if there is a new revision of AOS/VS on this tape. For diskette, generally type N and press NEW LINE. If you don't want a new SYSBOOT installed, answer N and press NEW LINE and go to step 14.

If you press NEW LINE, the Installer asks

Install from which unit [MTC0]?

12. To install from magnetic tape, press NEW LINE and go to step 13. To install from diskette, make sure that the diskette that holds SYSBOOT is mounted in a unit (replace the system diskette, if needed). Then type the unit name; for example, enter DPJ10. The installer asks

Device code?

12a. If the diskette unit is on the default device code, press NEW LINE. Otherwise, type the device code and press NEW LINE.

The Installer now reads the diskette and tries to copy SYSBOOT to the LDU. When finished, it displays *System Bootstrap installed.* Go to step 14.

13. If you pressed NEW LINE at the previous prompt, the Installer asks

Device code [22]

13a. If the tape unit is on the default MTB/MTC device code (22), press NEW LINE. If it is on a different device code (e.g., 62), type the device code and press NEW LINE.

File number [4]?

13b. SYSBOOT is in file 4 of an AOS/VS system tape, so press NEW LINE.

The Installer now reads the tape or diskette and tries to copy SYSBOOT to the LDU. When finished, it displays

-- System bootstrap installed
Do you want to install a System [Y]?

14. If you install an AOS/VS system, it will overwrite the system already installed on the LDU. The system you install depends on the system tape or diskette you're using. If it's your own tape or diskette, then it has your tailored AOS/VS system on it. If it's a Data General–supplied AOS/VS tape or diskette, then it has the starter system on it.

Press NEW LINE or type N and press NEW LINE, depending on whether or not you want the system on the tape or diskette installed on the LDU. If you enter N, you're done; the Installer displays *Done!*, and terminates.

15. If you press NEW LINE, the Installer asks

Install from which unit [default]?

The Installer remembers the answer you gave in step 12. Press NEW LINE and, for tape, go to step 16. For diskette, continue with this step. The Installer asks

Device code?

15a. Make sure that a diskette with the AOS/VS system you want to install is inserted in diskette unit 0. If the diskette unit is on the default device code, press NEW LINE. Otherwise, type the device code and press NEW LINE.

Go to step 17.

16. After you press NEW LINE, the Installer asks

Device code [22]?

16a. If the tape unit is on the default MTB/MTC device code (22), press NEW LINE. If it is on a different device code (e.g., 62), type the device code and press NEW LINE.

File number [5]?

16b. To install from tape (either a Data General–supplied system tape or an AOS/VS tape you created using the SYSTAPE macro), press NEW LINE.

17. The Installer now reads the tape file or diskette and tries to install its contents on the LDU, placing a pointer in invisible space as described earlier. Then it displays

-- System installed
Done!

To run the Installer again, enter CONTINUE and retrace the steps above. Otherwise, you might want to bootstrap the AOS/VS system on this LDU to see how it does. After you specify each disk in the LDU, press NEW LINE to start up the installed system.

Figure 9–1 shows a sample stand–alone Installer dialog from magnetic tape.

```
Have all disks ready and write–enabled.

SCP–CLI> RESET ↵
SCP–CLI> BOOT 24 ↵

            Operating System Load Menu

Enter choice [1]: 2 ↵   (Choose option 2, Enter the Technical Maintenance Menu.)

            Technical Maintenance Menu

Enter choice [1]: 6 ↵   (Choose option 6, Run a Specified Program.)

Pathname? INSTL ↵

AOS/VS Installer Rev n
Specify each disk in the LDU
Disk unit name? DPJ10 ↵
Device code [64]? ↵

Disk unit name? DPJ11 ↵
Device code [64]? ↵

-- Disk bootstrap installed
Do you want to install a System Bootstrap [Y]? ↵

Install from which unit [MTB0]? ↵

Device code [22]? ↵
File number [4]? ↵

-- System bootstrap installed

Do you want to install a System [Y]? ↵

Install from which unit [MTC0]? ↵

Device code [22]? ↵
File number [5]? ↵

-- System installed
Done!
```

Figure 9–1 Installing Bootstraps and an AOS/VS System via the Stand–Alone Installer

The Stand–Among Installer

The stand–among Installer is in directory :UTIL, filename INSTL.PR. It works only with nonmaster LDUs that were formatted to include a system disk. It won't work on the master LDU or any LDU that has been initialized from the master.

Before running it, you should know the full pathname of the AOS/VS system you want to install. To run it, follow these steps.

Make sure that all disks in the LDU are mounted, and that their units are ready and write–enabled (if the latter applies).

Beside the AOS/VS CLI prompt, type

```
) DIR :UTIL⏎
) SUPERUSER ON⏎
Su) XEQ INSTL.PR⏎
```

AOS/VS Installer Rev n
Specify each disk in the LDU
Disk Unit Name?

Type the unit name that holds the first physical disk in the LDU; for example, enter DPF10. The unit names of all disks supported by AOS/VS appear in Table 8–1, in the previous chapter.

For a mirrored LDU, type the LDU names separated by the ! character. For example

Disk Unit Name? DPJ2!DPJ3⏎

If the LDU was formatted to contain more than one physical disk, the Installer again asks

Disk unit name?

The Installer repeats the *Disk unit name?* prompt until you have identified the units that hold all disks in the LDU.

(If you specified only one image of a mirror, the Installer will prompt

Disk is normally mirrored
Do you wish to continue with an incomplete mirror? [Y]

Press NEW LINE if you wish to continue or type N and press NEW LINE if you do not.

If you specified an unsynchronized mirror, the Installer will prompt

Disk n is the preferred image.
Do you wish to continue with the preferred image? [Y]

Press NEW LINE if you wish to continue or type N and press NEW LINE if you do not.)

Finally, the Installer writes a disk bootstrap to the LDU and displays

-- Disk bootstrap installed

Do you want to install a System Bootstrap [Y]?

Press NEW LINE if you want the system bootstrap (SYSBOOT) written to the LDU. Type N and press NEW LINE if you do not. Installing a system bootstrap overwrites the existing bootstrap (if any) but does not affect the installed AOS/VS system (if any).

Generally, it can't hurt to press NEW LINE. But if you don't want a new SYSBOOT written to the LDU, enter N and go to the question *Do you want to install a System?*

If you press NEW LINE, the Installer asks for SYSBOOT's pathname:

Pathname?

The SYSBOOT pathname, in root directory, is :SYSBOOT, so type :SYSBOOT and press NEW LINE. The Installer now copies SYSBOOT to the LDU and displays

-- System Bootstrap installed

Do you want to install a System [Y]?

If you choose to install an AOS/VS system, it will overwrite the system (if any) that is installed on the LDU. You can install any existing AOS/VS system that you want.

Press NEW LINE if you want to have a system installed; type N and press NEW LINE if you do not. If you answer N, you're done; the Installer displays *Done* and terminates.

If you enter Y, the Installer wants to know

Pathname?

Type the full pathname, with .PR suffix, of the AOS/VS system you want to install. For example, type :SYSGEN:NEWSYS.PR and press NEW LINE.

The Installer then copies the system to the LDU, placing a pointer in invisible space as described earlier. Then it terminates and control returns to the CLI.

-- System installed

Done!

Su)

To run the Installer again, enter XEQ INSTL and retrace the steps above. Otherwise, you might want to shut down the current AOS/VS system and bootstrap the installed AOS/VS system on this LDU to see how it does. After you specify each disk and device code in the LDU, press NEW LINE to bring up the installed system.

Figure 9–2 shows a sample stand–among Installer dialog.

```
Ready all disks in the LDU.

) DIR :UTIL ↵

) SUPERUSER ON ↵

Su) XEQ INSTL ↵

AOS/VS Installer Rev n
Specify each disk in the LDU

Disk unit name? DPF10 ↵

Disk unit name? DPF11 ↵

-- Disk bootstrap installed
Do you want to install a System Bootstrap [Y]? ↵

Pathname? :SYSBOOT ↵

-- System Bootstrap installed

Do you want to install a System [Y]? ↵

Pathname? :SYSGEN:NEWSYS.PR ↵

-- System installed

Done!

Su)
```

Figure 9–2 Installing Bootstraps and an AOS/VS System on an LDU via the Stand–Among Installer

Installer Error Messages

While you are running the Installer, you may receive one of the error messages shown alphabetically in Table 9–1.

Table 9–1 Installer Error Messages

Message	Meaning
ABORT message	The Installer encountered a fatal error and aborted. If the message allows you to correct the problem, do so and retry. Otherwise, try to find the message text in this table.
Bad system file	The tape or diskette file you specified is too big for its reserved area on the LDU. This probably means that you specified the wrong tape file or used the wrong diskette. If you get a *MUST RUN FIXUP* message, run FIXUP on the LDU. Rerun the Installer and type the correct file number for the system tape. The number is 4 for a system bootstrap, 5 for an AOS/VS system. Make sure the tape is a system tape, created by the SYSTAPE.CLI macro. For diskette, make sure the diskette contains an AOS/VS system in CLI COPY format.
Both LDU images have inconsistent data –– Must run a Full format	The Installer has detected that the information on the images is inconsistent. Perhaps you specified incorrect images.
Device already in use	The Installer can't open the disk(s). This occurs if you try to run the stand–among Installer on an LDU that a program has already opened (for example, the master LDU). Try the stand–alone Installer.
Disk 1 is the preferred image	The Installer has chosen the first image specified as the preferred image.
Disk 2 is the preferred image	The Installer has chosen the second image specified as the preferred image.
Disk and file system revision numbers don't match	The disk has an early revision number; or perhaps the Disk Information Block (DIB) has been damaged. Try a (current revision) Disk Formatter Partial format on the LDU, changing nothing. If this runs, bring up AOS/VS, try to dump all files from the LDU, run a Disk Formatter Full format on the LDU, and run the Installer again.
Disk error, Device d u Status= s	The Installer has encountered a disk block from which it cannot read or write; it aborts. The *d* is the device code, *u* is the unit number, and *s* is the hardware status code, described in the Peripherals manual (see Preface).

(continued)

Table 9–1 Installer Error Messages

Message	Meaning
Disk error, Device d u Status= s (cont'd)	Make sure the unit(s) are write–enabled, and retry. If problem persists, try a Disk Formatter Partial format (Chapter 8). The disk may need diagnostics; consult your Data General support organization.
Disk is normally mirrored	You have specified only one image of a mirrored LDU. You can continue, but the mirror will have to be synchronized at a future time.
Disk space exhausted	The Installer cannot find the disk space it needs to install a disk or system bootstrap. The easiest way to handle this is to dump the LDU, run a Full format on it, try the Installer again, and reload the files.
Disk was left in inconsistent state	The image(s) specified is not consistent due to an incomplete mirror synchronization. Specify a consistent image.
File does not exist	The entry you typed does not identify an existing tape or disk file. Try retyping the device name, or respecify the tape file number, or type an existing file pathname.
Hard tape error	The Installer has hit a hard error on the tape unit. Retry. If the same message recurs at the same point, the tape is probably bad; try another system tape. If it recurs, you may need to run hardware diagnostics on the tape unit or contact your Data General support organization.
Inconsistent LDU	One or more of the disks involved do not belong to the LDU. Mount the correct disk(s) and retry; or, specify the disks in a different order.
Inconsistent mirrored LDU	The LDU you specified has inconsistent information in the Disk Information Block (DIB). Respecify the LDU.
Invalid DIB info, must run Full format	The disk has not been formatted via a Disk Formatter Full format. Run a Formatter Full Full format on the disk(s) involved.
Invalid disk sequence number	The disk sequence number is not between 1 and 8. For action, see *Disk and file system...* message, above.
Invalid mirror input	You specified incorrect disk unit names. Start over and specify the right names.
Invalid mirrored LDU	The Installer has found that the specified mirror is inconsistent. Perhaps you specified incorrect images.

(continued)

Table 9–1 Installer Error Messages

Message	Meaning
LDU is not mirrored	You specified a mirror, but the Installer has found that the LDU is not mirrored. Specify the image that you want the Installer to run on.
Mirror synchronization was in progress	One of the images is inconsistent and cannot be used. The Installer must choose the other image as the preferred image.
Must run FIXUP on this LDU	The LDU is unstable because a utility or AOS/VS has aborted. Run FIXUP on the LDU.
Soft tape error	A soft (correctable) tape error occurred; proceed as usual.
System Bootstrap area not allocated	The LDU was not formatted as a system disk. Run a Disk Formatter Partial format, enter Y at the *Allocate a system bootstrap area?* prompt, and change nothing else (described in Chapter 8).
System Bootstrap too large	The file you specified is too large for the SYSBOOT area reserved by the Disk Formatter. See the message *Bad system file* in this table for recovery action.
This LDU is not normally mirrored	The Installer has detected that the disks specified are not images of each other. Specify the image that you want the Installer to run on.

(concluded)

What Next?

This chapter explained how installed software brings AOS/VS up, and described using the Installer utility to place this software on an LDU. This is the end of the last chapter.

End of Chapter

Appendix A
Peripheral Device Types and Names

This appendix gives some background. Then it lists Data General peripherals supported by AOS/VS.

- Table A–1 lists devices by their AOS/VS names, with descriptions of each device.
- Table A–2 describes all disk units supported on AOS/VS, including their device codes and AOS/VS device names.

Some Background

When you generate a tailored AOS/VS system, software drivers for the device controllers you specify become *part* of the system.

When you bring up the tailored system, it creates the peripherals directory (:PER, shorthand @) and writes entries for all the devices into this directory. Users can then access devices via the @ prefix. When you shut the system down, it deletes the peripherals directory. So, each tailored AOS/VS system always has its own tailored peripherals directory as it runs.

AOS/VS can support devices other than those you specify at VSGEN, but someone must code drivers for these devices, and the drivers must be identified at runtime via ?IDEF system calls.

Devices and Controllers

Each I/O device is run by a *controller* board, generally within the computer chassis. The controller may support one or more devices. For example, some disk controllers can support up to four devices (units). The controller is connected to a device code in the computer chassis. Through the device code connection, AOS/VS accesses the controller and—through it—the unit.

Table A–1 Devices by AOS/VS Name

AOS/VS Name	Device and Description
@CON0	The system console, a CRT or hardcopy terminal connected to its own controller and the SCP.
@CON2, @CON3, ...	Asynchronous communications lines, connecting an asynchronous controller (for example, IAC, MCP1, LAC, DRT, or CPI/24) with a user terminal, modem, or printer. The CON number is the line number plus 2; for example, the device at the end of line 0 is number 2 and has the filename @CON2.
@CRA and @CRA1	First and second card reader controllers.
@DKB and @DKB1	First and second fixed–head disk controllers. Each controller can run up to four units.
@DPx—@DPxn	Moving–head disk controllers. AOS/VS Supports up to sixteen DPJ controllers (DPJ0 through DPJF) and up to eight of other types of controller (DPx, ... DPx7). The x signifies the type of disk; it is shown in Table A–2. The units on each controller are numbered 0 through 3 (if the controller supports four) or 0 and 1 (if the controller supports two). So, unit names on the first controller can be @DPx0, @DPx1,...@DPx7. On the second controller they can be @DPx10, @DPx11, ... @DPx17; on the third they can be @DPx20, @DPx21, ... @DPx27, and so on.
@LPB—@LPB7	Data channel line printer controllers, up to eight. Each controller supports one printer.
@LPD—@LPD7	DASHER LP2 line printer controllers, up to eight. Each controller supports one printer.
@LPE—@LPE7	Laser printer controllers, up to eight. Each controller supports one printer.
@LPJ—@LPJ7	Printer controllers for DS/7500 and deskside ECLIPSE systems, up to eight.
@MCAR and @MCAT	First multiprocessor communications adapter (MCA) controllers. The receiver and transmitter each has its own device code.
@MCAR1 and @MCAT1	Second MCA receiver and transmitter.

(continued)

Table A–1 Devices by AOS/VS Name

AOS/VS Name	Device and Description
@MTB—@MTB7	Dual–density (800/1600 b/in) Model 6026 tape controllers, up to eight. An MTB unit has a DENSITY rocker switch on its front panel. Each controller can support up to eight units. Units are numbered 0 through 7, so the default unit names on the first controller are @MTB0, @MTB1, ...@MTB7; on the second controller they are @MTB10, @MTB11,...@MTB17.
@MTC—@MTC7	Streaming tape controllers, Models 6125, 6231, and 6311, up to eight. Model 6125 uses reels side by side, at a density of 1600 b/in; a 6125 controller can support up to four units, with default names @MTC0, @MTC1, @MTC2, and @MTC3. Models 6231 and 6311 use cartridges, at 6400 b/in; a controller can support one unit, @MTC0. The default device code for the first MTC controller is 22.
@MTD—@MTD7	Dual–density (1600/6250 b/in) tape controllers, up to eight. The model number is 4307 (switches at top) or 6300 (touch–sensitive switch panel). A controller can handle up to four units. On the first controller, the default names are @MTD0, @MTD1, @MTD2, and @MTD3. On the second controller, default names are @MTD10, @MTD11, @MTD12, and @MTD13. The default device code for the first MTD controller is 62.
@MTJ— @MTJ7	Streaming tape controller, Models 6340, 6341, 6351, 6352, 6577, 6590, 6591, 6656, and 6679, up to eight. These units are available with a Combined Storage Subsystem (CSS) or with a deskside system (DS/7500, MV/3500 DC, MV/2500 DC, MV/2000 DC, MV/1400 DC, and MV/1000 DC) only. An MTJ controller, of any model, can support up to four tape units, with default names @MTJ0, @MTJ1, @MTJ2, and @MTJ3. The default device code of the MTJ controller is 23. Models 6340 and 6341 (for deskside systems only) use reels side by side, at a density of 1600 or 6250 b/in. A Model 6351 unit (for deskside systems only) uses a 21–Mbyte cartridge. A Model 6352 unit uses a 120–Mbyte cartridge. Model 6352 is available on a Combined Storage Subsystem (CSS) with any computer; it is also available without a CSS on a deskside system.

(continued)

Table A–1 Devices by AOS/VS Name

AOS/VS Name	Device and Description
@MTJ—@MTJ7 (cont'd)	Models 6577, 6590, 6591, 6656 and 6679 are cartridge tape units. Model 6577 is a 1/4" unit for deskside systems; Models 6656 and 6679 are also 1/4" units; Models 6590 and 6591 are 8mm cartridge units. Models 6588 and 6589 are reel–to–reel, 6250 b/in units.
@PLA and @PLA1	First and second digital plotter controllers.
@SLN0, @SLN1, ...	Synchronous communications lines (for example, for DG/SNA or a XODIAC network) connected to an ISC, MCP1 (synchronous controller part), or DCU.
@TCON0, @TCON1, ...	Telnet consoles (managed by the TELNETD.PR process). These are connected to a local area network controller like an ILC.
@VCON0, @VCON1, ...	Virtual consoles (managed by Data General's XODIAC Networking VTA agent). These are connected to an MCA (local) or to an ISC, MCP1, NBA, or DCU (remote). Network software manages the interfaces.
@WCON0, @WCON1, ...	PCs used as terminals (managed by the WSVTA.PR process). These are connected to a local area network controller like an ILC.

(concluded)

Table A–2 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name	
A 5.25–inch diskette, used in DESKTOP GENERATION and other systems. 4314, 4514. 4514 = 368 Kbytes; 4314 = 737 Kbytes.	20	First	DPM0	
		Second	DPM1	
	60	First	DPM10	
		Second	DPM11	
6030. This is a diskette, single or dual slot. Capacity per diskette is 0.3 Mbyte.	33	0 on dial	DPD0	
		1 on dial	DPD1	
		2 on dial	DPD2	
		3 on dial	DPD3	
	73	0 on dial	DPD10	
		1 on dial	DPD11	
		2 on dial	DPD12	
		3 on dial	DPD13	
			Removable	**Nonremovable**
6045 **. This is a moving head unit with two disks: one removable, one nonremovable. Unit capacity is 10 Mbytes. It also supports diskettes.	33	0 on dial	DPD0	DPD4
		1 on dial	DPD1	DPD5
		2 on dial	DPD2	DPD6
		3 on dial	DPD3	DPD7
	73	0 on dial	DPD10	DPD14
		1 on dial	DPD11	DPD15
		2 on dial	DPD12	DPD16
		3 on dial	DPD13	DPD17
6060, 6061, 6067, and 6122; 6160 and 6161; 6214. All are moving head disks. The 6060, 6061, 6067, and 6122 are freestanding and use a removable pack; a controller can run four units. The 6160, 6161, and 6214 are sealed with nonremovable disks; a controller can run two units. A 6060 holds 96 Mbytes; a 6061 holds 190 Mbytes, a 6067 holds 50 Mbytes; and a 6122 holds 277 Mbytes. A 6160 holds 73 Mbytes and a 6161 holds 147 Mbytes. A 6214 is a freestanding unit and holds 602 Mbytes.	27	First (0)	DPF0	
		Second(1)	DPF1	
		Third (2)	DPF2	
		Fourth(3)	DPF3	
	67	First (0)	DPF10	
		Second(1)	DPF11	
		Third (2)	DPF12	
		Fourth(3)	DPF13	
	*	First (0)	DPF20	
		Second(1)	DPF21	
		Third (2)	DPF22	
		Fourth(3)	DPF23	
	*	First (0)	DPF30	
		Second(1)	DPF31	
		Third (2)	DPF32	
		Fourth(3)	DPF33	

* There is no default device code for the third, fourth, or subsequent disk controllers. These device codes are chosen at installation.

** A model 6045 controller can run both 6045 disk units and 6030 diskette units. To format diskettes on the first 6045 controller, dial 1, 2, or 3 on the diskette unit; this makes the diskette names DPD1, DPD2, or DPD3, respectively. To format diskettes on the second 6045 controller, dial 1, 2, or 3 on the diskette units; this makes the diskette names DPD11, DPD12, or DPD13, respectively.

(continued)

Table A–2 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name
6063, 6064, 6066. Each is a fixed head disk. Model 6063 holds 1 Mbyte, the 6064 holds 2 Mbytes, the 6066 is two 6064 units and one controller.	26	First(0) Seond(1) Third(2) Fourth(3)	DKB10 DKB11 DKB12 DKB13
	66	First(0) Seond(1) Third(2) Fourth(3)	DKB0 DKB1 DKB2 DKB3
6067. See 6060 description.			
			Removable **Nonremovable**
6070. This is a moving head unit with two disks: one removable, one nonremovable. Unit capacity is 20 Mbytes.	33	0 on dial 1 on dial 2 on dial 3 on dial 0 on dial 1 on dial 2 on dial 3 on dial	DPG0 DPG4 DPG1 DPG5 DPG2 DPG6 DPG3 DPG7 DPG10 DPG14 DPG11 DPG15 DPG12 DPG16 DPG13 DPG17
6097. This is a diskette unit, single or dual slot. Diskette capacity is 1.26 Mbytes.	33	First Second	Left: DPI0; right: DPI1 Left: DPI2; right: DPI3
	73	First Second	Left: DPI10; right: DPI11 Left: DPI12; right: DPI13
6098. This is a moving head sealed disk with diskette. A toggle switch makes the disk unit 0 and diskette unit 1, and vice versa. Capacity: Disk 12.3 Mbytes, diskette 1.26 Mbytes.	33	Only	Disk DPI0 and diskette DPI1; or vice–versa.
	73	Only	Disk DPI10 and diskette DPI11; or vice–versa.
6099. This is the same as 6098, but without the diskette.	33	Only	DPI0
	73	Only	DPI10
6100. This is the same as 6098, with twice the disk capacity; disk 24.6 Mbytes, diskette 1.26 Mbytes.	33	Only	Disk DPI0 and diskette DPI1; or vice–versa.
	73	Only	Disk DPI10 and diskette DPI11; or vice–versa.
6103. This is the same as the 6100, without the diskette; capacity is 24.6 Mbytes.	33	Only	DPI0
	73	Only	DPI10

(continued)

Table A–2 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name
6122. See 6060 description.			
6160, 6161. See 6060 description.			
6214. See 6060 description.			
6227. A sealed, moving head disk, capacity 15 Mbyte. There can be a 1.26 Mbyte diskette on the same controller. If so, a toggle switch under the front panel makes the disk unit 0 and diskette unit 1, and vice versa.	33 73	Only Only	Disk DPI0 (with diskette, DPI0 or DPI1) Disk DPI10 (with diskette, DPI10 or DPI11)
6234. A sealed, moving head disk, rack mounted. It holds 50 Mbytes.	33 73	Only Only	DPI0 DPI10
6236, 6237, and 6357; 6239, 6240, and 6290; 6398, 6399, and 6400. A rack–mounted sealed, moving head unit with power switch on the right. It has a LED display that shows the number and can show the current cylinder or disk fault code. A controller can run four units. Models 6236–6299 are 14–inch disks. A 6236 unit holds 354 Mbytes; a 6237 is three 6236 units in one cabinet, on one controller. A 6239 unit holds 592 Mbytes; a 6240 is three 6239 units in one cabinet, on one controller; a 6290 is two 6239 units in one cabinet, on one controller. A 6297 holds 862 Mbytes; a 6298/6299 is two or three 6297 units in one cabinet on one controller. A 6357 holds 862 Mbytes; a 6398 is two 6357 units in one cabinet, on one controller. A 6399 is three 6357 units in one cabinet, on one controller. A 6400 is six 6357 units in two cabinets, on two controllers. Models 6716 and 6718 are 5.25–inch SCSI disks that hold 1.4 Gbytes. Models 6796 and 6799 are 3.5–inch disks that hold 520 Mbytes.	24 64 * * 	First(0) Second(1) Third (2) Fourth(3) First(0) Second(1) Third (2) Fourth(3) First (0) Second(1) Third (2) Fourth(3) First (0) Second(1) Third (2) Fourth(3)	DPJ0 DPJ1 DPJ2 DPJ3 DPJ10 DPJ11 DPJ12 DPJ13 DPJ20 DPJ21 DPJ22 DPJ23 DPJ30 DPJ31 DPJ32 DPJ33

* There is no default device code for the third through sixteenth disk controllers. These device codes are chosen at installation.

(continued)

Table A–2 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name
6309. This is a 737 Mbyte, 5.25–inch, minidiskette unit. It is an add–on to the primary diskette on MV/4000 SC and Data General DS/4000 series systems.	64	Second(1)	DPJ11
6310, 6328, 6329, and 6363. This is a 5.25–inch, sealed disk, an add–on to the primary disk on deskside systems like the MV/4000 DC and MV/2000 DC and on engineering workstations like the DS/7500. Model 6310 holds 38 Mbytes. Model 6328 holds 70 Mbytes. Model 6329 holds 120 Mbytes. Model 6363 holds 160 Mbytes.	24	Second(1)	DPJ1
6446–M, 6429, 6430, 6432, 6453, 6464, 6465, and 6467 are 5.25–inch disks that hold 234 Mbytes. These disks work from a CSS/2 or a CSS/2 DC. Model 6491 is a 5.25–inch disk that holds 322 Mbytes in a CSS/2, a CSS/2 DC, or a Peripheral Housing Unit (PHU). Model 6539 is a 5.25–inch disk that holds 179 Mbytes in a PHU. A controller can run seven units. Models 6554, 6662, 6685, and 6740 are 5.25–inch disks that hold 662 Mbytes, 332 Mbytes, 1 Gbyte, and 1 Gbyte respectively in a CSS/2, a CSS2/DC, or a Peripheral Housing Unit (PHU). A controller can run seven units. Models 6492, 6578, and 6579 are 8–inch disks; one disk holds 727 Mbytes. A 6492 has one disk; 6578 two disks; and 6579, four disks.	24	First(0) Second(1) Third(2) Fourth(3) Fifth(4) Sixth(5) Seventh(6)	DPJ0 DPJ1 DPJ2 DPJ3 DPJ4 DPJ5 DPJ6

(continued)

Table A–2 All AOS/VS Disk Unit Names and Device Codes

Disk Model Number, Description, and Capacity	Default Device Code of Controller	Disk Number on Controller	Disk Unit Name
Models 6581, 6582, 6584, 6621, 6622, 6624, 6631, 6632, and 6634 are Rapid Access Mass Storage (R.A.M.S.) disks. Model 6581 holds one 500–Mbyte disk; Model 6582 holds two 500– Mbyte disks; and Model 6584 holds four 500–Mbyte disks. A controller can run as many as eight units. Model 6621 is one 1.2–Gbyte disk; a controller can run up to four units. Model 6622 holds two 1.2 Gbyte disks; and Model 6624 holds four 1.2 Gbyte disks. Models 6631, 6632, and 6634 hold one, two, and four disks, respectively, of 600 Mbytes each. Model 6627 is a 5.25–inch erasable magneto–optical disk that holds 600 Mbytes.	24	First(0) Second(1) Third(2) Fourth(3) Fifth(4) Sixth(5) Seventh(6) Eighth(7)	DPJ0 DPJ1 DPJ2 DPJ3 DPJ4 DPJ5 DPJ6 DPJ7

(concluded)

End of Appendix

Appendix B
Files Shipped with AOS/VS

Table B–1 lists and describes files that are part of AOS/VS Revision 7.69, shipped on the release media—tape or diskette—and listed in :UTIL:7.69_AOSVS_FILES.

Table B–1 lists files by filename in ASCII order (as FILESTATUS/SORT displays them), followed by the location of the file and a brief description of the purpose of the file. Files that ship with AOS/VS Model 31133 only or with Model 3900 only are so noted. To conserve space, some filenames include the + template to indicate more than one file. For example, instead of showing the more than one hundred CLI command Help files (CLI.CMD.ACL through CLI.CMD.XEQ), we show only one: CLI.CMD.+.

General filename suffix conventions are: a .CLI suffix indicates a CLI macro; a .PR suffix, a program file; an .OL suffix, an overlay file; and an .ST suffix, a symbol table.

Table B–1 Files Shipped with AOS/VS

Filename	Description
069_000031_02	In :UTIL. Documentation–changes file for *Learning to Use Your AOS/VS System.*
069_000293_00	In :UTIL. Documentation–changes file for *Starting and Updating Preinstalled AOS/VS.* Model 31133 only.
085_000147_16	In :UTIL. Disk file copy of the AOS/VS Model 3900 Release Notice.
085_000780_09	In :UTIL. Disk file copy of the AOS/VS Model 31133 Release Notice. Model 31133 only.
093_000242_02	In :UTIL. Documentation–changes file for *AOS/VS Macroassembler (MASM) Reference Manual.*
093_000245_02	In :UTIL. Documentation–changes file for *AOS/VS Link and Library File Editor (LFE) User's Manual.*
093_000246_01	In :UTIL. Documentation–changes file for *AOS/VS Debugger and File Editor Users Manual.*
093_000335_01	In :UTIL. Documentation–changes file for *AOS/VS System Concepts.*
093_000541_01	In :UTIL. Documentation–changes file for *Managing AOS/VS and AOS/VS II.*
093_000646_00	In :UTIL. Documentation–changes file for *Using the CLI (AOS/VS and AOS/VS II).*
093_000714_00	In :UTIL. Documentation–changes file for *Supplement I to Managing AOS/VS and AOS/VS II.*
7.70	In :UPDATE. Directory that contains required and optional patches. *See* 7.70_+_+PAT in this table.
7.70_UPDATE_SCRIPT.CLI	In :UPDATE. A macro that installs update 7.70. This calls other macros.
7.70_+_OPAT	In :UPDATE:7.70. Optional patches. Type each patch file to see the change in functionality or problem it corrects.
7.70_+_PAT	In :UPDATE:7.70. Required patches. Type each patch file to see the problem it corrects.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
AGENT.PR AGENT.ST	In the : (root). The Agent program provides user interface to AOS/VS system calls.
ALPHARS.PR ALPHARS.ST	In the : (root). Operating system to run in MIOC controlier, used on MV/7800 DCX/DC and MV/4000 DC/SC systems. Model 3900 only. AOS/VS loads it on startup.
ANSI_+.PR ANSI_+.ST	In the : (root). Operating systems that let MIOCs, IACs, CPI/24s, and Local–bus Asynchronous Controllers support ANSI (VT100) terminals, modems, and Kanji. AOS/VS loads these files on startup.
AOSVS.PANICS.SR	In :UTIL. Explanation of panic codes (as displayed with *AOS/VS FATAL ERROR* message).
AOSVS_MODEL	In :UTIL. A file containing the text string "3900" or "31133." The UP_EXEC.CLI macro reads this file to determine how to tailor the SMI interface.
ASCII	In :UTIL:FORMS. EXEC mapper file that defines the printable 7–bit ASCII character set.
BELL.CLI	In :UTIL. A file used by the System Management Interface (SMI). The SMI uses this file to ring the terminal bell (beep).
BOOMER.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*
BRAN.PR BRAN.ST	In :UTIL. Break file analyzer, useful for problem diagnosis by system programmers.
BROADCAST.CLI	In :UTIL. A macro used by the System Management Interface (SMI). The macro lets a user send a message to all users on the system.
BROADCAST_SELF.CLI	In :UTIL. A macro the System Management Interface (SMI) uses. It simulates a broadcast when SMI is in tutorial mode. (Tutorial mode, however, is no longer supported.)
BSCGEN.PR BSCGEN.ST	In :SYSGEN. Program to generate support for bisynchronous communications lines, needed if your system will communicate with IBM systems using bisync protocol.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
BUILD_SAMPLE.CLI	In :UTIL:COOP_TOOLKIT. A macro that compiles and links the sample EXEC cooperative.
CERMES.OB	In :UTIL. Error message file for the C programming language.
CHECK_CON0.CLI	In :UTIL. A macro the System Management Interface (SMI) uses. Used by the BROADCAST.CLI macro to see if CON0 is a link.
CHECK_SPACE.CLI	In :UTIL. CLI macro to monitor disk space remaining in the system log directory.
CLEAR	In : (root). File to clear a laser document printer.
CLEAR_SCREEN.CLI	In :UTIL. File that displays a form feed when typed by other macros.
CLI.CLI	In :UTIL. A macro the System Management Interface (SMI) uses. The macro chains to the CLI.
CLI.CMD.+	In :HELP. CLI16 command Help files with text for CLI HELP/V displays (108 files).
CLI.OL	In : (root). A link to CLI16.OL. Model 31133 only.
CLI.PR	In : (root). Link file to :CLI16.PR, but you can change this to be a link to :CLI32.PR.
CLI.PSM.+	In :HELP. CLI16 pseudomacro Help files (59 files). They provide text for Help displays for CLI pseudomacros.
CLI.TPC.+	In :HELP. CLI topic Help files (54 files with AOS/VS; other software has additional topic Help files). They provide the text for CLI HELP and Help topic displays.
CLI.TPC.UPDATE	In :UPDATE. (Identical to :HELP:CLI.TPC.UPDATE.) Help file for the update tool.
CLI16.OL CLI16.PR CLI16.ST	In : (root). CLI16—16–bit version of the user interface to AOS/VS.
CLI32.CMD.+	In :HELP. CLI32–only command Help files (11 files). They provide text for CLI32–only command HELP displays.
CLI32.PR CLI32.ST	In : (root). CLI32—32–bit version of the user interface to AOS/VS.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
CLI32.PSM.+	In :HELP. CLI32–only pseudomacro Help files (8 files). They provide text for CLI32–only pseudomacro Help displays.
CLI32ERMES.OB	In :UTIL. Message file with text for CLI32 error messages.
CLIERMES.OB	In :UTIL. Message file with text for CLI6 error messages.
CLIBT.LB	In :SYSGEN. System–generation library VSGEN uses to build the special CLI used for initial load.
CLREERMES.OB	In :UTIL. Error message text for programming languages in the Common Language Runtime Environment (CLRE); these include practically all programming languages available from Data General.
CONTEST.+.PR CONTEST.+.ST	In :UTIL. A set of nine programs (and their symbol tables) that test MV/Family hardware.
CONTEST.CLEAN.CLI	In :UTIL. Macro to delete temporary files created by CONTEST.
CONTEST.CLI	In :UTIL. Macro to execute CONTEST test suite.
CONTEST.ERRORS.CLI	In :UTIL. Macro to display errors found by CONTEST.
CONVERT.PR CONVERT.ST	In :UTIL. Program to convert an RDOS object file (.RB file) to an AOS, AOS/VS, or AOS/VS II object file (.OB file).
COOP_TOOLKIT	In :UTIL. Directory containing files needed to create an EXEC cooperative program.
COOP_+	In :UTIL:COOP_TOOLKIT. An object file, library file, documentation file, and C and PL/I include files for creating an EXEC cooperative program.
CPIO.CLI CPIO.PR CPIO.ST	In :UTIL. Macro and program to dump or load files in UNIX cpio format (CPIO.PR is a link to TAR.PR); has UNIX option interface.
CPIO_VS.CLI CPIO_VS.PR CPIO_VS.ST	In :UTIL. Macro and program to dump or load files in UNIX cpio format (CPIO_VS.PR is a link to TAR_VS.PR); has AOS/VS switch interface.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
CPIRS.PR CPIRS.ST	In : (root). Operating system to run in a CPI/24 (Computer–PBX Interface) asynchronous line controller. Model 3900 only. The AOS/VS PMGR loads this into CPI(s) on startup.
CREATE_WINDOW.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Model 31133 only. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*
CX.CLI	In :UTIL. CLI macro that lets you issue EXEC commands using the form CX cmd.
DEBUG4.+	In :HELP. Help files for assembly–language debugger (30 files).
DEFAULT.SPEC	In :SYSGEN. File with default specifications for BSCGEN.PR.
DEFAULT.SYS	In :SYSGEN. Link to the default system STARTER.SYS brings up.
DEVLIB.LB	In :SYSGEN. System–generation library VSGEN uses to build device drivers.
DFMTR DFMTR.ST	In : (root). Stand–alone Disk Formatter, to create or modify a logical disk unit (LDU).
DFMTR.PR DFMTR.ST	In :UTIL. Stand–among Disk Formatter, to create or modify a logical disk unit (LDU). Runs under AOS/VS.
DGI	In :UTIL:FORMS. EXEC XLPT mapper file that defines the printable 8–bit Data General International character set.
DGI_TO_ASCII	In :UTIL:FORMS. EXEC XLPT mapper file that defines the printable 8–bit Data General International character set, mapped to 7–bit ASCII characters (where possible).
DGLERMES.OB	In :UTIL. Message text for DG/L language errors.
DGXTERM_DEFAULTS	In :UTIL. X resource specifications for using an xterm window as a Data General terminal.
DISCO.PR DISCO.ST	In :UTIL. DISCO disk–load monitor program.
DISKETTE_BACKUP.CLI	In :UTIL. A macro the System Management Interface (SMI) uses. The macro lets users back up files to diskettes.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
DISKETTE_RESTORE.CLI	In :UTIL. A macro the System Management Interface (SMI) uses. The macro lets users restore files from diskettes.
DISPLAY.PR DISPLAY.ST	In :UTIL. DISPLAY program, to display contents of a file.
DLIST.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*
DOWN.CLI	In : (root). Macro to bring down multiuser environment. Model 31133 only.
DOWN.CLI	In :UTIL. Sample macro to bring down multiuser environment. Model 3900 only. You edit this macro and then move it to the root.
DPJ1_FIXUP_SCRIPT.FXP	In : (root) and :UTIL. A FIXUP scriptfile for systems running the System Management Interface (SMI).
DU.CLI DUM.CLI DUMP.CLI	In :UTIL. Macros to run DUMP_II instead of the CLI DUMP command. Executed if you are running CLI32.PR (which does not include the DUMP command).
DUMP_II.CLI DUMP_II.PR DUMP_II.ST	In : (root) and in :UTIL. DUMP_II macro and program for file backup. The files DUMP_II.PR and DUMP_II.ST in :UTIL are links to the files in the root.
DUMP_LOAD_ERMES	In : (root) and in :UTIL. Error message text for the DUMP_II and LOAD_II programs. The file in :UTIL is a link to the file in the root.
DUMPLIB.LB	In :SYSGEN. System–generation library of routines to create a memory dump driver.
EBID.SR ECID.SR	In :UTIL. ECLIPSE basic and commercial instruction definitions, used to create macroassembler permanent symbol file.
EDIT.CLI	In :UTIL. A macro the System Management Interface (SMI) uses. It lets SMI users edit macros like UP.CLI.
EMASM.CLI	In :UTIL. Macro to assemble error message object files (+ERMES.OB); for AOS/VS programs, these object files are shipped ready–made.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
ERMES	In : (root). Error message file. As shipped, this file includes error text for all AOS/VS programs, C, DG/L, FORTRAN 77, PL/I, and assembly language runtime errors.
ERMES.SR	In :UTIL. Source file that explains the format of ERMES error messages in AOS/VS.
EXEC.+	In :HELP. EXEC help files; they provide text for XHELP commands (59 files).
EXEC.PR EXEC.ST	In :UTIL. EXEC program, which manages user logon and logoff and spooling. *See also* XBAT.PR, XMNT.PR, and XNET.PR.
F77ERMES.OB	In :UTIL. Message text for FORTRAN 77 runtime errors.
FCU.PR, FCU.ST	In :UTIL. Forms control utility that lets you create printer specification files for special form printing.
FED.+	In :HELP. Help files for assembly language disk file editor (16 files).
FED.PR FED.ST	In :UTIL. Disk file editor that lets you change contents of disk locations.
FF.CLI	In :UTIL. Macro to print a form feed (blank sheet) at the end of a print job, useful for separating jobs.
FILCOM.PR FILCOM.ST	In :UTIL. Program to compare binary files and display differences. (To compare text files use SCOM.PR.)
FILCREATE.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary*.
FIXUP FIXUP.ST	In : (root). Stand–alone disk fixer, corrects LDU inconsistencies after an abnormal shutdown.
FIXUP.PR FIXUP.ST	In :UTIL. Stand–among disk fixer, corrects LDU inconsistencies after an abnormal shutdown; runs under AOS/VS.
FORMS	In :UTIL. Directory with forms files for special forms printing.
FULL_BACKUP.CLI	In :UTIL. Macro to execute full backup of user files and non–AOS/VS files to diskettes.
FULL_DUMP.CLI	In :UTIL. Macro to execute full backup of user files and non–AOS/VS files to labeled magnetic tape.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
GATE.ARRAY.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*
GRAPHICS_SAMPLE.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. Model 31133 only. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*
GSMGR.PR GSMGR.ST	In : (root). Global synchronous–line manager program; run it if your system will use synchronous lines.
HEAR.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*
HELP	In : (root). Directory that holds Help files.
HELPV.CLI	In :UTIL. Macro to display verbose Help messages.
HISTO.PR HISTO.ST	In :UTIL. Histogram generator program files.
HISTOREPORT.PR HISTOREPORT.ST	In :UTIL. Histogram report generator (works on files created by HISTO.PR).
IAC24RS.PR IAC24RS.ST	In : (root). Operating system to run in a new IAC–24 asynchronous line controller. The AOS/VS PMGR loads this into IAC–24(s) at startup. Model 3900 only.
IAC8RS.PR IAC8RS.ST	In : (root). Operating system to run in a new IAC–8 asynchronous line controller. The AOS/VS PMGR loads this into IAC–8(s) at startup. Model 3900 only.
IACRS.PR IACRS.ST	In : (root). Operating system to run in an IAC asynchronous line controller. The AOS/VS PMGR loads this into IAC–8(s) at startup. Model 3900 only.
INC_BACKUP.CLI	In :UTIL. Macro to run incremental backup of user files to diskettes. Used between full backups done by FULL_BACKUP.CLI.
INC_DUMP.CLI	In :UTIL. Macro to run incremental backup of user files to labeled magnetic tape. Used between full backups done by FULL_DUMP.CLI.
INRING.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
INSTALL.CLI	In :UTIL. A macro the System Management Interface (SMI) uses. The macro lets a user load files from release media.
INSTL INSTL.ST	In : (root). Stand–alone Installer program, to install a disk bootstrap and a system bootstrap and, optionally, a system on an LDU.
INSTL.PR INSTL.ST	In :UTIL. Stand–among Installer program, to install a disk bootstrap and a system bootstrap and, optionally, a system on an LDU; runs under AOS/VS.
IOPRS.PR IOPRS.ST	In : (root). Program to run in an ATI's IOP (ECLIPSE MV/8000 with model numbers beginning with 93). Model 3900 only. Loaded by AOS/VS PMGR.
ITC1RS.PR ITC1RS.ST ITC2RS.PR ITC3RS.PR	In : (root). Operating system to run in an Intelligent Terminal Controller for systems other than deskside ECLIPSE systems. The AOS/VS PMGR loads these files into the ITC on startup.
KANJI	In :UTIL:FORMS. EXEC XLPT mapper file that defines the printable Kanji character set.
KANJI_+.PR KANJI_+.ST	In : (root). Operating systems that let MIOCs, IACs, CPI/24s, and Local–bus Asynchronous Controllers support the Kanji character set. AOS/VS loads these files on startup.
KATAKANA	In :UTIL:FORMS. EXEC XLPT mapper file that defines the printable Katakana character set.
LABEL.PR LABEL.ST	In :UTIL. Tape labeling program; use it to create labeled tape sets before using the tapes for backup.
LAC32RS.PR LAC32RS.ST	In : (root). Operating system to run in a LAC–32, 32–line Local–Bus Asynchronous Controller. The AOS/VS PMGR loads it into the IAC on startup. Model 31133 only.
LACRS.PR LACRS.ST	In : (root). Operating system to run in a Local–Bus Asynchronous Controller (LAC, also known as IAC–12). The AOS/VS PMGR loads it into the LAC on startup. Model 31133 only.
LANG_RTERMES.OB	In :UTIL. Message text for Data General runtime language errors.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
LFCOPY.PR LFCOPY.ST	In :UTIL. Labeled diskette copy program, copies a memory dump that was done to diskettes. Intended for Data General personnel.
LFE.PR LFE.ST	In :UTIL. Library file editor program, builds libraries from program routines.
LIB1.LB LIB2.LB LIB3.LB LIB4.LB	In :SYSGEN. System–generation libraries, used to build AOS/VS operating systems.
LINK.PR LINK.ST	In :UTIL. Linker program, creates executable program files from object files.
LINKERMES.OB	In :UTIL. Error message text for Link program errors.
LINK_ERMES.CLI	In :UTIL. Macro to create new error message file (ERMES).
LMC8RS.PR LMC8RS.ST	In : (root). Operating system to run in a Local–Bus Modem controller (LMC). The AOS/VS PMGR loads this at startup. Model 31133 only.
LOA.CLI LOAD.CLI	In :UTIL. Macros to run LOAD_II instead of the CLI LOAD command. Executed if you are running CLI32.PR (which does not include the LOAD command). LOAD.CLI is a macro that runs LOAD_II.PR. LOA.CLI is a link to LOAD.CLI.
LOAD_II.CLI LOAD_II.PR LOAD_II.ST	In : (root). LOAD_II macro and program for file backup.
LOAD_II.CLI LOAD_II.PR LOAD_II.ST	In :UTIL. LOAD_II.CLI is a macro that runs LOAD_II.PR. The other files are links to LOAD_II files in the root.
LOCK_CLI.OL LOCK_CLI.PR LOCK_CLI.ST	In :(root). A 16–bit CLI that can be locked so as to prevent anyone from issuing critical CLI or EXEC commands. Designed to safeguard the system console.
LOGCALLS.PR LOGCALLS.ST	In :UTIL. System call logger program.
LOGON LOGON.MESSAGE	In :UTIL. Directory LOGON contains the message file LOGON.MESSAGE, a text file supplied with Model 31133 AOS/VS systems. You can edit this file using the SED text editor. (You can also create this file on Model 3900 systems in directory :UTIL.)

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
LPMGR.PR LPMGR.ST	In : (root). Local peripheral manager (PMGR) program that runs terminals for users; the system loads it into memory (in ring 3) at startup. *See also* PMGR.PR.
LTC1RS.PR LTC1RS.ST LTC2RS.PR	In : (root). Operating system to run in an Intelligent Terminal Controller for ECLIPSE MV/1000 DC, MV/2000 DC, and MV/2500 DC systems. The AOS/VS PMGR loads these files into the LTC on startup. Model 31133 only.
MASM.PR MASM.PS MASM.ST	In :UTIL. Macroassembler program and permanent symbol file (MASM.PS).
MASM16.PR MASM16.PS MASM16.ST	In :UTIL. Macroassembler program for 16–bit programs and permanent symbol file (MASM16.PS).
MASMERMES.OB	In :UTIL. Error text for macroassembler errors.
MASMXR.PR MASMXR.ST	In :UTIL. Macroassembler cross–reference generator.
MASM_32CHAR.PS	In :UTIL. Macroassembler 32–character symbol file.
MIRRORINFO.PR MIRRORINFO.ST	In :UTIL. Logical disk mirroring information utility. Model 3900 only.
MKABS.PR MKABS.ST	In :UTIL. Program to copy an RDOS save file (program file) into an absolute binary file.
MODEM_IACRS.PR MODEM_IACRS.ST	In : (root). Files providing modem support on an IAC.
MSCOPY.BTSFPLK MSCOPY.CLI MSCOPY.PR MSCOPY.ST	In :UTIL. MSCOPY modified sector disk backup program files: error message file, macro, program file, and symbol table file. Model 3900 only.
MSCOPY.COMMAND_HELP	In :HELP. Help file displayed while executing MSCOPY. Model 3900 only.
MV2000.CSF MV2000.PR MV2000.SSF MV2000.ST	In :SYSGEN. VSGEN specification and program files for DS/7500 and ECLIPSE MV/1000 DC, MV/1400 DC, MV/2000 DC, and MV/2500 DC systems.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
MV2000_SMI.CSF MV2000_SMI.PR MV2000_SMI.SSF MV2000_SMI.ST	In :SYSGEN. VSGEN specification and program files for DS/7500 and ECLIPSE MV/1000 DC, MV/1400 DC, MV/2000 DC, and MV/2500 DC systems with the System Management Interface (SMI) enabled.
MV5500.CSF MV5500.PR MV5500.SSF MV5500.ST	In :SYSGEN. VSGEN specification and program files for ECLIPSE MV/3000–Series and MV/5000–Series Systems.
MV5500_SMI.CSF MV5500_SMI.PR MV5500_SMI.SSF MV5500_SMI.ST	In :SYSGEN. VSGEN specification and program files for ECLIPSE MV/3000–Series and MV/5000–Series Systems.
NEWFS_MIGRATION NEWFS_CHECKLIST NEWFS_MIGRATION.DOC NEWFS_WORKSHEET	In :UTIL. Directory containing a check list, manual, and worksheet to help plan migrating from the AOS/VS file system to the AOS/VS II file system.
NEWTASK.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*
OP OP	In :UDD. User directory for OP. Model 31133 only. (You can create a user directory for OP with Model 3900.) In :UPD. User profile for OP. Model 31133 only. (You can create a user profile for OP with Model 3900.)
PARU.16.SR PARU.32.SR PARU_LONG.SR	In :UTIL. User parameter definitions for 16– and 32–bit macroassemblers and for system calls used in 32–bit high–level language programs (defines long symbol names).
PASSWORD	In : (root). A file containing the encrypted, default 32–bit CLI password, which is PASSWORD.
PATCH.PR PATCH.ST	In :UPDATE and :UTIL. Patch program to install patches supplied in :UPDATE.7.68. The update tool uses the Patch program.
PCOPY PCOPY.ST	In : (root). Stand–alone PCOPY physical copy program, which backs up and restores LDUs.
PCOPY.PR PCOPY.ST	In :UTIL. Stand–among PCOPY physical copy program, which backs up and restores LDUs; runs under AOS/VS.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
PED.CLI PED.PR PED.ST	In :UTIL. Process environment display macro and program.
PIDCALL_CHECK.CLI	In :UTIL. Macro that checks a program for system calls that may require change to let a program run with big PIDs.
PIDCALL_CHECK16.FED PIDCALL_CHECK32.FED	In :UTIL. FED input files used by PIDCALL_CHECK.CLI.
PIDSIZE.CLI	In :UTIL. Macro that checks a program's PID–size type.
PL1ERMES.OB PL1ERMES16.OB	In :UTIL. Message text for PL/I and 16–bit PL/I runtime errors.
PLNERMES.OB	In :UTIL. Message text for PL/Nichols runtime errors (this is a custom Data General version of PL/I).
PM.CLI	In :UTIL. A macro the System Management Interface (SMI) uses. The macro places a user's terminal in page mode.
PMGR.PR PMGR.ST	In : (root). Peripheral manager (PMGR) program, loaded by system at startup.
PREDITOR.PR PREDITOR.ST	In :UTIL. PREDITOR user profile editor program to create profiles and assign privileges.
QCMP.PR QCMP.ST	In :UTIL. Queue compression (cleanup) program.
RDOS.OL RDOS.PR RDOS.ST	In :UTIL. Program that converts RDOS files, tapes, and disks to AOS/VS format, and vice versa.
REPORT.PR REPORT.ST	In :UTIL. Program to generate reports from system log files and error log files.
RESOLVE.LB	In :SYSGEN. System–generation library to avoid Link errors for devices you omit at VSGEN.
RESTORE.CLI	In :UTIL. Macro to restore data backed up by FULL_BACKUP.CLI and INC_BACKUP.CLI, using diskettes.
RESTORE_TAPE.CLI	In :UTIL. Macro to restore data backed up by macros FULL_DUMP.CLI and INC_DUMP.CLI, using tape.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
RINGLOAD.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary*.
RUNTIME.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary*.
SAMPLE_COOP.C	In :UTIL:COOP_TOOLKIT. A simple cooperative program of an EXEC user cooperative.
SCOM.PR SCOM.ST	In :UTIL. Program to compare text (source) files and display differences.
SED.+	In :HELP. Help files for SED text editor (40 files).
SED.DICTIONARY	In :UTIL. Word list the SED text editor uses for spelling assistance.
SED.PR SED.ST	In :UTIL. SED text editor program.
SEDERMES.OB	In :UTIL. Error message text for SED text editor.
SETUP.CLI	In : (root) and in :UTIL. A macro the System Management Interface (SMI) uses as the default initial IPC file for all user profiles. The macro sets the default ACL and search list.
SKIPS.SR	In :UTIL. File that defines useful assembly language macros for skips and graphics instructions.
SLDCU.PR	In : (root). Operating system to run in a DCU synchronous line controller. The GSMGR program loads it into the DCU when you create the GSMGR process. Model 3900 only.
SLISC.PR	In : (root). Operating system to run in an ISC synchronous line controller. The GSMGR program loads it into the ISC when you create the GSMGR process.
SMI.CLI SMI.PR SMI.ST	In :UTIL. The System Management Interface (SMI) program and the macro that executes it.
SMI_CLI.OL SMI_CLI.PR SMI_CLI.ST	In :UTIL. A special CLI program that performs CONTROL @EXEC status commands for the System Management Interface (SMI).

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
SMI_DOWN.CLI	In :UTIL. A DOWN.CLI macro for systems that use the System Management Interface (SMI). Model 3900 only.
SMI_ERMES	In :UTIL. SMI error message text file.
SMI_HELP	In :HELP. SMI Help text file library.
SMI_OPCON.PR SMI_OPCON.ST	In :UTIL. A program the System Management Interface (SMI) uses to let you send commands to the master CLI process—and to see system response to those commands.
SMI_TEXT	In :UTIL. SMI screen text file library.
SMI_UP.CLI	In :UTIL. A modified UP.CLI for systems that use the System Management Interface (SMI). Model 3900 only.
SON.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary*.
SPEAK.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary*.
SPEED.PR SPEED.ST SPEEDERMES.OB	In :UTIL. SPEED text editor program and error text for SPEED program errors.
SPRED.PR SPRED.ST	In :UTIL. Symbolic Preamble Editor program, to edit program preambles and specify items like the number of pages to load on a page fault.
STACKER.PR STACKER.ST	In :UTIL. Stacker program that EXEC uses to handle punched card images.
STARTER.SYS STARTER.SYS.ST	In : (root). AOS/VS starter system for deskside ECLIPSE systems. Model 31133 only.
STARTER.SYS_DISKETTE1 STARTER.SYS_DISKETTE2 STARTER.SYS_DISKETTE3	In : (root). Copy of the AOS/VS starter system, divided into three files for copying to diskettes. Used by the System Management Interface (SMI). Model 31133 only.
STARTER_HELP	In :HELP. Starter Help text file library. Model 3133 only.
STR_FORM_AOSVS	In :UTIL. Forms to help you fill out a software trouble report (STR). File STR_FORM_AOSVS is designed for AOS/VS. You can print these forms. Filing an STR is explained in *Managing AOS/VS and AOS/VS II*.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
SYS.CSF SYS.PR SYS.SSF SYS.ST	In :SYSGEN. VSGEN specification and starter program files for ECLIPSE MV/Family computers other than deskside ECLIPSE systems. Model 3900 only.
SYSBOOT SYSBOOT.ST	In : (root). SYSBOOT system bootstrap program that loads microcode (if needed) and loads and starts up AOS/VS.
SYSDISKETTE.CLI	In :SYSGEN. Macro to create a tailored system set of diskettes. Model 31133 only.
SYSERMES.OB	In :UTIL. Error message text for general system runtime errors.
SYSGEN	In : (root). Directory that holds system generation program VSGEN and related files.
SYSID.16.SR SYSID.32.SR	In :UTIL. Definition files for 16–bit and 32–bit system calls, respectively.
SYSMGR	In :UDD. User directory for SYSMGR. Model 31133 only.
SYSMGR	In :UPD. User profile for SYSMGR. Model 31133 only.
SYSTAPE.CLI	In :SYSGEN. Macro to create a tailored system tape.
SYSTEM_CALL_SAMPLES	In :UTIL. A directory that contains sample assembly language programs. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary*.
SYS_REV	In :SYSGEN. File with current AOS/VS revision number.
TAPE_BACKUP.CLI	In :UTIL. A macro the System Management Interface (SMI) uses; it lets users back up files to tape.
TAPE_RESTORE.CLI	In :UTIL. A macro the System Management Interface (SMI) uses; lets users restore files from tape.
TAR.CLI TAR.PR TAR.ST	In :UTIL. Macro and program to dump or load files in UNIX tar format; has UNIX option interface.
TAR_VS.CLI TAR_VS.PR TAR_VS.ST	In :UTIL. Macro and program to dump or load files in UNIX tar format; has familiar AOS/VS switch interface.
TBOOT	In : (root). Tape bootstrap program; when copied to file 0 of a tape, lets you boot tape and asks which tape file to load into memory.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
TIMEOUT.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary.*
UDD	In : (root). Directory that holds all user directories. Shipped with Model 31133 with directories for users OP and SYSMGR. (When you run PREDITOR under Model 3900, the system creates this directory.)
UP.CLI	In : (root). Macro to bring EXEC and the multiuser environment up. Model 31133 only.
UP.CLI	In :UTIL. Sample macro to bring EXEC and the multiuser environment up. Model 3900 only. You can edit this file and then move it to the root.
UPD	In : (root). Directory containing (initially) profiles for users OP and SYSMGR, and shipped with Model 31133. (When you run PREDITOR under Model 3900, the system creates this directory.)
UPDATE	In : (root). Directory that holds directories with update tool, patch files, documentation, update script, and auxiliary macros used to install AOS/VS updates.
UPDATE.CLI UPDATE.DOC UPDATE_EXIT.CLI UPDATE_INIT.CLI UPDATE_INITROUTINE.CLI UPDATE_MOVE.CLI UPDATE_PATCH.CLI UPDATE_ROUTINE.CLI UPDATE_VSGEN.CLI	In :UPDATE. Macros for and documentation about the update tool.
UP_EXEC.CLI	In : (root) and in :UTIL. A macro the System Management Interface (SMI) uses. The macro runs EXEC on the system console, requiring you to log on to use the system console.
UPPER	In :UTIL:FORMS. EXEC XLPT mapper file that defines the printable 8–bit Data General International character set, mapping lowercase characters to uppercase.
URT16.LB URT32.LB	In :UTIL. User runtime libraries for 16–bit and 32–bit programs respectively; contain essential runtime code for user programs.
UTIL	In : (root). Directory that holds system utility programs and files.

(continued)

Table B–1 Files Shipped with AOS/VS

Filename	Description
VSGEN+	In :HELP. Help files for VSGEN commands (14 files).
VSGEN.DATA VSGEN.PR VSGEN.QUES VSGEN.ST	In :SYSGEN. VSGEN data, program, and question files.
WAIT_FOR_NO_PORT.CLI	In :UTIL. Macro that DOWN.CLI macro uses to determine that EXEC is halted.
WAIT_FOR_PORT.CLI	In :UTIL. Macro that UP.CLI macro uses to determine that EXEC is running.
WHOS.CLI	In :UTIL. Macro that displays the names of all processes running on the system.
WRITE.SR	In :UTIL:SYSTEM_CALL_SAMPLES. Sample assembly language program. For more detail, see *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary*.
XBAT.PR XBAT.ST	In :UTIL. Batch program, works with EXEC to manage batch queues and streams.
XERMES.OB	In :UTIL. Error message file with text for EXEC errors.
XHELP.CLI	In :UTIL. Macro to display EXEC Help messages.
XLPT.PR XLPT.ST	In :UTIL. XLPT program, works with EXEC to manage printers and other spooled devices.
XMNT.PR XMNT.ST	In :UTIL. Mount facility manager program, works with EXEC to manage user tape mount requests.
XNET.PR XNET.ST	In :UTIL. Network queue manager program, works with EXEC to manage network queues.
XYZZY.PS	In :SYSGEN. AOS/VS permanent symbol file, used for macroassembly during system builds.
XYZZY1.SR XYZZY2.SR XYZZY3.SR	In :SYSGEN. AOS/VS symbol definition files, may be needed for macroassembly during system builds.
XYZZYERMES.OB	In :UTIL. Message file with text for AOS/VS errors.
ZERMES.OB	In :UTIL. Message file with text for CLI16 error messages.

(concluded)

End of Appendix

Appendix C
Powering Up for the First Time and Loading Microcode — ECLIPSE MV/4000 DC, MV/4000 SC, and Data General DS/4000–Series Computers

This appendix tells you how to load microcode for the first time and bring up the SCP on the following machines:

ECLIPSE MV/4000 DC and MV/4000 SC
Data General DS/4000–series

Read this appendix only if you need to build (or rebuild) AOS/VS from scratch on a blank disk. If the SCP CLI prompt (*SCP–CLI>*) is showing on the system console, you don't need to execute these steps; return to Chapter 2.

First–Time Powerup

In this section, you'll power up your computer and load microcode.

All MV/4000 DC, MV/4000 SC, and DS/4000 computer systems include at least one 737,000–byte diskette unit. An optional extra is a tape unit. Several programs (the IOC emulator and SCP/microcode) are supplied on diskettes.

To power up, you need two diskettes, or diskette plus cartridge tape, from the following groups:

- The I/O CB emulator, on one diskette. The diskette label, second line, includes the words "I/O CB EMULATOR."
- System media and microcode, on two diskettes or a cartridge tape. If you received system media on diskettes, one of the diskette labels includes, on its second line, the words "... SYSTEM MEDIA"; this is the first diskette. On the other diskette, the second text line includes the words "MVn000xxx.MCF" and the last line includes "AOS FMT." You'll use the first diskette to power up; and you'll use the second after installing AOS/VS (Chapter 2).

  If you received system media on tape, the tape label has the words "xxx SYSTEM MEDIA" on its second line.

1. The following steps assume that CPU power is off. If it's on, turn it off.

2. Turn on the system console. The switch is an on/off rocker behind the console or a push switch on the front. The console may display a test message and beep. If there is an ON LINE light on the keyboard, it should glow. (If the light doesn't glow, press the CMD key, hold CMD down, and press the ON LINE key. The ON LINE light should glow.) If there is no ON LINE key, check the ON LINE switch behind the unit.

   Adjust brightness by moving the brightness control (a slide under the right side of the unit or a knob on the lower right); ensure that brightness is set to let you see the screen cursor.

   If your keyboard has an ALPHA LOCK key (next to the space bar), press it to make the ALPHA LOCK light glow. You need to set ALPHA LOCK because one of the programs you'll use doesn't accept lowercase letters.

3. To use the tape unit, you must turn it on before turning computer power on. If you have a tape unit, turn it on now, by moving its switch to ON—1.

4. Find the diskette labeled "I/O CB EMULATOR." Insert it in unit 0 as follows. If you have two diskette units, the right one is unit 0.

4a. Turn the latch beside the slot to the vertical position.

4b. Remove the diskette from its outer envelope. Don't try to remove the inner envelope—the diskette must remain in this.

4c. Hold the diskette by the edges and examine it. One side has a paper label and the other is blank. On each side, the envelope is cut away to expose part of the diskette surface. Just a reminder—*don't touch the diskette surface.* The oil on your finger could make that part of the diskette unreadable. One edge of the diskette has a small notch (about 1/4 x 1/4 inch). This is the *write—enable* notch. When this notch is uncovered, information can be written to the diskette.

4d. Hold the diskette with the write—enable notch up and your fingers on the label. Slide it into the unit slot. The diskette should slide in smoothly and come to a firm stop.

4e. Turn the latch beside the slot to the horizontal position. This locks the diskette in the unit.

5. Turn computer power on via the power switch on the cabinet. The power light above the switch should glow. The computer runs power—up tests.

6. With an MV/4000–series system, the system console prompts

   MV4000 READY

   IOC EMULATOR INSTALLER

   (Wait 50 to 60 seconds here.)

   STATUS OF IOC EMULATOR ON HARD DISK

   1. INSTALL AND RUN IOC EMULATOR ON HARD DISK
   2. VERIFY IOC EMULATOR ON HARD DISK
   3. RUN ONLY
   4. INSTALL ONLY
   5. EXIT

   CHOOSE ONE: [1]

   If nothing happens after 30 seconds, perhaps you misinserted the diskette. Remove the diskette, turn computer power off, and return to step 4.

   If you see an incomplete *READY* message after 30 seconds, turn computer power off and on again. If the full message still does not appear, perhaps the system has problems; depending on your contract with Data General, consult your Data General support organization.

7. You must now install the I/O CB emulator on the hard disk. To install and run the emulator, choose the default (1) by pressing NEW LINE:

   CHOOSE ONE: [1]

   A few moments pass. Then

   EMULATOR INSTALLED
   @

8. Remove the diskette from unit 0.

9. If you received system media on a cartridge tape, skip to step 13. If you received system media on diskette, continue.

10. Get the system media diskette with the label that has "xxx SYSTEM MEDIA" written on it.

11. Insert the diskette in unit 0 (right unit, if you have two) as explained earlier.

12. Next to the @ prompt, type 64L.

    @ 64L

    A loader program reads the diagnostic operating system from the diskette. After 5 seconds or so, you'll hear a click as the diskette drive engages. Reading the system from diskette takes 10 to 20 seconds. The system console displays

    TESTOK

    .
    COPYRIGHT DATA GENERAL ...
    ALL RIGHTS ...

    *

    If this message doesn't appear after a minute or so, perhaps you misinserted the diskette. Press the break sequence (CMD and BREAK/ESC). Remove the diskette from the unit and return to step 12.

    With the prompt * showing, skip to step 16.

13. If you received the system media on tape, get the tape with SYSTEM MEDIA on it.

14. Insert the cartridge tape in your tape unit, with the label facing right.

15. Wait for the tape unit READY light to glow. Then, next to the @ prompt, type 22L (or 23L, for an MTJ tape unit)—for example,

    @ 22L

    A loader program reads the diagnostic operating system from the tape. This may take a few moments. Then the system console displays

    TESTOK

    .
    COPYRIGHT DATA GENERAL ...
    ALL RIGHTS ...

    *

    If this message doesn't appear after a minute or so, type the break sequence (CMD and BREAK/ESC keys); then retry this step.

16. Tell the diagnostic system to load the correct CPU microcode file.

- With an MV/4000 DC or SC and no hardware options (like floating–point unit or graphics instruction set), the filename is MV4000.
- With an MV/4000 DC or SC and optional hardware floating–point unit, but without the graphics instruction set, the filename is MV4000FP.
- With an MV/4000 DC or SC and optional graphics instruction set (without hardware floating–point unit), the filename is MV4000G.
- With an MV/4000 DC or SC and both hardware floating–point unit and graphics instruction set, the filename is MV4000GFP.

Next to the * prompt, type the LOAD command, followed by the correct microcode filename for your machine. For example,

```
* LOAD MV4000FP ↵        (For an MV/4000 with FPU).
```

After a few moments, you'll see messages like

```
MV4000.. MICROCODE REV n LOADING
   .
   .
   .
MV4000.. MICROCODE REV n LOADED AND VERIFIED
*
```

17. Exit from the diagnostic system by typing EXIT:

```
* EXIT↵

CPU HALTED
SCP–CLI>
```

18. Microcode is loaded into the computer, and the SCP CLI, which allows you to start other programs, has control (as you can tell by the prompt).

19. Remove the diskette or tape from unit 0. For diskette, return the diskette to its outer envelope. For tape, return the cartridge to its protective case.

You're finished with first–time powerup. This sequence will work anytime you want to cold start your system, but it's easier to have everything loaded automatically, as will happen after you format your system disk and install microcode on it. To format your system disk, return to Chapter 2.

End of Appendix

Appendix D
Powering Up for the First Time and Loading Microcode — ECLIPSE MV/20000, MV/18000, MV/15000, MV/10000, MV/8000, MV/7800, MV/6000, and MV/4000 Computers

This appendix tells you how to load microcode for the first time and bring up the SCP on the following machines:

MV/20000 Models 1, 2, and C
MV/18000 Models 1 and 2
MV/15000 Models 8, 10, 20, and S
MV/10000 and MV/10000 SX
MV/8000, MV/8000 II, and MV/8000 C
MV/7800, MV/7800 C, and MV/7800 XP
MV/6000
MV/4000

Read it only if you need to build (or rebuild) AOS/VS from scratch on a blank disk. If the SCP CLI prompt (*SCP–CLI>*) is showing on the system console, you don't need to execute these steps; return to Chapter 3. For first–time powerup on an MV/40000 system, see the manual *Starting ECLIPSE MV/40000–Series Systems*, supplied with the computer. For first–time powerup on an MV/9000–series systems, see the manual *Starting ECLIPSE MV/9500™ Computer Systems*.

First–Time Powerup

In this section, you'll power up your computer and load microcode.

1. Find the correct tape. This tape, shipped with the computer hardware, is labeled as the MV/n SCP SYSTEM MEDIA tape (for example, the MV/20000 SCP SYSTEM MEDIA tape). It contains firmware that's independent of the operating system: a diagnostic program, diagnostic operating system (SCP–ADEX), CPU diagnostics, CPU microcode, and the SCP operating system. This tape is vital for first–time powerup; you can also use it in subsequent powerups (although powerups will be much easier if you install the tape's programs on your system disk, as described in Chapter 3).

2. The following steps assume that CPU power is off. If it's on, turn it off.

3. Ready the system console. If this is a hardcopy (printing) terminal, turn it on using the power switch under the keyboard or behind the unit, near the floor. Press the ON LINE switch and the READY light will glow.

   If the system console is a CRT display, turn it on. The switch is a rocker switch behind the unit or a push–pull knob on the front lower right corner. The screen may display a self–test message and beep. Check the ON LINE status light (if any). If this light glows, fine. If it doesn't glow, depress the CMD key, hold CMD down, and press the ON LINE key. The ON LINE light should glow. (If there is no ON LINE key, examine the ON LINE switch behind the unit.)

   On a CRT display, check brightness by moving the brightness control (a slide under the right side of the unit or a knob on the lower right); ensure that brightness is set to let you see the screen cursor.

4. Ready your disk(s). If your primary disk unit is a sealed unit, press ON–1 (or READY or START). Soon, the READY light will glow.

   If your primary disk uses a removable disk pack, make sure a pack is inserted in the unit. Doing this is described in the illustrated disk instruction booklet. Press ON or DC POWER ON, WRITE ENABLE, and DRIVE START. Soon, the READY lamp will light.

   If you want to format multiple disks, make sure all of them are ready.

5. Ready the tape unit. If you have a choice among units, choose the one nearest the computer. (The unit you select must be designated unit 0—the first unit—on the first tape controller.) Turn unit power on.

   If the unit's control panel has a SELECT thumbwheel, it is a type MTB unit. The starter system requires that the MTB controller be connected to the first tape controller device code, 22. Dial 0 on the thumbwheel and make sure that no other unit that is ON LINE has the same number. Then press the MTB unit's panel switch to HIGH DENSITY.

   If the tape unit has no SELECT thumbwheel and its reels are side by side, it is a type MTC unit. Always, the MTC unit you use must be unit 0 on its controller. And the

starter system requires that the MTC controller be connected to the first tape controller device code, 22.

If the tape unit uses a cartridge (a 4– x 4–inch, 120–Mbyte cartridge with half–inch tape or a small tape–cassette size, 21–Mbyte cartridge), it's a type MTC (Models 6311 and 6231) or type MTJ unit. Or, if it has reels side–by–side and model number 6341, it's a type MTJ unit. A 120–Mbyte cartridge unit may be mounted in a separate rack or in a Combined Storage Subsystem (CSS) chassis. The starter system requires that the MTJ controller be connected to the first tape MTJ controller device code, 23.

If the tape unit has touch–sensitive (membrane) switches, or if it has switches at the top, it is a self–threading 1600/6250 b/in unit, type MTD. The MTD unit must be unit 0 on its controller, and the controller must be connected to the second tape controller device code, 62.

(The device code rules above are based on the AOS/VS starter system. The starter system supports an MTB or MTC controller on device code 22, an MTJ controller on device code 23, and an MTD controller on device code 62. If you want the starter system to operate a tape unit, the unit must be connected on the appropriate device code.)

6. Mount and thread the MV/n SCP SYSTEM MEDIA tape, or insert it in the unit, whichever applies. If the unit has a door, close the door, since some units won't operate with the door open.

Tell the unit to load the tape. (On an MTB or MTC unit, press the tape UNLOAD/BOT switch to BOT, and then press ON LINE; the tape will move forward and stop. On an MTD unit, press Reset, Load, and On Line.)

7. With any machine except a blue and white MV/8000, skip to step 8. With a blue and white MV/8000, proceed as follows.

7a. If the MV/8000 system diskette (supplied with the computer) is not in the computer's diskette slot, insert it. Then close the diskette door. Press the computer POWER switch to ON. The computer then runs some power–up tests, displays CONSOLE READY, and prompts

ENTER DATE (MO DAY YR)

7b. Type the date, separating month, day, and year by spaces (for example, 11 22 92) and press NEW LINE. Then type the time, based on a 24–hour clock (for example, 13:30 for 1:30 p.m.) and press NEW LINE. Then, if the system displays a question about microcode, accept the default microcode file by pressing NEW LINE.

The SCP now loads its operating system and the MV/8000 microcode from the diskette. This takes a few moments. Finally, it displays

SCP–CLI>

Skip to step 13.

8. With any machine except a blue and white MV/8000, do the following:

On the computer's front panel, if there is a LOCK switch, press the switch to the OFF or to the unlock position.

Press the computer POWER (or PWR) switch to ON. The computer then runs power–up tests. Then, depending on your computer, the system console displays either

POWER UP TESTING COMPLETED	(on MV/20000, MV/15000, and MV/7800)
. . .	
SCP–CLI/Jpn>	(*Jpn* is not displayed on MV/7800s. If displayed, *n* is usually 0.)

or

*** POWER UP TESTING COMPLETED ** BOOT*	(on MV/10000, MV/8000, and MV/6000)
...	

or

MV4000 READY	(on MV/4000)
@	

If you see nothing, or *POWER UP TESTING – FAILED*, or an incomplete *POWER UP/READY* message, press power off and on again. If the message remains incomplete, or if the failure occurs again, make sure the system console is on and on line, and that the computer has power. If the system console is a CRT, perhaps the screen is too dim; check the brightness control. If there's no obvious problem, the computer may need service. How you receive service depends on your Data General Field Service Maintenance Agreement.

9. Now you must tell the computer to load from the tape. Proceed to the step appropriate for your machine:

- With an MV/20000, MV/18000, MV/15000,or MV/7800, continue with this step.
- With an MV/10000 SX or MV/10000, skip to step 10.
- With an MV/8000 II, MV/8000 C, or MV/6000, skip to step 11.
- With an MV/4000, skip to step 12.

9a. With an MV/20000, MV/18000, MV/15000,or MV/7800, execute the following steps to select automatic booting, set the date and time, and load microcode. First, type

SCP–CLI/Jpn> FLAGS AUTO YES↵

Boot from what device? [0]

9b. Type the device code of the disk from which you will want to start AOS/VS in the future. Generally, for nonremovable disks, the device code is 24; for disks with removable packs, it's 27. Table 3–2, in Chapter 3, gives specific model numbers and device codes. For example,

Boot from what device? [0] 24↵

Then, on an MV/20000 Model 2, it asks for the channel number. Type 0 and press NEW LINE.

9c. Turn computer power off and on again. It displays an Automatic Program Load Menu. You want to change preset values, so type 2 and press NEW LINE.

The Change Preset Values Menu is displayed.

9d. You want to change the date and time, so type 2 and press NEW LINE.

9e. Type the date in the specified format. For MV/20000s, MV/18000s, and MV/15000s, this is dd–mmm–yy (for example, 22–NOV–92). For MV/7800s, the format is mm–dd–yy; (for example 11–22–92).

9f. Type the time, based on a 24–hour clock; for example, for 1:30 p.m., type 13:30 and press NEW LINE.

9g. To answer the question *Offset to GMT,* for now, press NEW LINE. You may want to set the value later. The time offsets are further described in Chapter 6.

9h. Select choice 6 on the menu, the SCP CLI, by typing 6 and pressing NEW LINE.

SCP–CLI>

9i. Type BOOT 22↵ (Or for an MTJ unit, type BOOT 23↵; or for a 6250 b/in unit, type BOOT 62↵.)

Then, on an MV/20000 Model 2, press NEW LINE to choose the default channel number.

The system displays the SCP–ADEX menu.

9j. You want to load microcode, choice 2, so type 2 and press NEW LINE. Wait for the microcode loading messages to stop. Then it displays

SCP–CLI>

Skip to step 13.

10. With an MV/10000 SX or MV/10000, the system console displays

BOOT WHAT DEVICE? (CHANNEL AND DEVICE CODE):

10a. Press the break sequence: CMD and BREAK/ESC key or BRK key.

10b. Next to the *!* prompt, type 22T, to load from an MTB or MTC tape unit, 23T to load from an MTJ unit, or 62T to load from an MTD tape unit.)

! 22T (Or 23T or 62T)

This brings the diagnostic operating system from tape. It displays some messages, and then

*

10c. Next to the * prompt, type

* LOAD SCPOS↵

You may see some *LOADING...* messages. After 70 seconds or so, you'll see an SCP message. It then asks for the date.

10d. Type the date, separating month, day, and year by spaces (for example, 11 22 92); then press NEW LINE.

10e. Type the time, based on a 24–hour clock; for example, 13:30 for 1:30 p.m. It displays initialization messages, followed by

SCP–CLI>

Go to step 13.

11. On an MV/8000 II, MV/8000 C, or MV/6000, the system console displays

BOOT DEVICE?

Type 22 and press NEW LINE.

BOOT DEVICE? 22↵ (62 if tape is on a type MTD tape unit; 23 for a type MTJ.)

The loader program reads the diagnostic operating system from the tape. It displays a TOP OF MEMORY message, and then

*

11a. Next to the * prompt, type

* LOAD SCPOS↵
LOAD SCPOS REV. n

You'll see some *loading...* messages. After 70 seconds or so, you'll see an SCP message, followed by a request for the date.

11b. Type the date, separating month, day, and year by spaces; for example, 11 22 92; then press NEW LINE.

11c. Type the time, based on a 24–hour clock (for example, for 1:30 p.m., type 13:30 and press NEW LINE). The system displays initialization messages, followed by

SCP–CLI>

Go to step 13.

12. With an MV/4000, the system console shows @. Type

@ 22L (Or 23L, for an MTJ unit)

This command loads the diagnostic operating system from the tape. You'll see some copyright messages, and then

*

12a. Tell the diagnostic operating system to load CPU microcode. For an MV/4000 with a hardware floating–point unit (FPU), the filename is MV4000FP; for an MV/4000 *without* FPU, the filename is MV4000. Type the LOAD command, followed by the appropriate filename for your machine. For example,

* LOAD MV4000↵ (Or MV4000FP)

After a few moments, you'll see microcode messages, followed by

*

12b. Type

* EXIT↵

CPU HALTED
SCP–CLI>

13. CPU microcode has been loaded and the SCP CLI, which allows you to start other programs, has control, as you can tell by the prompt.

14. Dismount the MV/n SCP SYSTEM MEDIA tape. Use the tape switches (if any) to take the tape off line and unload it; and then remove it from the tape unit.

You're finished with first–time powerup. This sequence will work anytime you want to cold start your system, but it's easier to have everything loaded automatically, as will happen after you format your system disk and install microcode on it. To format your system disk, return to Chapter 3.

End of Appendix

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For Users

Learning to Use Your AOS/VS System (069–000031)

A primer for all users, this manual introduces AOS/VS (but the material applies to AOS/VS II) through interactive sessions with the CLI, the SED and SPEED text editors, programming languages, Assembler, and the Sort/Merge utility. *Using the CLI (AOS and AOS/VS)* is a good follow–up.

Using the CLI (AOS/VS and AOS/VS II) (093–000646)

For all users, this manual explains the AOS/VS and AOS/VS II file and directory structure and how to use the CLI, a command line interpreter, as the interface to the operating system. This manual explains how to use the CLI macro facility, and includes a dictionary of CLI commands and pseudomacros.

Using the AOS/VS System Management Interface (SMI) (069–000203)
Using the AOS/VS II System Management Interface (SMI) (069–000311)

For those working with preinstalled systems and those on regular systems who want an alternative to the CLI, the SMI is an easy–to–use, menu–driven program that helps you with system management functions and some file maintenance tasks.

AOS/VS and AOS/VS II Glossary (069–000231)

For all users, this manual defines important terms used in AOS/VS and AOS/VS II manuals, both regular and preinstalled.

SED Text Editor User's Manual (AOS and AOS/VS) (093–000249)

For all users, this manual explains how to use SED, an easy–to–use screen–oriented text editor that lets you program function keys to make repetitive tasks easier. The *SED Text Editor* template (093–000361) accompanies this manual.

For System Managers and Operators

Starting and Updating Preinstalled AOS/VS on ECLIPSE MV/3500™ DC and MV/5000™ DC Series Systems (069–000481)
Starting and Updating Preinstalled AOS/VS II on ECLIPSE MV/3500™ DC and MV/5000™ DC Series Systems (069–000480)

For those working with preinstalled (as opposed to regular) operating systems on ECLIPSE ECLIPSE MV/3500™ DC and MV/5000™ DC Series computers, these manuals explain how to start, update, and change certain system parameters. The manuals also help you interpret error messages and codes. Companion manuals are *Using the AOS/VS System Management Interface* and *Using the AOS/VS II System Management Interface.*

If you have one of these computer systems, use the pertinent manual above; discard any other *Starting and Updating Preinstalled* manuals you receive.

Starting and Updating Preinstalled AOS/VS (069–000293)
Starting and Updating Preinstalled AOS/VS II (069–000294)

For those working with preinstalled (as opposed to regular) operating systems on all computers except ECLIPSE MV/5000 Series systems, these manuals explain how to start, update, and change certain system parameters. The manuals also help you interpret error messages and codes. Companion manuals are *Using the AOS/VS System Management Interface* and *Using the AOS/VS II System Management Interface.*

Information Update: Starting Your ECLIPSE MV/1000 DC (014–001728)

Updates *Starting and Updating Preinstalled AOS/VS* and *Starting and Updating Preinstalled AOS/VS II.*

Installing, Starting, and Stopping AOS/VS (093–000675)
Installing, Starting, and Stopping AOS/VS II (093–000539)

For system managers and operators of regular (as opposed to preinstalled) systems, these manuals explain the steps necessary to format disks, install a tailored operating system, create the multiuser environment, update the system or microcode, and routinely start up and shut down the system. *AOS/VS and AOS/VS II Error and Status Messages* and *Managing AOS/VS and AOS/VS II* are companions to these manuals.

AOS/VS and AOS/VS II Menu–Based Utilities (093–000650)

A template. A number of system management programs, such as Disk Jockey, VSGEN, and the SMI, use the function keys indicated on this template.

AOS/VS and AOS/VS II Error and Status Messages (093–000540)

For all users, but especially for system managers and operators of regular systems, this manual lists error and status messages, their source and meaning, and appropriate responses. This manual complements *Installing, Starting, and Stopping AOS/VS, Installing, Starting, and Stopping AOS/VS II*, and *Managing AOS/VS and AOS/VS II.*

Managing AOS/VS and AOS/VS II (093–000541)

For system managers and operators, this manual explains managing an AOS/VS or AOS/VS II system. Programmers will also find material of interest to them. Managing tasks include such topics as editing user profiles, backing up and restoring files, using runtime tools, and so forth. Separate supplements describe the EXEC program, which manages the multiuser environment. This manual complements the "Installing" manuals, whether for regular or preinstalled systems.

For Programmers

SPEED Text Editor (AOS and AOS/VS) User's Manual (093–000197)

For programmers, this manual explains how to use SPEED, a powerful (but unforgiving) character–oriented text editor.

AOS/VS Macroassembler (MASM) Reference Manual (093–000242)

For assembly language programmers, this reference manual describes the use and operation of the MASM utility, which works under AOS/VS and AOS/VS II.

AOS/VS Link and Library File Editor (LFE) User's Manual (093–000245)

For AOS/VS and AOS/VS II programmers, this manual describes the Link utility, which builds executable program files from object modules and library files, and which can also be used to create programs to run under the AOS, MP/AOS, RDOS, RTOS, or DG/UX™ operating systems. This manual also describes the Library File Editor utility, LFE, for creating, editing, and analyzing library files; and the utilities CONVERT and MKABS, for manipulating RDOS and RTOS files.

AOS/VS Debugger and File Editor User's Manual (093–000246)

For assembly language programmers, this manual describes using the AOS/VS and AOS/VS II debugger for examining program files, and the file editor FED for examining and modifying locations in any kind of disk file, including program and text files. The *AOS/VS Debug/FED* template (093–000396) accompanies this manual.

AOS/VS System Concepts (093–000335)

For system programmers and application programmers who write assembly–language subroutines, this manual explains basic AOS/VS system concepts, most of which apply to AOS/VS II as well. This manual complements both volumes of the *AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary*.

AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary, ?A through ?M (093–000542)
AOS/VS, AOS/VS II, and AOS/RT32 System Call Dictionary, ?N through ?Z (093–000543)

For system programmers and application programmers who want to use system calls, this two–volume manual provides detailed information about system calls, including their use, syntax, accumulator input and output values, parameter packets, and error codes. *AOS/VS System Concepts* is a companion manual.

Other Related Documents

AOS/VS and AOS/VS II Performance Package User's Manual (093–000364)

For system managers, this manual explains how to use the AOS/VS and AOS/VS II Performance Package (Model 30718), a separate product that is useful for analyzing and perhaps improving the performance of AOS/VS and AOS/VS II systems.

Backing Up and Restoring Files With DUMP_3/LOAD_3 (093–000561)

For system managers, operators, and experienced users, this manual explains the DUMP_3/LOAD_3 product, separately available, which provides backup and enhanced restoration functions, including precise indexing of files on a backup tape set.

Configuring and Managing the High–Availability Disk–Array/MV (H.A.D.A/MV) Subsystem (014–002160)

For system managers of the High–Availability Disk–Array/MV subsystem (a separate product that requires AOS/VS II), this manual explains how to configure, operate, and replace subsystem controllers, disk modules, and tape modules. This manual also explains how to replace fans, power supplies, and other subsystem hardware.

Configuring Your Network with XTS (093–00689)

For network administrators, managers, or operators responsible for designing, configuring, or maintaining a network management system, this manual describes how to manage and operate Data General's XODIAC™ Transport Service (XTS and XTS II) under AOS/VS and AOS/VS II.

Installing and Administering DG TCP/IP (093–701027)

For network managers and operators, this manual explains how to install and manage a TCP/IP network under AOS/VS.

Managing AOS/VS II ONC™/NFS® Services (093–000667)

For network managers and operators, this manual explains how to install and manage an ONC Network File server software under AOS/VS II.

Managing AOS/VS II TCP/IP (093–000704)

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Managing and Operating the XODIAC™ Network Management System (093–000260)

For network managers and operators, this manual describes how to install and manage the Data General proprietary network software.

Managing XTS II with DG/OpenNMS (093–000698)

For network managers and operators, this manual explains how to use DG/OpenNMS to manage the XTS II transport service for large communications networks. It also identifies the XTS II components and explains how to use the NMI menus and screens to manage the XTS II subsystems and the Message Transport Agent (MTA).

*Managing Your DG/PC*Integration Network with DG/ONMS* (093–000624)

For network managers, this manual explains how to manage XTS II and DG/PC*Integration components with DG/OpenNMS.

Managing Your Network with DG/OpenNMS (093–000486)

For network managers, administrators, and operators, this manual describes how to use the DG/OpenNMS software. It also explains how to load the software, create the DG/OpenNMS environment, and use the Network Management Interface (NMI) to manage the network.

Managing Your XODIAC™ Network with DG/ONMS (093–000625)

For network managers, this manual explains how to manage XTS II, MTA, and the XODIAC agents (FTA, RMA, and SVTA) with DG/OpenNMS.

Using CLASP (Class Assignment and Scheduling Package) (093–000422)

For system managers, this manual explains how to use the AOS/VS and AOS/VS II Class Assignment and Scheduling Package (Model 31134), a separate product that is useful for tailoring process scheduling to the needs of a specific site.

Using the Dump Tool (093–000519)

For experienced system programmers and operating system experts, this manual explains how to use the Dump Tool to find and display the values of locations in memory dump and break files.

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