



A Prime Company

5300 Family Handbook

Revision 22.1.3

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5300 Family Handbook



First Edition

George Gove

This manual documents the software operation of the PRIMOS operating system on 50 Series computers and their supporting systems and utilities as implemented at Master Disk Revision Level 22.1.3 (Rev. 22.1.3) and 23.0 (Rev. 23.0).

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Ce produit est conforme aux exigences de la norme CSA – C108.8M, 1983 pour les appareils digitaux de classe A.

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About This Book



The *5300 Family Handbook* provides procedures for startup, shutdown, and general operation of 5310™, 5320™, 5330™, and 5340™ computer systems. This handbook is intended primarily for use by operators working in both computer-room and office environments.

Before reading any of the chapters, familiarize yourself with the conventions used in this book by reading the last section of this preface, Prime Documentation Conventions. These conventions are used throughout 50 Series™ documentation.

Other Useful Books

This handbook provides an overview of the tasks you must perform to keep a Prime® computer operating smoothly. Greater detail about some of these tasks can be found in the related documentation described below. Some of these books are intended for the System Operator, some for the System Administrator, and some for both.

To display an online list of Prime documentation, use the `HELP DOCUMENTS` command.

For the System Operator

The *PRIMOS User's Guide* (DOC4130-5LA) provides an excellent introduction to Prime systems. This guide explains the PRIMOS® file management system and provides introductory and tutorial information about essential commands and utilities.

After you are familiar with Prime systems, read the *Operator's System Overview*, which outlines the material in the Operator's Guide series. Then, select the other books in the series as they apply to the tasks you must perform.

As you learn more about system operations, you will use the *Operator's Guide to System Commands* as a reference for many of the special system commands and arguments that you, as an Operator, will need to perform your job. It fully

documents most of the PRIMOS commands described in the books in the Operator's Guide series.

The Operator's Guide Series

The Operator's Guide series of books is designed and written to help you, as a System Operator or a System Administrator of a Prime computer, do your job. These guides for System Operators are logically divided into eight books to make them easy for you to use.

- *Operator's System Overview* (DOC9298-3LA) introduces the series and describes computer-room operation of Prime systems.
- *Operator's Guide to System Monitoring* (DOC9299-3LA) describes how to monitor system activity, messages, and use.
- *Operator's Guide to File System Maintenance* (DOC9300-5LA) and its update (UPD9300-51A) describe the PRIMOS file system and explain how to format disk partitions, run the disk partition maintenance program, determine physical device numbers, and interpret disk error messages.
- *Operator's Guide to the Batch Subsystem* (DOC9302-3LA) describes how to set up, monitor, and control the Batch subsystem.
- *Operator's Guide to the Spooler Subsystem* (DOC9303-4LA) describes how to set up, monitor, and control the Spooler subsystem.
- *Operator's Guide to System Commands* (DOC9304-5LA) serves as a reference guide for most of the commands described in the other books in the series.
- *Operator's Guide to Data Backup and Recovery* (DOC10324-1LA) describes how to save information on disk or tape and how to restore that information when it is needed. The *Data Backup and Recovery Guide* (DOC10129-1LA) is the pre-Rev. 23.0 version.
- *Operator's Guide to Prime Networks* (DOC10114-1LA) and its update package (UPD10114-11A) and release note (RLN10252-1LA) provide reference information about running network-related programs and monitoring network events.

Other Books for the Operator

The following books are also of special interest to System Operators.

- *Operator's Master Index* (DOC10110-4LA) indexes all the Operator and System Administrator Guides. Consulting this index is often the quickest way to find which manual has the information you need.

- *User's Guide to Prime Network Services* (DOC10115-1LA) and its update (UPD10115-11A) and release note (RLN10252-1LA) describe networking services that enable users to access files remotely, transfer files, and log in to other 50 Series systems on a network.
- *Rev. 23.0 Prime Networks Release Notes* (RLN10252-1LA) describes the Name Server process and the concept of common file system name space.
- *NTS User's Guide* (DOC10117-3LA) explains the Network Terminal Service.
- *The 50 Series Technical Summary* (DOC6904-2LA) describes the features of the 50 Series™ systems, including advanced architecture concepts and the software and hardware products the concepts support.
- *The System Architecture Reference Guide* (DOC9473-3LA) describes the internal functioning of all 50 Series computers.
- *The Instruction Sets Guide* (DOC9474-2LA) provides a complete listing of the instruction sets for all 50 Series systems.
- *The Assembly Language Programmer's Guide* (DOC3059-3LA) contains information necessary to write programs in the PMA language and covers usage of PMA, machine formats, and instructions.
- *PRIMOS Commands Reference Guide* (DOC4130-7LA) serves as a reference guide for all PRIMOS user commands.

Prime Documentation Conventions

The following conventions are used throughout this document. The examples in the table illustrate the uses of these conventions.

<i>Convention</i>	<i>Explanation</i>	<i>Example</i>
Uppercase	In command formats, words in uppercase bold indicate the names of commands, options, statements, and keywords. Enter them in either uppercase or lowercase.	BOOT
Italic	Variables in command formats, text, or messages are indicated by lowercase italic.	LOGIN <i>user-id</i>
Abbreviations	If a command or option has an abbreviation, the letters of the abbreviation are underlined.	LIST <u>REV</u>

<i>Convention</i>	<i>Explanation</i>	<i>Example</i>
Brackets	Brackets enclose a list of one or more optional items. Choose none, one, or several of these items.	LD [- BRIEF - SIZE]
Braces	Braces enclose a list of items. Choose one and only one of these items.	CLOSE { filename - ALL }
Braces within brackets	Braces within brackets enclose a list of items. Choose either none or only one of these items; do not choose more than one.	MAKE [{ - AC - IC }]
Monospace	Identifies system output, prompts, messages, and examples.	Tape unit (9 Trk):
Underscore	In examples, user input is underscored but system prompts and output are not.	CP1> <u>BOOT 14114</u>
Hyphen	Wherever a hyphen appears as the first character of an option, it is a required part of that option.	SPOOL -LIST
Ellipsis	An ellipsis indicates that you have the option of entering several items of the same kind on the command line.	ADDISK pdev-1 [...pdev-n]
Subscript	A subscript after a number indicates that the number is not in base 10. For example, the subscript 8 is used for octal numbers.	200 ₈

System Overview

1



This chapter presents a general overview of the components of the 5300 computer system and some basic concepts of operating the system. For a more detailed description of the architecture, components, and software of Prime systems, see the *System Architecture Reference Guide* and the *50 Series Technical Summary*.

The computer system presents three general areas of responsibility for the System Operator:

- The system logbook
- The computer room
- The system itself, which consists of the hardware, the software, and the peripherals

These areas are discussed in the following sections.

System Logbook

The System Administrator generally establishes a logbook for each computer system. Although the precise design of the logbook varies from one computer facility to another, logbooks contain records of all events affecting system operation.

Operators maintain the logbooks and record in them events that relate to the computer system. Therefore, you should learn your site's logbook procedures as soon as possible.

A logbook should contain sufficient information about system operation and history to allow a thorough analysis of unusual or undesirable occurrences. Such occurrences include

- Hardware changes
- System halts
- System hangs

- Operator errors
- Power failures

The logbook should also record significant system conditions or changes, including

- Hardware configuration
- Disk partitioning
- Backups
- Addition of new users

By recording these events, you can use the logbook to reconstruct the system history. Logbook records should be detailed enough to enable the System Administrator or Operator to restore the system to normal status.

When making a logbook entry, always follow three rules:

- All entries should include the time and date (including year).
- All entries should be signed. The System Administrator or a PrimeServiceSM representative will then be able to check with the appropriate Operator for clarification or additional information.
- If you are in doubt as to the importance of a particular event, enter it in the logbook because it may prove valuable later.

Computer Room

Many computer systems require special, restricted-environment rooms in which to operate. These rooms normally have special air-conditioning equipment to maintain a constant temperature and humidity. Your system, however, has been designed to operate successfully in a normal office environment, as well as in a special computer room.

As an Operator, you monitor all activity in the computer room. Specific tasks in the computer room are defined by the System Administrator, but generally, it is your responsibility to ensure that the hardware functions properly. Pay close attention to the following components:

- Air-conditioning units — make sure they are maintaining the temperature and humidity of the computer room within acceptable limits
- The CPU — make sure it is running to keep the computer operational at all times

- Disk drives — keep them online and functioning normally
- Tape drives — clean them on a regular basis
- Printers — clean them on a regular basis and replace their paper and ribbons
- Modems and multiplex units — make sure they are moving data through the network

System Components

The term *system* refers collectively to these components:

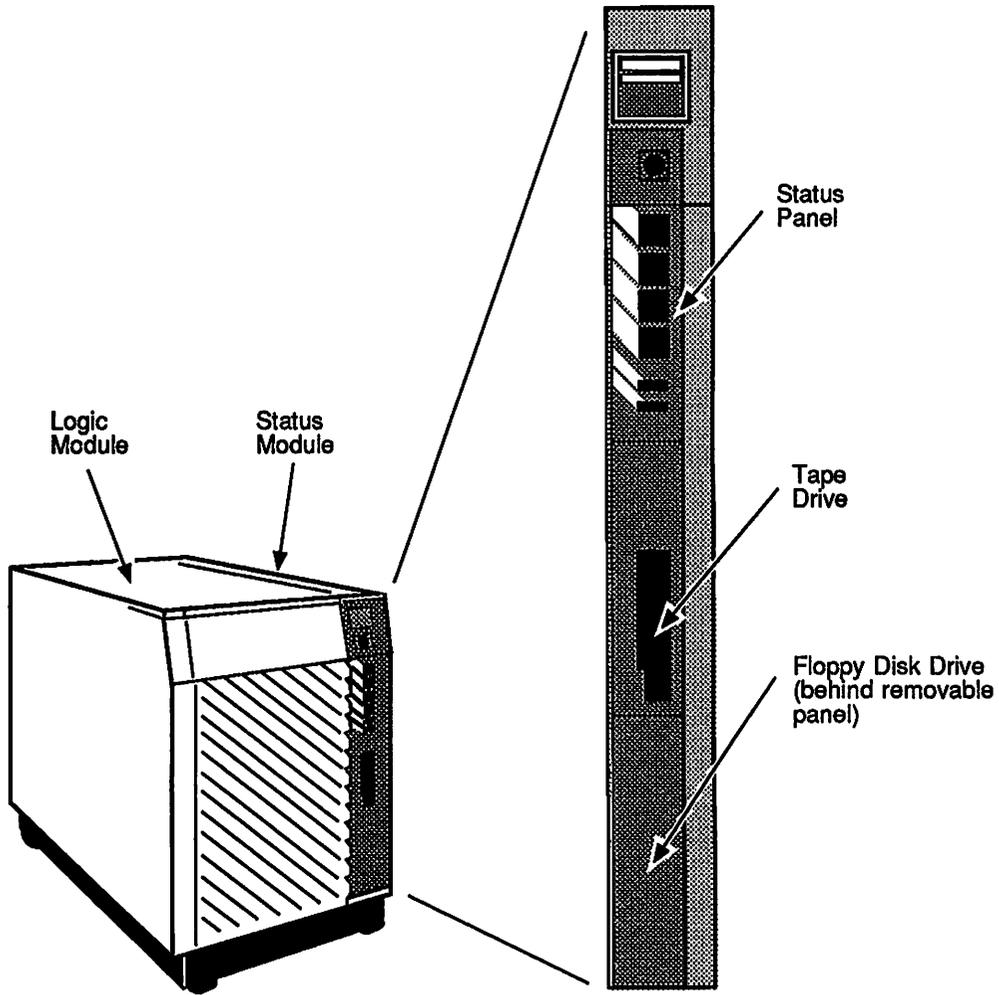
- Central Processing Unit (CPU)
- Memory (main memory and virtual memory)
- Online storage (disks)
- Maintenance Processor, including the Virtual Control Panel (VCP), the System Status Panel, and a battery-powered clock
- Operating system (PRIMOS)
- Programs
- Peripherals, including terminals, tape drives, and printers

These components are discussed briefly in the following sections and illustrated in the following figures.

The 5310 and 5330 systems consist of a Status module and a Logic module. The Status module contains disks, a tape drive, a floppy disk drive used by the Maintenance Processor, a blower, and power supplies for those components. There are no other peripherals with the exception of an optional ICS3 subsystem. A typical 5310/5330 system is shown in Figure 1-1.

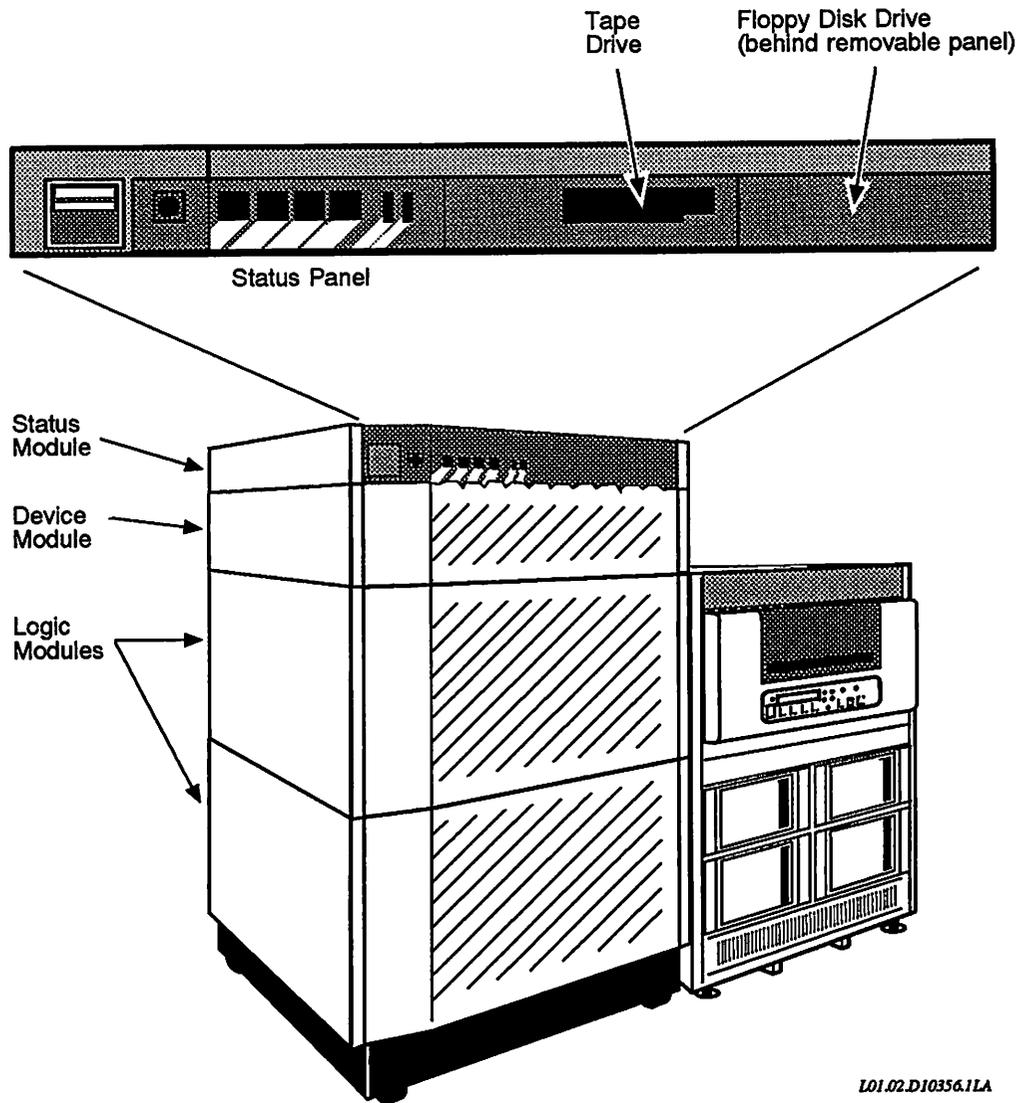
The 5320 and 5340 systems may consist of one or more Logic modules containing the CPU and the I/O controllers, one or more Device modules containing the I/O devices (disks and tape drives), and the Status module, which contains the Status Panel, the floppy disk drive and may contain a tape drive. These modules are stacked to form the computer system. 5320/5340 medium and maximum size systems are shown in Figure 1-2 and Figure 1-3.

The Logic module where the CPU is located contains such standard components as the CPU board including memory and the Maintenance Processor, a maximum of six input/output (I/O) controller boards, an extended memory board, and power supplies. The 5300 Family systems require less power, less cooling, and less space than other 50 Series systems.



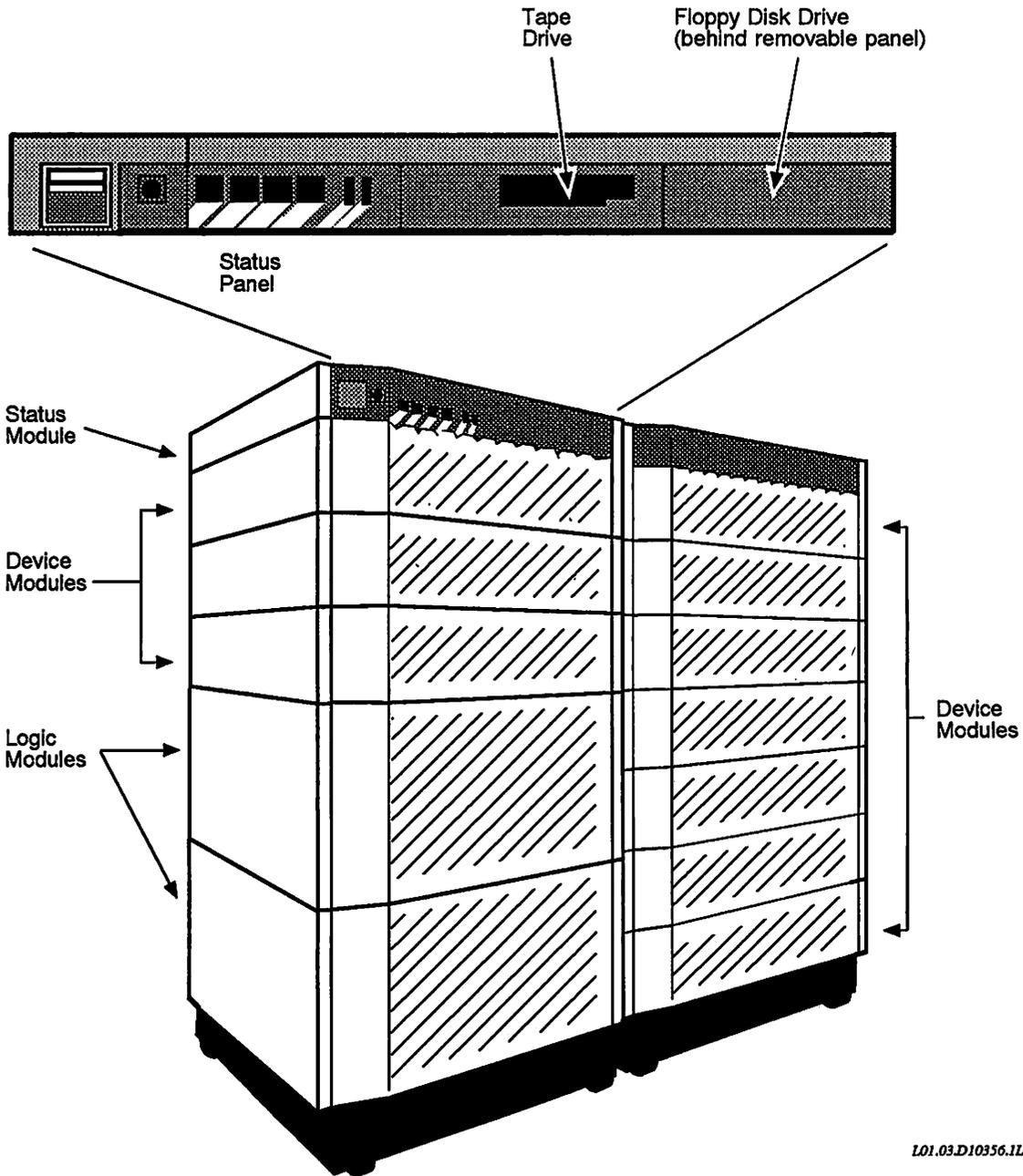
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Figure 1-1. 5310 and 5330 Systems



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Figure 1-2. 5320 and 5340 Systems



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Figure 1-3. 5320 and 5340 Systems

Central Processing Unit (CPU)

The Central Processing Unit (CPU), which is located in a Logic module, is the part of the computer that executes programs. These programs do not reside in the CPU, but are referenced by the CPU from main memory. The CPU in all 5300 Family systems uses CMOS (Complementary Metal Oxide Semiconductor) circuits.

In order for the CPU and the rest of the system to communicate, the CPU is connected to both the main memory and the I/O controllers.

The CPU incorporates several architectural features that contribute to high performance. Some of these features, discussed in greater detail below, are cache memory, a five-stage pipeline architecture, and an associative write buffer.

When the CPU is executing a program, it is said to be running; otherwise, the CPU is stopped or halted. In general, the program that the CPU is executing is PRIMOS or programs that PRIMOS controls. However, you can boot standalone programs that do not require PRIMOS to be running, such as standalone MAKE, as discussed in Appendix A.

Cache Memory

The CPU includes a special portion of memory known as cache memory. On machines with virtual memory, the system must constantly translate virtual addresses into the address of a physical location in memory and then fetch the data from memory. Cache memory reduces the average time that the CPU spends accessing main memory by storing frequently used instructions and data in a fast buffer memory within the CPU.

Cache memory is much faster than main memory because it uses faster RAM (Random Access Memory). On the 5300 Family, the CPU has a single-set associative 128KB cache memory. For more information on cache memory, see the *System Architecture Reference Guide*.

Pipeline Architecture

The five-stage pipeline architecture of the CPU provides overlapped execution of instructions, thus allowing five instructions to be in some stage of execution concurrently in the CPU. This pipeline architecture allows cache access, instruction decode, effective address formation, virtual memory mapping, and instruction execution to overlap one another.

Overlapped instruction decoding is performed by a part of the CPU known as the instruction unit. The instructions are executed by another part of the CPU known as the execution unit. The instruction unit speeds up execution by processing as much information as possible about the next instructions before they are needed.

While the execution unit is executing an instruction, the instruction unit decodes the next instruction, calculates what the next address will be, and determines what registers or memory locations are to be accessed. At the same time, the instruction unit fetches instructions from cache memory so that they are ready to be decoded when other instructions are executed. When the execution unit completes the current instruction, the instruction unit has in most cases calculated enough information to allow the execution unit to execute the next instruction without delay.

Associative Write Buffer

Because the cycle time of the CPU is so much faster than main memory, the system has a fully associative write buffer that stores CPU writes for later transmission to main memory. Memory writes thus take place in minimum time (from the CPU's viewpoint) because the CPU does not have to wait for the full write cycle to main memory to complete.

Main Memory and Virtual Memory

As with all 50 Series machines, 5300 Family systems are virtual memory systems. Virtual memory makes a 512Mbyte virtual address space available to each user. Users can therefore run programs that are larger than the amount of physical main memory present on the system.

Main Memory

The main memory of the system uses high speed NMOS (N-type Metal Oxide Semiconductor) and incorporates an ECC (error checking and correction) code that allows correction of single-bit errors and detection of double-bit errors. The ECC code, which is in the system's memory control unit, can thus detect both correctable (ECCC) and uncorrectable (ECCU) memory parity errors and issue memory parity checks.

To improve main memory bandwidth, the 5300 Family systems use page mode memory devices. Page mode allows access to multiple memory words in a single memory access. When PRIMOS makes a memory reference, the system fetches two consecutive locations from physical memory in much less time than would be necessary to fetch each location separately.

Paging: Main memory is divided into 2KB units called pages. The pages subdivide main memory into pieces that PRIMOS can conveniently and efficiently manage. Pages, which are the units that are transferred between disk and main memory, are small enough to be easily manageable, but large enough

to minimize the number of disk-to-memory transfers necessary to ensure that data is in main memory when the user needs it. The process of making transfers between disk and memory is called paging.

Subdividing memory into pages has many other advantages. For example, PRIMOS replies to all requests for space in the same way because all pages are the same size. In addition, disk records are the same two kilobytes in size, so transfers between main memory and disk are simplified.

Information in main memory is lost when power is turned off. If, however, your system has a backup power supply, the system can continue running without a cold start. For more information on backup power supplies, see Appendix E.

Virtual Memory

The advantage of virtual memory to the system owner is that it provides the ease of use of a large memory at the cost of a much smaller amount of hardware. The advantage to the user is that an address space of almost unlimited size (a maximum of 512Mbytes) is available to support very large applications without using overlays.

Virtual memory works in conjunction with main memory and the system disk storage. PRIMOS uses virtual memory to run a program that is larger than main memory by moving portions of the program back and forth between main memory and disk storage. PRIMOS performs this paging operation automatically. A program that fits into main memory if run by itself may still be paged out (sent back to disk) by PRIMOS when other users are also running programs that need memory space.

Segments: Virtual memory is divided into units called segments. Each segment contains a maximum of 128KB, which is 64 virtual pages of 2KB each. Segments are logical units, not physical ones, that aid both the user and the system in organizing virtual address spaces and the information contained there. For example, users can organize program code in one segment and program data in a second segment, and can even allow extra room in a program for variable-length data structures, such as arrays whose dimensions can change each time the program runs. Segments also allow users to build modular programs, one module to a segment. PRIMOS uses segments in a similar way to organize its own code into modules.

The maximum virtual address space of each user is 4096 segments; thus, each user has a virtual address space of up to 512Mbytes. The 4096 segments are subdivided into four groups of 1024 segments each, which simplifies address translation and segment sharing.

In addition, each user address space of 4096 segments is divided into shared and unshared space. The first 2048 segments are shared with all other users. The operating system, shared libraries and application programs, and shared subsystems, which use the first 2048 segments, are therefore visible to all users.

The disk drives on 5300 Family systems may be located in the Device modules either in the stack with the Logic module containing the CPU or in a separate stack or in a separate peripheral cabinet. On 5310 and 5330 systems, disks are located in the Status module. On 5320 and 5340 systems, disks may be located in a Device module in the stack with the CPU module or in separate Device module stacks or in peripheral cabinets.

Storage Module Disks (SMDs) are also supported. The major difference between SMDs and FMDs is that SMDs have removable surfaces.

Unlike main memory, disks must be prepared before being used. This preparation, called formatting or partitioning, is performed by the Operator with a utility called MAKE.

For detailed information on disk types, MAKE, and disk formatting, see the *Operator's Guide to File System Maintenance*.

Limitations of Online Storage

Three limitations of disk storage are a slower access rate than main memory, susceptibility to damage, and the accidental loss of data (for example, when a user mistakenly deletes a file). Some solutions to these limitations are discussed in the following sections.

Speed of Data Access: Disk storage not only allows larger volumes of data to be stored less expensively than main memory, but the data remain intact whether system power is on or off. The CPU, however, accesses disks much more slowly than if the data were in main memory.

To solve this problem, PRIMOS has several facilities that keep disk access time to a minimum, resulting in greater overall performance. These facilities include LOCATE buffers (also called associative buffers), pseudo-LRU (least recently used) memory management, and the buffering of physical disk records on intelligent disk controllers.

Susceptibility to Damage: To provide high-density data storage and rapid access to those data, disks are constructed to extremely precise tolerances. Because of these tolerances and the fact that the disk assembly rotates at a high speed, even a minor disruption of the disk head or surface can severely damage the entire disk assembly, resulting in the destruction of the data on the disk.

When a disk surface is severely damaged, you cannot recover the data on it. In contrast, data on a damaged magnetic tape can often be recovered because the tolerances of tape provide larger margins of error. In addition, the tape itself is pliable, light, and can be cut and spliced, so a disruption rarely results in the loss of an entire tape or tape drive. For these reasons, tape is an excellent medium for backing up the data on your disks. Although you cannot eliminate a disk's susceptibility to damage, you can reduce the loss of data from such damage by performing regularly scheduled backups of that data.

Accidental Loss: Because the PRIMOS file system makes online storage so convenient, it is easy to delete files and directories. Users sometimes delete or overwrite important files unintentionally. After a file is deleted, neither you nor the user can recover that file from the disk. By performing periodic system backups, you may be able to restore, from a backup, an earlier version of the deleted file.

Offline backup storage can reduce the incidence of accidental data loss by deletion or damage to disks. System backups are discussed in the *Operator's Guide to Data Backup and Recovery*.

Power System

The power system for the 5300 Family systems can be in one of three possible states as follows:

<i>State</i>	<i>Description</i>
OFF	The ON/OFF switch of each power control module (PCM) and of the power distribution unit (PDU) of any non-5300 peripheral cabinet is in the OFF (0) position.
STANDBY	AC power is connected to and present at each PCM and at any PDU of a non-5300 peripheral cabinet, each PCM and PDU ON/OFF switch is in the ON (1) position, each PCM READY indicator is lit (green), and the ON/INITIATE SHUTDOWN indicator on the Status module is off (dark).
OPERATIONAL	AC power is connected to and present at each PCM and at any PDU of a non-5300 peripheral cabinet, each PCM and PDU ON/OFF switch is in the ON (1) position, each PCM READY indicator is lit (green), and the ON/INITIATE SHUTDOWN indicator on the Status module is lit or flashing (green).

The OFF state exists only when the system is initially shipped or when someone intentionally turns each PCM ON/OFF switch and any PDU ON/OFF switch to the OFF position, such as when a PrimeService representative is servicing the system.

The STANDBY state exists just prior to pressing the ON/INITIATE SHUTDOWN button to start the system and boot PRIMOS and after the system is shut down.

The OPERATIONAL state exists between the time the ON/INITIATE SHUTDOWN button is pressed to start the system and the time that the system achieves a shutdown.

Thus, the power system will be in the OPERATIONAL state the majority of the time. It will be in the STANDBY state whenever the system is shut down such that the CPU is not running, and will rarely, if ever, be in the OFF state.

Maintenance Processor

All 5300 Family systems contain a Maintenance Processor (also called a Diagnostic Processor), located on the CPU board in a Logic module. The Maintenance Processor, which is actually a small computer, contains its own CPU (which is much smaller than the system CPU); its own operating system; its own file system (consisting of a floppy diskette in the Status module); its own set of system messages (listed in Appendix C); and its own set of commands (called VCP commands, listed in Chapter 8). As long as the power system is in the STANDBY state, the Maintenance Processor is waiting to start the system. In addition, the Maintenance Processor can be running even when PRIMOS is shut down.

The Operator communicates with the Maintenance Processor through a software interface (the Virtual Control Panel) and through a hardware interface (the System Status Panel). They are described in following sections.

The Maintenance Processor performs such tasks as the following:

- Verifying system components
- Booting PRIMOS and other bootable programs
- Controlling the supervisor terminal (that is, acting as an interface between the supervisor terminal and the CPU)
- Controlling the CPU, regardless of whether PRIMOS is running
- Monitoring environmental sensors and power supplies
- Shutting down the system in an orderly manner in emergency situations, such as during power failures or when excessive temperatures exist in the CPU module
- Logging Maintenance Processor error messages in its History File, which is located on the floppy diskette drive
- Communicating with an optional Uninterruptible Power Supply (UPS)
- Allowing remote diagnostics

For information on using the Maintenance Processor for remote diagnostics, see Appendix D.

Virtual Control Panel (VCP)

The Virtual Control Panel (VCP) is the software interface between the Maintenance Processor and the Operator. (The VCP is called *virtual* because in some older Prime machines, many VCP software functions were performed by switches and knobs on a physical control panel.) The term VCP is often used as a synonym for the Maintenance Processor.

User terminals are in effect connected to the system CPU, and therefore operate only when PRIMOS is running. In contrast, the supervisor terminal is connected to the VCP, which in turn is connected to the system CPU. Thus, you can still use the supervisor terminal even when the CPU (and PRIMOS) is stopped. Through the VCP, you can also control the system CPU when PRIMOS is running. When the CP1> prompt (instead of the OK, prompt) is displayed at the supervisor terminal, you are communicating with the VCP, not with PRIMOS.

Because the supervisor terminal (including the VCP) controls the system, use of the supervisor terminal should be restricted to the System Administrator, Operators, and other key personnel.

VCP Functions: Chapter 7 lists the reasons for which system Operators would use the VCP. In general, though, you use the VCP for these purposes:

- Booting PRIMOS (described in Chapter 4)
- Handling halts and hangs of PRIMOS (described in Chapter 6)
- Monitoring and controlling the CPU, independent of PRIMOS (described below and in Chapters 7 and 8)
- Switching terminal modes (described below and in Chapter 3)

Monitoring and Controlling the CPU: The VCP allows you to use VCP commands to communicate directly with the CPU, independent of PRIMOS. When you are using the VCP, the supervisor terminal is in CP (Control Panel) mode and you can issue VCP commands. See Chapter 8 for complete information on VCP commands; for a description of CP mode, see Chapter 3.

Switching Terminal Modes: When PRIMOS is running, the supervisor terminal is logged in as a server process named SYSTEM, which has the user number 1. This mode is called ST (Supervisor Terminal) mode. As User 1 at the supervisor terminal, the Operator is a privileged user, with the power to perform special functions such as setting the system date and time, sending broadcast messages, shutting down PRIMOS, and logging out users.

The VCP, however, lets you switch the supervisor terminal to act as a user terminal, thus allowing you to log in as a regular user. This terminal mode, known as USER mode, is intended for systems that use a video display terminal (such as a PT250) as the supervisor terminal and for situations when an Operator is a regular user who is also responsible for system operation.

When the supervisor terminal is in USER mode, you can log in with your own user ID and you will be user number 2. User 1 operates in the background as a type of phantom.

By pressing the ESC key twice, you can switch directly to CP mode at any time from both ST and USER modes. All three supervisor terminal modes are described in Chapter 3.

System Status Panel

The System Status Panel, located in its own module on the right side as you face 5310/5330 systems (Figure 1-1) or at the top of 5320/5340 systems (Figure 1-2 and Figure 1-3), provides three main functions for the Operator:

- The lights are a quick reference to the status of the system. For example, if the PROCESSOR HALT light is lit, then you know that the CPU has halted.
- The four buttons provide physical control of the Maintenance Processor. For example, pressing the MASTER CLEAR button is similar to using the VCP command VIRY.
- The key switch is a safeguard against unauthorized use of the supervisor terminal.

For details on the operation of the System Status Panel, see Chapter 2.

Internal Clock

The Maintenance Processor contains an internal, battery-powered clock that keeps track of the date and time. The time is stored in 24-hour format. At cold start, you need not use the PRIMOS SETIME command to set the system time, because PRIMOS automatically picks up the date and time from the internal clock.

Because the clock is battery-powered, it continues running even when power to the system is interrupted. When the battery is fully charged, the time is kept when the system power is out for a maximum of three months. Whenever system power is available for at least 24 hours, the battery is fully charged. Unlike previous processor clocks, you cannot program this clock to switch over automatically to daylight saving time. This feature was not implemented because of the varying implementations of daylight saving time around the world.

Although you can set the date and time by using the VCP command SETIME, it is rarely necessary to do so because the clock is always running, even when the system power is turned off. To display the date and time, use the DATE command, which is available both as a PRIMOS command and as a VCP command.

Operating System

PRIMOS is the operating system for 5300 Family systems. An operating system is a group of programs that synchronize the operation of the CPU, memory, disks, and peripherals. For example, PRIMOS recognizes a command issued by a user on a terminal, searches for the requested program on the disk, loads that program into memory, and instructs the CPU to execute the program. Programs use the operating system to display information on users' terminals and also to access and update data on disk.

Time Sharing

PRIMOS is a time-sharing system. A time-sharing operating system allows many users to use the system simultaneously, even though only one CPU may be present and only one program can run at a time.

Because of the CPU's high execution speed, time sharing allows each user to operate as though the CPU is executing only for that user. For information on how time sharing works under PRIMOS, see the discussion on process exchange mechanism in the *System Architecture Reference Guide*.

Privileged Users

PRIMOS recognizes three types of users as privileged users: the supervisor terminal user, the System Administrator, and certain designated users.

The most privileged user in PRIMOS is the person who is using the supervisor terminal. This person is usually the System Operator. PRIMOS recognizes the supervisor terminal user as a special user, named SYSTEM. User SYSTEM is always logged in and is always user number 1. (Other users on the system have numerically higher user numbers.) When using the supervisor terminal, the Operator can perform functions that regular users cannot, such as logging out other users, sending messages to all users at once, and shutting down the system. *The Operator's Guide to System Commands* details the commands that are available to the System Operator.

Another privileged user is the System Administrator. Some of the privileges of the System Administrator include adding users to the system, changing user passwords, and setting priority ACLs on partitions. For complete information on the privileges and responsibilities of a System Administrator, see the three volumes of the *System Administrator's Guide*.

The System Administrator can designate regular users to have certain privileged rights. For example, a regular user who is a member of the ACL group .SPOOL_ADMINISTRATOR\$ can start, modify, and stop printer environments with the PROP command. Other regular users with special privileges are Project Administrators and Batch Administrators, both of whom are appointed by the System Administrator.

Programs

The major purpose of an operating system is to execute programs. Some of these programs, such as DISCOVER™ and Prime INFORMATION™, are applications programs provided by Prime. PRIMOS provides a flexible environment in which users may also write and develop such programs.

Some parts of PRIMOS, such as external commands, can be considered separate programs. PRIMOS external commands invoke programs that are stored in the top-level directory named CMDNC0. When you issue the COPY command, for example, you are invoking the program named COPY.RUN in CMDNC0.

All 5300 Family systems support many industry-standard programming languages that allow users to tailor applications closely to specific needs. CPL, the PRIMOS command processing language, is also available.

Most Prime languages support a standard Prime procedure call to make references from one procedure to another. This control transfer standard means that the user can call procedures written in one language from those written in another. Thus, one basic routine can be used in many different situations without communications problems.

Many languages are supported by the Prime Source Level Debugger (DBG) and many can also access the MIDASPLUS™ and PRISAM™ data management products. The EMACS screen editor also provides language modes to support program formatting for several compilers.

Peripherals

Strictly speaking, disks are peripherals. Because they are considered integral parts of a Prime computer system, however, disks are discussed above as components of the system.

Peripherals include these devices:

- User terminals
- Magnetic tape drives
- Parallel printers and serial line printers, including letter quality printers
- Plotters
- CAD/CAM work stations
- PRIMENET™ Node Controller (PNC, for RINGNET™)

For details on the operation of peripheral devices, consult the manual that was provided with the device, such as the *PT250 User's Guide*.

System Status Panel

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The Operator controls the system by using two components:

- The System Status Panel, which is the subject of this chapter.
- The supervisor terminal, either in CP mode or ST mode. The supervisor terminal is described in Chapter 3.

Both the System Status Panel and the supervisor terminal are connected to the Maintenance Processor, which in turn communicates the Operator's instructions directly to the system CPU.

Purpose of the System Status Panel

The System Status Panel is used by the Operator to perform the following functions. These functions are described in the next sections.

- Turn on or turn off power to the system. Turning on power also initiates the startup procedure for PRIMOS. The ON/INITIATE SHUTDOWN button controls the system power.
- Reinitialize the entire system when a major error (such as a hang) has stopped the system or prevented it from starting. Reinitialization (called a Master Clear) is controlled by the MASTER CLEAR button and clears errors from the Maintenance Processor and the CPU.
- Allow the system to be controlled from a remote terminal, so that a PrimeServiceSM representative can perform diagnostic tests from an off-site office. The REMOTE ENABLE and REMOTE PRIVILEGED buttons control this remote function.
- Disable the MASTER CLEAR button and both REMOTE buttons, and prevent the supervisor terminal from being switched to another mode (for example, from USER mode to ST mode). The key switch, when set to the locked position, accomplishes these functions, thus preventing unauthorized use of both the System Status Panel and the supervisor terminal.

Arrangement of the System Status Panel

The System Status Panel, which is located on the front of the system either at the right side (5310/5330 systems) or on the top (5320/5340 systems) in the Status module, contains the following controls and indicators. (See Chapter 1 for illustrations of the systems and Figure 2-1 for an illustration of the Status Panel.)

- Four push buttons that control the main functions of the system. The buttons are labeled ON/INITIATE SHUTDOWN, MASTER CLEAR, REMOTE ENABLE, and REMOTE PRIVILEGED. Except for the MASTER CLEAR button, each button has a light indicator that shows the status of that button.
- Two light indicators labeled PROCESSOR A HALT and PROCESSOR B HALT. (The PROCESSOR B light is always off.)

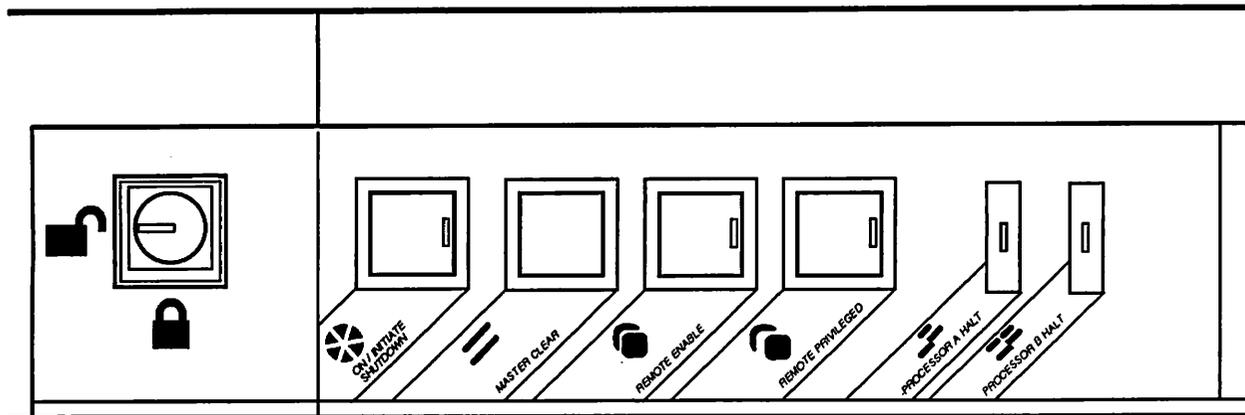
A key switch, labeled with padlock icons, works in conjunction with the switches of the Status Panel. The key switch is described at the end of this chapter. The Status module also contains the floppy diskette drive. Do not remove the floppy diskette because it is required by the system at cold start to perform diagnostic testing and for logging error messages.

The buttons are labeled by text and by icons. The icons have these interpretations:

<i>Label</i>	<i>Meaning of Icon</i>
Key switch	Padlocks that are locked and unlocked.
ON/INITIATE SHUTDOWN	Combination of O for ON, I for OFF, and * for INITIATE.
MASTER CLEAR	Symbol = means to reinstate to initial condition or reset to zero.
REMOTE ENABLE	One terminal looking over the shoulder of the second terminal.
REMOTE PRIVILEGED	Two terminals separated a little more; step back – paternal approach.
PROCESSOR A HALT PROCESSOR B HALT	Symbol / is a processor so / means / / means halted or disconnected. Processors are designated by letters, A and B, and by the number of symbols (1 or 2) shown in the icon above the processor symbol.

Figure 2-1 shows the arrangement of the System Status Panel. Table 2-2, later in this chapter, provides a quick reference to the meanings of the REMOTE ENABLE and REMOTE PRIVILEGED lights, and Table 2-3 summarizes the functions of the System Status Panel buttons and lights, as well as the key switch.

The buttons and indicators are described in detail in the remaining sections of this chapter.



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Figure 2-1. System Status Panel

ON/INITIATE SHUTDOWN Button

The ON/INITIATE SHUTDOWN button controls the power supplies to all devices in the Logic and Device modules and in any peripheral cabinets. This button has two functions: ON and INITIATE SHUTDOWN. Which function is used depends on the present state of the power system when you push the button and whether PRIMOS is running.

- If the power system is in the **STANDBY** state, pushing the ON/INITIATE SHUTDOWN button changes the power system to the **OPERATIONAL** state and automatically boots PRIMOS from disk drive 0 on controller address 26₈ (the ON function).
- If the power system is in the **OPERATIONAL** state and PRIMOS is halted, pushing the ON/INITIATE SHUTDOWN button changes the power system to the **STANDBY** state.

- If the power system is in the OPERATIONAL state and PRIMOS is running, pushing the ON/INITIATE SHUTDOWN button tells the Maintenance Processor to shut down PRIMOS in an orderly manner (the INITIATE SHUTDOWN function) and changes the power system to the STANDBY state. However, it is recommended that you shut down PRIMOS with the SHUTDN ALL command (as described in Chapter 5) before pressing the ON/INITIATE SHUTDOWN button.

WARNING

Power is still supplied to the CPU board, the PCMs, and any peripheral cabinet PDUs when the power system is in the STANDBY state. (See Chapter 1.) Set all PCM and any PDU ON/OFF switches to the OFF (0) position to change the power system to the OFF state.

ON/INITIATE SHUTDOWN Light

The ON/INITIATE SHUTDOWN button has a green light that indicates the status of the system power, as follows:

- When the light is *on*, the system is operating.
- When the light is *flashing*, the Maintenance Processor is in the process of shutting down the system.
- When the light is *off*, the power system is in STANDBY and the system is not running.

MASTER CLEAR Button

The MASTER CLEAR button

- Reinitializes the system by clearing errors from the Maintenance Processor and the CPU
- Disconnects all remote users on the system
- Halts the CPU
- Turns on the PROCESSOR HALT light
- Places the supervisor terminal in CP mode

The effect of a Master Clear is as severe as using the VCP command VIRY. The major difference is that you cannot use the VIRY command while the system is running, whereas the MASTER CLEAR button works regardless of the state of the CPU.

You typically use the MASTER CLEAR button when the system is hung and you cannot halt the CPU with the VCP command STOP. For more information on hangs and halts, see Chapter 6.

REMOTE ENABLE Button

The REMOTE ENABLE button, which works in conjunction with the REMOTE PRIVILEGED button, is intended for use with a remote terminal that is performing remote diagnostics. The remote terminal is usually located in the office of your PrimeService representative, who must dial in to the modem connected to the Maintenance Processor's remote port. When the remote terminal user dials in, the remote terminal is considered to be active.

In general, use the REMOTE ENABLE button only when your PrimeService representative dials in—for example, to perform system test and maintenance activities.

Pressing the REMOTE ENABLE button has the following effect on a remote terminal.

- If the remote terminal is not active (that is, the remote user has not dialed in), pressing the REMOTE ENABLE button enables the remote port. When the remote user subsequently dials in, he or she is prompted for the Maintenance Processor's password, which is set by the VCP command PASSWORD. (For details on PASSWORD and the password procedure, see Chapter 8.)
- If the remote terminal is active (that is, the remote user has dialed in), pressing the REMOTE ENABLE button enables the remote terminal and the remote user is prompted for the password.
- If the remote terminal is active and already enabled (but not privileged), pressing the REMOTE ENABLE button disables and disconnects the remote terminal.
- If the remote terminal is active, enabled, and privileged (with the REMOTE PRIVILEGED button), and the local supervisor terminal (Local 1) is enabled, pressing the REMOTE ENABLE button disables and disconnects the remote terminal, and privileges the local supervisor terminal.

If the local supervisor terminal is disabled, pressing the REMOTE ENABLE button does not affect the remote terminal connection.

Table 2-1 summarizes the effect of pressing the REMOTE ENABLE button. The status of the remote terminal is indicated by the lights on the two REMOTE buttons and is summarized in Table 2-2.

When the remote terminal is active and enabled but not privileged, it monitors your system by displaying on its screen all the output to your supervisor terminal. At the same time, input from the remote terminal is displayed on both your supervisor terminal and on the remote terminal, with the input delimited by angle brackets (<>). To make the remote terminal function as the supervisor terminal, you must push the REMOTE PRIVILEGED button after the remote terminal is active and enabled.

The REMOTE ENABLE button serves the same function as the VCP command ENABLE :3. (For the ENABLE command, see Chapter 8.)

Table 2-1. Effect of Pressing the REMOTE ENABLE Button

<i>Remote Terminal is</i>	<i>Remote Terminal becomes</i>	<i>Comment</i>
Not active	Enabled	Remote user prompted for password upon dialing in.
Active	Enabled	Remote user prompted for password.
Active + enabled	Disabled + disconnected	
Active + enabled + privileged	Disabled + disconnected	No effect on remote terminal if Local 1 terminal not already enabled.

REMOTE ENABLE Light

The REMOTE ENABLE light, which is amber and is located on the REMOTE ENABLE button, works with the REMOTE PRIVILEGED light to indicate the status of the remote terminal, as described below. Table 2-2 summarizes the meanings of the REMOTE lights.

- When the light is *off*, the remote port is disabled and no remote terminal is dialed in.
- When the light is *glowing steadily*, the remote port is enabled, either with the REMOTE ENABLE button or with the ENABLE :3 command.
- When both this light and the REMOTE PRIVILEGED light are *blinking*, the remote terminal is active (has dialed in), but is disabled (is not monitoring the system). This is how you can tell that the remote user has dialed in and is waiting for you to enable the remote terminal.
- When this light is *blinking* but the REMOTE PRIVILEGED light is *off*, the remote terminal is active and enabled, but not privileged. The remote terminal is monitoring the system.

- When this light is *glowing steadily* and the REMOTE PRIVILEGED light is *blinking*, the remote terminal is active, enabled, and privileged and is functioning as the supervisor terminal.

REMOTE PRIVILEGED Button

The REMOTE PRIVILEGED button determines whether an enabled, active, remote terminal functions as the supervisor terminal or only as a monitoring terminal. (For the remote terminal to be enabled, you must have previously pushed the REMOTE ENABLE button or used the ENABLE :3 VCP command.)

When a remote terminal is privileged, it is functioning as the supervisor terminal. You should privilege a remote terminal only when you are certain that the remote user is a PrimeService representative.

Pressing the REMOTE PRIVILEGED button affects an active remote terminal as follows:

- If the active remote terminal is enabled (with either the REMOTE ENABLE button or the ENABLE :3 command), pressing the REMOTE PRIVILEGED button privileges the remote terminal and it therefore functions as the supervisor terminal. The user of the remote terminal can issue VCP commands or PRIMOS operator commands. Your local supervisor terminal acts only as a monitoring terminal. When a remote terminal is functioning as the supervisor terminal, it is active, enabled, and privileged.
- If the active remote terminal is already privileged, pressing the REMOTE PRIVILEGED button removes privilege and the remote terminal becomes an enabled terminal. The remote terminal remains enabled until you disable it with either the REMOTE ENABLE button or the DISABLE :3 command.

The REMOTE PRIVILEGED button serves the same function as the VCP command PRIVILEGE :3. (For the PRIVILEGE command, see Chapter 8.)

REMOTE PRIVILEGED Light

The REMOTE PRIVILEGED light, which is amber and is located on the REMOTE PRIVILEGED button, works with the REMOTE ENABLE light to indicate the status of the remote terminal, as indicated below. Table 2-2 summarizes the meanings of the REMOTE lights.

The REMOTE lights indicate the status as follows:

- When the REMOTE PRIVILEGED light is *off*, the remote terminal is not privileged. Whether it is active and/or enabled depends on the status of the REMOTE ENABLE light.
- When the REMOTE PRIVILEGED light is *glowing steadily*, the remote port is enabled and privileged, but the remote user has not dialed in.
- When this light is *off* and the REMOTE ENABLE light is *blinking*, the remote terminal is active and enabled, but is not privileged. The remote user has dialed in and is monitoring your system.
- When both this light and the REMOTE ENABLE light are *blinking*, the remote terminal is active, but is disabled and not privileged. This is how you can tell that the remote user has dialed in and is waiting for you to enable the remote terminal.
- When this light is *blinking* and the REMOTE ENABLE light is *glowing steadily*, the remote terminal is functioning as the supervisor terminal. Input from the remote terminal is processed by the CPU and output is sent to the remote terminal.

Note that the remote port can be active (someone can dial in to the modem) before it is enabled (with either the REMOTE ENABLE button or the VCP command ENABLE :3), and it can be enabled before it becomes active. The remote port has to be both active *and* enabled before it can be privileged with the REMOTE PRIVILEGED button or with the VCP command PRIVILEGE :3.

Table 2-2. Status of Remote Port/Terminal as Indicated by Remote Lights

REMOTE ENABLE	REMOTE PRIVILEGED	Status of Remote Port/Terminal
Off	Off	Disabled and inactive. (Remote port is disabled and no remote user is dialed in to the modem.)
On	Off	Enabled and inactive. (Remote port is enabled, but no remote user is dialed in.)
On	On	Enabled, inactive, and privileged. (Remote port is enabled and privileged, but no remote user is dialed in.)
Blinking	Off	Enabled, active, and nonprivileged. (Remote port is enabled and remote user is dialed in, but remote terminal is not privileged and is only monitoring the system.)

Table 2-2. Status of Remote Port/Terminal as Indicated by Remote Lights (continued)

<i>REMOTE ENABLE</i>	<i>REMOTE PRIVILEGED</i>	<i>Status of Remote Port/Terminal</i>
Blinking	Blinking	Disabled and active. (Remote user is dialed in, but the remote port is not enabled.)
On	Blinking	Enabled, active, and privileged. (Remote user is dialed in and the remote port or terminal is enabled and privileged, and thus functioning as the supervisor terminal.)

PROCESSOR HALT Lights

The PROCESSOR A HALT light indicates the status of the CPU. (The PROCESSOR B HALT light is always off.)

- When the PROCESSOR A HALT light is *off*, the CPU is running. (When the CPU is running, it is executing whatever program you booted, which in most cases is PRIMOS.)
- When the PROCESSOR A HALT light is *on*, the CPU has halted and is not running. This light always comes on when you push the MASTER CLEAR button.

Note that a system halt causes the PROCESSOR A HALT light to turn on; a hang does not. Therefore, one indication that a hang has occurred is that the PROCESSOR A HALT light is off but the system does not respond to commands from the supervisor terminal or from user terminals. For details on halts and hangs, see Chapter 6.

Lock/Unlock Key Switch

The two-position lock/unlock key switch is located on one end of the System Status Panel, next to the Prime logo. Figure 2-2 shows the key switch.

The key switch enables or disables the MASTER CLEAR, REMOTE ENABLE, and REMOTE PRIVILEGED buttons, as follows:

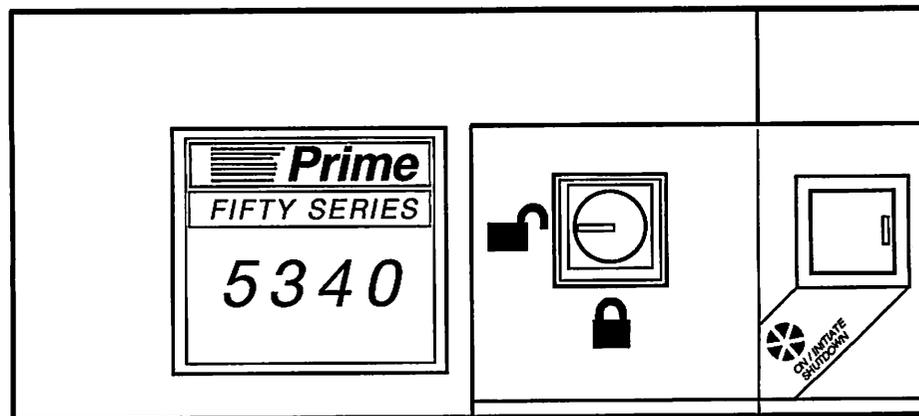
- When the switch is in the the unlocked padlock position, pushing any of these buttons has the desired effect.
- When the switch is in the the locked padlock position, pushing these buttons has no effect.

The key switch does not affect the operation of the ON/INITIATE SHUTDOWN button, but it does prevent you from using the button to boot PRIMOS because the Maintenance Processor would not perform the necessary initialization operations.

Turning the key switch counterclockwise to the locked padlock position also locks the supervisor terminal in the current terminal mode (CP mode, ST mode, or USER mode) and prevents anyone from shifting the supervisor terminal among these modes. When the supervisor terminal is locked in CP mode, no one can change the state of the system with VCP commands, because the only VCP commands that are accepted are DATE, DIRECTORY, HELP, and LISTREV. Attempting to use other VCP commands while the key switch is in the locked position causes the Maintenance Processor to display this message:

DPM301: Can't while key switch is locked.

Use this security feature when you have to leave the supervisor terminal unattended and unauthorized users have access to the terminal. Turn the key switch clockwise to place it in the unlocked position.



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Figure 2-2. Key Switch

Summary of System Status Panel Functions

Table 2-3 summarizes the System Status Panel functions described in this chapter.

Table 2-3. System Status Panel Functions

<i>Button, Light, or Key Switch</i>	<i>Function</i>
ON/INITIATE SHUTDOWN	If power is off, turns on power to all modules and automatically boots PRIMOS. If power is on and PRIMOS is running, shuts down PRIMOS in an orderly manner and turns off power to all modules. When the green light on the button is lit, the module (including the CPU) has power.
MASTER CLEAR	Halts the CPU, clears errors from the CPU and peripheral controllers, and places the supervisor terminal in CP mode.
REMOTE ENABLE	Enables or disables a remote terminal. An enabled, active, remote terminal monitors what is displayed on the supervisor terminal. (The remote terminal will not function as supervisor terminal until the REMOTE PRIVILEGED button is subsequently pushed.) Same as the ENABLE :3 command.
REMOTE PRIVILEGED	Makes a dialed-in and enabled remote terminal function as the supervisor terminal. (The remote terminal must have been enabled previously with the REMOTE ENABLE button or the ENABLE :3 command.) The normal supervisor terminal cannot execute commands, but can only monitor what is displayed on the remote privileged terminal. Same as the PRIVILEGE :3 command. If the remote terminal is already privileged, pushing this button removes privilege and returns it to an enabled local terminal.
PROCESSOR HALT	If lit, the CPU has halted and the supervisor terminal is in CP mode. If off, the CPU is running.
Lock	Disables the MASTER CLEAR, REMOTE ENABLE, and REMOTE PRIVILEGED buttons, but not the ON/INITIATE SHUTDOWN button. Locks the supervisor terminal into the current mode and disables all VCP commands except for DATE, DIRECTORY, HELP and LISTREV.
Unlock	Enables the MASTER CLEAR, REMOTE ENABLE, and REMOTE PRIVILEGED buttons, and all VCP commands.

Using the Supervisor Terminal

3



As discussed in Chapter 2, you can interact with the system by using the physical controls of the System Status Panel. This chapter discusses how you can use the supervisor terminal to control the system by issuing PRIMOS commands and VCP commands.

Supervisor Terminal

The supervisor terminal is the main link between you and the system's many programs and devices. You use it for giving instructions to various parts of the system and for receiving and recording information from the system.

The supervisor terminal is not directly connected to the system CPU, but is instead connected to the Maintenance Processor, which allows the supervisor terminal to function as a supervisor terminal, a user terminal, or a virtual control panel (VCP). These three operating modes are summarized in Table 3-1 and are discussed in detail in the sections that follow.

Caution Your system has a Terminal Break security feature that prevents unauthorized users from accessing the supervisor terminal. This security feature (enabled with the VCP command BREAKON and disabled with the VCP command BREAKOFF) works in conjunction with the VCP command PASSWORD.

If the Terminal Break feature is enabled and you turn off power to the supervisor terminal while the system is running, whoever powers on the supervisor terminal is prompted for a password. That person has three tries to enter the correct password to regain access to the terminal. (The password is whatever you set with the VCP PASSWORD command.) If the correct password is not entered, the supervisor terminal locks up and the only way you can unlock it is to restart the system by using the ON/INITIATE SHUTDOWN button.

Operating Modes of the Supervisor Terminal

You can use the supervisor terminal in three different operating modes:

- Supervisor Terminal (ST) mode
- Control Panel (CP) mode
- User Terminal (USER) mode

If the key switch is in the unlocked position, you can change back and forth between modes. The following sections describe the functions of each mode as well as the methods for changing from one mode to another. Table 3-1 summarizes these three modes. Table 3-2, later in this chapter, summarizes the procedures for changing from one mode to another.

Table 3-1. Supervisor Terminal Operating Modes

<i>Mode</i>	<i>Function</i>
Supervisor Terminal (ST)	<p>Used for administrative and operations work when you must issue operator commands.</p> <p>No login is necessary because the supervisor terminal is always logged in as SYSTEM with the user number 1. When you are logged in with your user ID while in USER mode, SYSTEM is still logged in.</p> <p>OK, and ER! are the default system prompts for ST mode.</p> <p>You can use any PRIMOS command, including operator commands.</p>
User Terminal (USER)	<p>Used when you are doing work as a regular user, not as an operator.</p> <p>The terminal functions as a regular user terminal, and you have only those rights granted to other nonprivileged users.</p> <p>The first time you change to USER mode, you must log in by using the LOGIN command with your user ID. If, however, you were previously logged in in USER mode and shifted to another mode, you do not have to log in when you shift back to USER mode.</p> <p>OK, and ER! are the default system prompts for USER mode.</p> <p>You can use only PRIMOS user commands.</p>

Table 3-1. Supervisor Terminal Operating Modes (continued)

<i>Mode</i>	<i>Function</i>
Control Panel (CP)	<p>Used when the supervisor terminal must act as a virtual control panel for the computer (for example, when PRIMOS halts or hangs).</p> <p>CP mode is mainly used to boot the system, perform tape dumps, and shift between ST and USER modes.</p> <p>No login is required.</p> <p>CP1> is the prompt for CP mode.</p> <p>You can use only the VCP commands, which are explained in Chapter 8.</p>

Supervisor Terminal (ST) Mode

When PRIMOS is running, the normal mode of operation for the supervisor terminal is Supervisor Terminal (ST) mode. Only in ST mode can you control the system by using the PRIMOS operator commands required for system monitoring and maintenance. For example, you can use the MAXUSR and SHUTDN commands only from ST mode. You can, of course, also use any PRIMOS user command. Operator commands are documented in the *Operator's Guide to System Commands*, and user commands are described in the *PRIMOS Commands Reference Guide*.

While the supervisor terminal is in ST mode, the terminal displays system messages and Maintenance Processor messages that are not displayed on user terminals. These messages inform you of changes in the system's status, such as when disk errors occur or when the Batch subsystem processes a Batch job.

ST mode is available only when PRIMOS is running. If PRIMOS is not running, the only available mode for the supervisor terminal is Control Panel (CP) mode.

In ST mode, you cannot use the LOGOUT command and log out User 1.

Entering ST Mode

When you cold start PRIMOS, the supervisor terminal is automatically set to ST mode and logged in as a server named SYSTEM with user number 1.

Note Although there can be only one User 1 on the system, any number of users can be logged in with the user ID of SYSTEM, if such an ID exists in the SAD. These other SYSTEM IDs are differentiated from User 1 because their user numbers are higher than 1.

From ST mode, you can change to CP mode by pressing the <ESC> key twice, or you can change to USER mode by first changing to CP mode and then using the VCP command MO USER. Each change is described in the section for the appropriate mode.

If you have changed from ST mode to another mode, you can return to ST mode by using one of the following procedures:

- To return to ST mode from CP mode, use the VCP command MO ST:

```
CP1> MO ST
```

- To return to ST mode from USER mode, first press the <ESC> key twice to change to CP mode and then use the VCP command MO ST:

```
OK, <ESC><ESC>  
CP1> MO ST
```

Note that you do not get the PRIMOS OK, prompt after you use the MO ST command. Instead, PRIMOS waits for you to enter a command. You do not have to log in because you are already logged in as User 1 (SYSTEM).

Control Panel (CP) Mode

When you set the supervisor terminal to CP mode, you can use the VCP commands described in Chapter 8. Some of these VCP commands perform functions similar to those performed by the buttons on the System Status Panel, such as booting, stopping the CPU, and performing a Master Clear. Other VCP commands are intended to be used to perform technical procedures by your PrimeService representative.

Here are some reasons for using CP mode:

- Booting PRIMOS (by using the BOOTP or BOOT commands)
- Switching the supervisor terminal between ST mode and USER mode (by using the MO USER and MO ST commands)
- Handling halts and hangs, including performing crash tape dumps (with the TAPEDUMP or PARTIAL_TAPEDUMP commands) and warm starting PRIMOS (with the WARMSTART command)

When you are in CP mode, you are communicating with the Virtual Control Panel (VCP). The Virtual Control Panel is so named because the earliest Prime computers had physical control panels with toggle switches and rotary knobs. Later Prime computers replaced this physical control panel with a processor-driven “virtual” control panel. The VCP now uses software commands to perform many of the functions that were previously done by manipulating physical switches.

CP1> is the prompt for CP mode. The letters CP in the CP1> prompt stand for Control Panel; the number 1 indicates that the terminal is connected to the Maintenance Processor’s Local 1 port.

Note By using the VCP command PRIVILEGE (explained in Chapter 8), you can make another terminal function as the supervisor terminal, while the normal supervisor terminal acts only as a monitoring terminal. The other terminal can be either a local terminal connected to Local 2 port (in which case its CP mode prompt is CP2> instead of CP1>), or it can be a remote dialed-in terminal (in which case its prompt is CP*>). For details on the Local 2 and remote ports, see the section titled Local and Remote Ports, later in this chapter.

Entering CP Mode

The supervisor terminal is automatically set to CP mode (and the CP1> prompt is displayed) whenever PRIMOS is not running. PRIMOS would not be running, for example, if you shut it down (with the SHUTDOWN command) or if it stops unexpectedly because of a halt. (Chapter 6 provides instructions on using VCP commands to deal with halts.)

If PRIMOS is running, you can enter CP mode from either ST mode or USER mode by pressing the <ESC> key twice:

```
OK, <ESC><ESC>  
CP1>
```

The CP1> prompt indicates that the terminal is connected to the Local 1 port and can accept only VCP commands. No login is required.

From CP mode, you can return to ST mode (assuming PRIMOS is running) by using the MO ST command or to USER mode by using the MO USER command.

User Terminal (USER) Mode

USER mode can be used by any system that has a video display terminal (such as a PT200) as the supervisor terminal. Using a hard-copy terminal in USER mode is not advised because many programs (such as EMACS) depend on a video screen for output.

Note USER mode is available only if Local 1 port is privileged and the supervisor terminal line is connected to the Maintenance Processor's spare port. See the section titled Spare Port, later in this chapter, for the hardware requirements for using USER mode.

USER mode is intended for systems on which the System Operator is also a regular user, because work performed in ST mode (as User 1) slows down system response for other users more than if the same work were performed in USER mode (as User 2). This occurs because User 1 has a higher priority than nonprivileged users and therefore is served by PRIMOS more often. Thus, an Operator in ST mode using EMACS to edit a large file uses more CPU and I/O time from PRIMOS than if the Operator were in USER mode.

A supervisor terminal in USER mode acts as a regular user terminal, which means that

- You can enter USER mode only when PRIMOS is running and users are allowed to log in.
- You must log in as a regular user.
- You are logged in as user number 2. User 1 (SYSTEM) continues to run in the background as a server (a type of phantom). The STATUS USERS command would show that User 1 is still logged in.
- You cannot use PRIMOS operator commands (such as MAXUSR, ADDISK, or SHUTDN) that can be issued only in ST mode.
- By default, informative messages to User 1 are inhibited. Therefore, you can use the terminal to work without disruptions.
- You should log out after finishing your work in USER mode. (If you are in ST mode, you cannot use the LOGOUT command to log out User 1.)

When you enter USER mode, you must log in by typing the LOGIN command and your user ID unless you had previously been in USER mode and had logged in at that time. When you are in USER mode, you can switch to another mode and then reenter USER mode without logging in again provided you did not previously log out of USER mode.

To protect against unauthorized access to the supervisor terminal when it is in USER mode, place the key switch on the System Status Panel in the locked

position and remove the key. Without the key, no one can change the terminal back to ST mode during your absence.

Entering USER Mode

You can enter USER mode only if PRIMOS is running and if the key switch is in the unlocked position. Use this procedure to enter USER mode from ST mode:

1. Press the <Esc> key twice to enter CP mode. The CP1> prompt is displayed.
2. At the CP1> prompt, enter the MO USER command. After this step, you do not receive the PRIMOS OK, prompt; instead, PRIMOS waits for you to enter a command.
3. Use the LOGIN command to log in.

Be sure to ignore Step 3 if you were previously in USER mode, changed to either CP mode or ST mode without logging out, and then changed back to USER mode. In this case, you are still logged in and PRIMOS restores your environment to what it was before you changed modes, as the following example demonstrates.

Example of Changing to USER Mode

As an example of changing supervisor terminal modes, suppose that you decide to switch from ST mode to USER mode to edit a file. You then decide to switch to ST mode to send a message to all other users on the system and then return to USER mode to continue your work exactly where you left off. The following steps show how this is done:

1. Change from ST mode to CP mode by pressing the <ESC> key twice:

```
OK, <Esc><Esc>  
CP1>
```

2. Use the MO USER command to enter USER mode, log in as a user (in this example, the user ID is GEORGE with a password of SECRET), and invoke the editor. (The password is not echoed on the terminal, but is shown in the display below for clarity.) Note that after you enter the MO USER command, the terminal does not display a prompt; however, you are communicating with PRIMOS:

```
CP1> MO USER  
LOGIN GEORGE  
Password? SECRET
```

```

GEORGE (user 2) logged in Friday, 13 Jul 90 09:36:48.
Welcome to PRIMOS version 23.0
Copyright (c) Prime Computer, Inc. 1990.
Last login Wednesday, 11 Jul 90 11:43:40.
OK, ED

```

```

INPUT
Now is the time for all

```

3. In the middle of your editing session (after typing the word *all*), you realize you forgot to send a message to all users about the unavailability of the system printer. You change to ST mode and send a system bulletin:

```

Now is the time for all<Esc><Esc>
CP1> MO ST
OK, MESSAGE ALL -NOW -FORCE
The printer is out of order. May be fixed by 3 pm.
OK,

```

4. Return to USER mode and continue your editing:

```

OK, <Esc><Esc>
CP1> MO USER
Now is the time for all good

```

Summary of Operating Modes

The following table summarizes the procedures for changing supervisor terminal operating modes.

Table 3-2. Procedure for Changing Supervisor Terminal Operating Modes

<i>Mode in</i>	<i>Mode wanted</i>	<i>Procedure</i>
ST	CP	OK, <Esc><Esc> CP1> (Enter VCP command)
ST	USER	OK, <Esc><Esc> CP1> MO USER (Log in or enter PRIMOS command)
CP	ST	CP1> MO ST (Enter PRIMOS command)

Table 3-2. Procedure for Changing Supervisor Terminal Operating Modes (continued)

Mode in	Mode wanted	Procedure
CP	USER	CP1> MO USER (Log in or enter PRIMOS command)
USER	ST	OK, <Esc><Esc> CP1> MO ST (Enter PRIMOS command)
USER	CP	OK, <Esc><Esc> CP1> (Enter VCP command)

Determining Your Terminal Mode

To determine the mode of the supervisor terminal, check the system prompt:

- If the CP1> prompt is displayed, you are in CP mode.
- If the OK, prompt is displayed, you are in either ST mode or USER mode.

If you are in either USER mode or ST mode, use the STATUS ME command:

- In ST mode, STATUS ME displays information about *all* system users.
- In USER mode, STATUS ME displays information only about your user ID.

Customizing Your Prompt

Use the RDY command to change the OK, prompt to one of your choosing. A customized prompt helps you keep track of your terminal mode. The following example shows how to change your USER mode prompt to SYSA_User> with the RDY command while in USER mode.

```
OK, RDY -RB 'SYSA_User> '  
SYSA_User>
```

For details on the RDY command, see the *PRIMOS Commands Reference Guide* or the *PRIMOS User's Guide*.

Securing the Supervisor Terminal

To protect your system's security, only specially designated people should have access to the supervisor terminal when it is in ST mode.

If you leave the supervisor terminal unattended and want to protect it against unauthorized use, set the terminal to USER mode, turn the key switch on the System Status Panel to the locked position, and remove the key. This procedure locks the supervisor terminal in USER mode, which prevents anyone from shifting the terminal to CP or ST modes.

You can also use the BREAKON feature described in Chapter 8 under the VCP command BREAKON and discussed in the Caution on the first page of this chapter.

Controlling Supervisor Terminal Output

The system displays messages at the supervisor terminal in different ways depending on the *operating* mode the supervisor terminal is in and depending on which *output* mode the terminal is in. The three supervisor terminal output modes are

- Buffer mode
- Interleave mode
- Ignore mode

ST Operating Mode

Whenever the supervisor terminal is in ST mode, it displays system messages immediately. System messages are those displayed on the supervisor terminal by the Maintenance Processor or by PRIMOS. PRIMOS messages originate from subsystems (such as Batch), from users (using the MESSAGE command, for example), or from PRIMOS itself (such as disk-error messages.) This output mode, called Interleave mode, is always the output mode when the supervisor terminal is in ST mode. The supervisor terminal cannot be changed to another output mode.

CP and USER Operating Modes

When the supervisor terminal is in USER mode or in CP mode, system messages are not displayed immediately; they are stored in a 384-character buffer and then displayed at once when you reenter ST mode. This output mode is called Buffer mode and is the default output mode for CP and USER operating modes.

Because the setting of the output mode is stored, you can change from ST mode to USER mode (for example), change back to ST mode, and still have the same output mode setting when you again return to USER mode. This setting for CP and USER modes remains in effect until you change it with the SYSOUT command, reset the VCP with the VIRY command, or turn off power to the Maintenance Processor.

Changing to Interleave Mode

You may decide that you want to see system messages while you are in USER or CP mode so that you can respond immediately to any message that requires your response as the Operator. For example, if a user uses the ASSIGN command to request that you mount a tape, you do not receive that user's request until you return to ST mode.

To change to Interleave output mode (the default is Buffer mode), use the SYSOUT INT command. This causes system messages to be displayed at your terminal when you are in USER or CP mode. The messages are interleaved with the normal screen display you receive as a PRIMOS user. To respond to system messages, you must change to ST mode.

After you use the SYSOUT INT command, Interleave mode becomes the default output mode for USER and CP modes until you use another SYSOUT command or repower the system.

The disadvantage of interleaving is that output to your terminal may appear garbled. The advantage is that you are immediately aware of any user or system message that requires your response.

Interleave mode is recommended if you frequently use the supervisor terminal in USER mode. If you later decide to change back to the default Buffer mode, you can use the SYSOUT BUFF command at any time.

Changing to Ignore Mode

Use the SYSOUT IGN command to cause system messages to be discarded when you are in CP or USER mode. After you use the SYSOUT IGN command, Ignore mode becomes the default output mode for USER and CP modes until you use another SYSOUT command or repower the system.

Ignore mode is not recommended because if you are in USER mode and an urgent system message requires that you respond, you will never see the message. If you do not want to receive system messages while you are in USER mode, use the default Buffer mode rather than Ignore mode.

Changing to Buffer Mode

When system power first comes on, the default mode for CP and USER modes is Buffer mode. If you have changed the output mode to Interleave or Ignore mode, that mode is retained as the default output for CP and USER modes until you can change it back to Buffer mode with the SYSOUT BUFF command or until you repower the system.

If you do not use USER mode very much, Buffer mode is the recommended output mode. If you use USER mode extensively, Interleave mode is recommended.

Recording Supervisor Terminal Activity

If your supervisor terminal is a hard-copy terminal, you automatically have a printed record of all messages sent to the supervisor terminal and of all commands typed at the terminal. If your supervisor terminal is a video display unit (VDU) such as a PT250, you have no permanent record of this data unless you save it in a command output file. (Command output files are also known as COMOUTPUT or COMO files, after the PRIMOS command that controls them.)

If you have a VDU and want to keep a COMO file, open the file at cold start with the COMOUTPUT command. (User 1, SYSTEM, must be given at least ALURW access to the directory in which the COMO file resides.) Place the COMOUTPUT command in the PRIMOS.COMI file immediately after the CONFIG command in one of two formats:

- To append the terminal output to an existing COMO file, use the -CONTINUE option of the COMOUTPUT command.
- To start a new command output file and overwrite an existing COMO file of the same name, do not use the -CONTINUE option.

For example, the first two commands of a PRIMOS.COMI file may be as follows:

```
CONFIG -DATA CONFIG           /* Specify CONFIG file
COMOUTPUT SYSTEM.COMO -CONTINUE /* Append output to
                                /* COMO file
```

In the above example, SYSTEM.COMO is the name of the COMO file to which PRIMOS output is appended. If you do not use the COMOUTPUT -NTTY option, the output is also displayed on the terminal, which allows you to monitor the startup process as it proceeds.

The System Administrator (or a designated Operator) keeps the COMO file to a manageable size so that it does not consume large amounts of disk space. It may

be your duty to spool, and then delete, this file at regular intervals. If you notice that the COMO file is large (over 100 records, for example), notify your System Administrator.

The system COMO file is supported by a 384-character buffer that stores all messages for User 1. All messages sent to the supervisor terminal by other processes are directed to this buffer. If messages arrive faster than they can be removed from the buffer, later messages are lost. (For example, multiple disk-error messages could cause such a situation.) PRIMOS indicates this condition with a message such as the following one:

```
User 1 message buffer overflowed. 20 characters lost.
```

If such messages appear often, notify your System Administrator. The System Administrator can reduce message traffic to the supervisor terminal by changing the LOGMSG directive or by changing the ASRBUF parameters, both of which are in the system configuration file.

Local and Remote Ports

The supervisor terminal is normally connected to the Maintenance Processor through an RS-232 serial port called the Local 1 port. When the system is powered on, the Local 1 port is automatically privileged (that is, the terminal connected to the Local 1 port becomes the supervisor terminal.) Some VCP commands can be executed only through the Local 1 port. (For further information on VCP commands, see Chapter 8.)

The Maintenance Processor also has two other RS-232 serial ports, each of which you can activate so that the terminal connected to that port becomes the supervisor terminal.

- A Local 2 port, used to make another local terminal the supervisor terminal
- A remote port, used to make a remote terminal (which has dialed in through a modem) the supervisor terminal, for purposes of performing remote diagnostics

All three ports can be active at the same time and can be enabled at the same time, but only one of these ports can be privileged at any given time.

The terminal connected to the privileged port is the only terminal that can execute commands; the other two terminals, if enabled, can only monitor the actions that are being executed at the privileged port. In normal operation, Local 1 port is the privileged port.

You can disable, enable, or privilege a local or remote port by using the VCP commands DISABLE, ENABLE, and PRIVILEGE. You can also perform the

A Local 2 terminal is intended to be used as the supervisor terminal at a location removed from the CPU cabinet, such as in an office. The Local 1 terminal is assumed to be near the CPU module, although both terminals may be placed in the same area.

Because the Local 2 port is a direct terminal connection (that is, without a modem), the terminal is always assumed to be active. (A remote terminal, by contrast, has to be dialed in to a modem before it is considered active.)

To make the Local 2 port the privileged port, use the following procedure:

1. At the Local 1 terminal, use the `ENABLE :2` command to enable the Local 2 port. You can use the `-NOPASS` option if you do not want the Local 2 user to be prompted for a system password.
2. If you used the `-NOPASS` option at step 1, the privileged port's prompt is displayed and the Local 2 user will see commands being entered at the privileged port. If you did not use the `-NOPASS` option, the Local 2 user is prompted for a password:

```
DPM203: Please enter password:
```

The user has three tries to enter the correct password, or a 40-second timeout period, whichever comes first. An incorrect password produces the message `ERR205: Incorrect password entered.` and another prompt for the password.

While the Local 2 user is being prompted for a password, the privileged port cannot enter commands and is considered nonprivileged for that time. This occurs because the Maintenance Processor is using the main input queue for the password information and the input queue cannot be corrupted with input from any other terminal.

3. After the port is enabled, use the `PRIVILEGE :2` command at the Local 1 terminal to make Local 2 the privileged port. The `CP2>` prompt is displayed on all enabled terminals.

The Local 2, or spare, port can also be used by a PrimeService representative for testing and maintenance purposes.

Remote Port

The remote port is a full PTT (Post, Telegraph, and Telephone) compliant, RS-232 port and has support for most types of modems. This port is intended for use by your PrimeService representative, who will perform remote diagnostics.

Unlike the local ports, the remote port is not active until a remote user has successfully dialed in through a modem. For details on using the remote port, see Appendix D and the discussion of the REMOTE buttons and lights in Chapter 2.

Note Because the Maintenance Processor supports the CCITT protocol, it expects the remote cable input to have the corresponding control signal active. Therefore, the only way you can connect a cable directly from a terminal to the remote port is by using a modem on the terminal side.

User Port

The user port is generally for systems that use the supervisor terminal as a user terminal (USER mode). The MO USER command places the Maintenance Processor in route-through mode, in which data typed on the Local 1 privileged port are transmitted directly out to the user port and data received on the user port are displayed on the privileged port.

This feature means that if the supervisor terminal's asynchronous line is connected to the user port, the terminal can function as a user terminal in USER mode because a virtual connection is made between the privileged Local 1 port and the user port. Thus, USER mode is available only if Local 1 port is privileged and only if a terminal line is connected to the user port.

Using RESUS

The Distributed Systems Management (DSM) facility allows you to administer a standalone or networked Prime system. For details on the operation, functions, and commands of DSM, see the *DSM User's Guide*.

A feature of DSM is RESUS, a facility that allows a user terminal to function as the supervisor terminal. The user terminal becomes the logical supervisor terminal while the real or physical supervisor terminal functions only as a monitoring terminal. (The User 1 process is actually assigned to the user terminal.) The effect is much like privileging a remote terminal with the VCP command PRIVILEGE :3 or the REMOTE PRIVILEGED button.

When the supervisor terminal is acting as a monitoring terminal, it echoes the commands that you type, but it does not execute them. The only two exceptions are the RESUS -DISABLE and RESUS -DISABLE -FORCE commands, both explained below.

Enabling and Disabling RESUS

Before the RESUS facility can be used, you must enable it with this command:

RESUS -ENABLE

When RESUS is enabled, the default system ready prompt (OK.) and error prompt (ER!) change respectively to the following prompts:

`<nodename>.RESUS_OK<`
`<nodename>.RESUS_ER<`

nodename is the name of your system.

After RESUS is enabled, an authorized local or remote user can make his or her user terminal function as the supervisor terminal by using this RESUS command format:

RESUS -START [-ON *nodename*]

The RESUS-started user terminal can then issue any PRIMOS operator command. CP mode is not available at the terminal, however, so VCP commands cannot be issued.

To disable RESUS on your system after it is enabled (so that the RESUS -START command does not work), use this command:

RESUS -DISABLE

If a RESUS-started user terminal is functioning as the supervisor terminal, you can forcibly disable RESUS by using this command:

RESUS -DISABLE -FORCE

The user's terminal is disabled from functioning as a supervisor terminal and normal supervisor terminal activity is returned to the physical supervisor terminal.

Note When you forcibly disable RESUS, the User 1 process remains in the most recently entered subsystem. You can exit the subsystem by using whatever quit command works with that subsystem.

Precautions When Using RESUS

Because RESUS creates a special environment, take special precautions when using RESUS. Avoid using a subsystem (such as EMACS) that takes advantage of special terminal characteristics. If you do use such a subsystem, the user terminal must be identical to the supervisor terminal (for example, both must be PT250 terminals). Otherwise, the terminal may lock because the session echoes at the physical terminal (that is, the subsystem may send to the supervisor terminal a special character that may change the setting of the terminal.)

You should stop the RESUS session (with the RESUS -STOP command) before using EMACS or any subsystem with these characteristics, unless you are positive that the two terminals are of the same type.

Table 3-4 lists the PRIMOS commands that you should not use during a RESUS session.

Table 3-4. PRIMOS Commands to Avoid in a RESUS Session

<i>Command</i>	<i>Effect of Command</i>
AMLC or SET_ASYNC	It is possible to deassign the line to the terminal. Recover by disabling RESUS at the physical supervisor terminal and reconfiguring the line.
EMACS	EMACS is a terminal-specific subsystem. A RESUS session is echoed at the supervisor terminal and may lock the supervisor terminal keyboard.
ICE	ICE (INITIALIZE_COMMAND_ENVIRONMENT) is an emergency reinitializing command that resets your command environment to the login state and resets all terminal prompts to PRIMOS defaults. If ICE is used within RESUS, the special RESUS prompts are lost for the remainder of the session and are restored only when RESUS is next enabled.
LOGOUT	If the DSM server is inadvertently logged out while RESUS is being used on a system, the supervisor terminal function can be temporarily lost. Restore normal function by disabling RESUS at the physical supervisor terminal.
NETLINK	Your netlink session is switched to the physical supervisor terminal and will be lost at your terminal. If you enter NETLINK by accident while using RESUS, disable RESUS at the physical supervisor terminal and quit the NETLINK session from there.
STOP_DSM	The operation of RESUS itself depends on DSM running on the system.
STOP_NET	Issuing STOP_NET on a remote machine eliminates the communication link RESUS uses and aborts the remote session.
TERM	This command allows remote or local system users to customize their operating environment. Such changes remain in force on the supervisor terminal when the system returns to local control. Because others will use the supervisor terminal after you, it is good practice not to alter the environment at all, either when operating the system from the supervisor terminal, or from a user terminal through RESUS.
USRASR	This command can hang the User 1 process and requires special recovery procedures.

System Startup

4



This chapter describes the following topics:

- Automated startup
- Starting the system from CP mode
- Monitoring the startup procedure, including system startup messages
- Actions to take after system startup
- System configuration and startup files
- Problems that can occur during startup
- Alternative startup methods

Automated Startup

Your system features an automated startup procedure that you initiate by pressing the ON/INITIATE SHUTDOWN button on the System Status Panel. During automated startup, the Maintenance Processor automatically initializes the system and boots PRIMOS.

Use the following automated startup procedure if the power system is in the STANDBY state. (You can tell that the power system is in the STANDBY state because the light on the ON/INITIATE SHUTDOWN button is not lit and the PROCESSOR A HALT light is lit.)

1. Turn on the power to the supervisor terminal.
2. Set the key switch on the System Status Panel to the unlocked position.
3. Push the ON/INITIATE SHUTDOWN button on the System Status Panel. The lights on the System Status Panel turn on briefly, so that you can check if they are operational.
4. Turn on power to any disk drives that you may have in a peripheral cabinet. When the disk drives are ready, the disk ready lights glow steadily. (Disks in Device modules have power when the power system is in the STANDBY state and you press the ON/INITIATE SHUTDOWN button.)

5. Monitor the startup procedure, as explained in the section below, **Monitoring the Startup Procedure**.
6. After the automated startup has completed and PRIMOS is running, perform any additional startup procedures for your site, such as those listed in the section below, **Actions After System Startup**.

The automated startup procedure boots PRIMOS from the following:

- The first disk controller serviced by the system (controller address 26₈)
- The first disk drive (drive unit 0) on controller 26₈
- The first (or top) partition, which becomes logical device 0
- The most recent successful version of the PRIMOS runfile, the pathname of which is in the `BOOT_RUN_FILE_TRENAME` file in the MFD of logical device 0 or `PRIRUN>PRIMOS.SAVE`

Starting the System From CP MODE

If the system already has electrical power but PRIMOS has been stopped, the supervisor terminal is in CP mode, with the `CP1>` prompt displayed. In this case, you can cold start PRIMOS by issuing one VCP command, `BOOTP`.

If you had previously shut down PRIMOS (with the `SHUTDOWN ALL` command) but did not press the `ON/INITIATE SHUTDOWN` button, the system components (including the CPU) still have electrical power. The `ON/INITIATE SHUTDOWN` and `PROCESSOR A HALT` lights are lit. The supervisor terminal is in CP mode and the `CP1>` prompt is displayed. To start up the system in this situation, use the following procedure:

1. Make sure that the key switch on the System Status Panel is set to the unlocked position and that all necessary peripheral devices (including the supervisor terminal) are turned on.
2. Issue the `BOOTP` command at the `CP1>` prompt:

```
CP1> BOOTP
```

3. Monitor the automated startup procedure.
4. After system startup, perform any additional startup procedures.

The `BOOTP` startup procedure is essentially the same as the automated startup procedure, except that the automated procedure performs more verification and initialization operations and, therefore takes a little longer. Like the automated procedure, the `BOOTP` procedure uses the same devices and files as the `BOOT 14114` command.

Monitoring the Startup Procedure

During a system startup, the following five main operations are performed:

1. Power is supplied to all peripheral devices (if you pressed the ON/INITIATE SHUTDOWN button).
2. Maintenance Processor circuits are tested for correct operation.
3. CPU and controller circuits are tested for correct operation.
4. The CPBOOT bootstrap program, located on the Maintenance Processor's floppy diskette drive, is executed. This preboot program loads the PRIMOS BOOT program from disk into main memory.
5. The BOOT program checks main memory and loads in PRIMOS from the disk. The loading of PRIMOS into memory is called a cold start.

The startup procedure takes several minutes to complete, depending on the contents of the PRIMOS system configuration and system startup files. Your responsibility is to monitor the startup to ensure that it proceeds properly.

During the startup, the supervisor terminal displays messages (from the Maintenance Processor or PRIMOS) that tell you what the system is doing. The actual terminal display depends on the system's configuration, but includes a series of messages similar to the startup example below.

```
DPM000: Maintenance Processor beginning self verification
DPM310: RAM Verification... PASSED.
        16 Aug 90 15:47:04 Thursday
DPM311: Floppy Disk System Verification... PASSED.
DPM312: Initializing File System...
DPM313: Loading Message File... LOADED.
DPM308: Extended I/O box available.
DPM314: Loading Maintenance Processor code... LOADED.
DPM001: Maintenance Processor self verification completed
```

```
Microdiagnostics and Control Program
Copyright(C), Prime Computer Inc., 1989, 1990
All Rights Reserved
Proprietary software of Prime Computer, Inc.,
provided under license for use only on a single CPU.
Except as provided under such license this software
may not be transferred, disclosed to third parties
or copied in whole or in part.
```

```
DPM002: Beginning Central Processor system verification, please wait.
DPM004: Central Processor system verified.
        16 Aug 90 15:52:07 Thursday
DPM005: Beginning Central Processor system initialization, please wait.
DPM006: Central Processor system initialization completed.
        16 Aug 90 15:52:40 Thursday
```

```
DPM006: Central Processor system initialization completed.  
      16 Aug 90 15:53:57 Thursday  
DPM007: System booting, please wait.  
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]  
[BOOT Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]  
BOOTING FROM 001060 PRIRUN>PRIMOS.SAVE  
Coldstarting PRIMOS, Please wait...  
CONFIG -DATA CONFIG  
[PRIMOS REV. 23.0 Copyright (c) 1990, Prime Computer, Inc.]  
65534K BYTES MEMORY IN USE  
Starting up revision 23 partition "SYSCMD".  
748K bytes wired.  
System clock has been initialized.  
OK,
```

When the startup procedure has finished, the PRIMOS OK, prompt appears at the supervisor terminal. See the section below, *Problems During Startup*, for information on some problems that may occur during the startup procedure.

Actions After System Startup

All PRIMOS commands that are required to start your system up and make it fully operational are usually included in the PRIMOS.COMI system startup file — for example, commands to share and start subsystems (such as Batch) and to execute site-specific programs. If, however, those commands are not in the PRIMOS.COMI file, you must issue them interactively. The following actions may be required at your site:

- Issue the MAXUSR command to enable users to log in.
- Add remote partitions to the system (if it is on a network and you are not part of a common file system name space and do not start the Name Server process).
- Start subsystems, such as DSM, Batch, Spooler, and FTS.
- Calculate time with the SET_TIME_INFO command.
- Issue the CHAP command to grant special priorities and timeslices to particular operations.
- Start any additional peripheral devices, such as magnetic tape drives, dataphone sets on automatic answer, and line printers.

The first four operations are described in the following sections. The CHAP command is documented in the *Operator's Guide to System Commands*. Instructions for starting peripheral devices are in the manual shipped with each device.

The System Administrator should provide you with guidelines about all additional actions that should be taken after the startup procedure.

Enabling User Login (MAXUSR)

The MAXUSR command sets the maximum number of users on your system and allows users to log in. Usually the MAXUSR command is in the PRIMOS.COMI startup file. If it is not, you must issue the command to allow users to log in:

OK, MAXUSR

If you do not specify a numerical argument to MAXUSR, you are allowing as many users to log in as are permitted by the system configuration. PRIMOS responds to MAXUSR by displaying the following message at all user terminals connected to the system:

Login please.
OK,

After you enable user login, users can log in as long as the number of users does not exceed the current setting of MAXUSR.

To allow only a limited number of users to log in, issue MAXUSR with a decimal number:

MAXUSR *n*

n is a decimal number from 0 to the maximum number allowed in your system configuration. When you use this command, only *n* users can be logged in at any one time. To prevent users from logging in, specify *n* as 0. (For more information on this form of the MAXUSR command, see Chapter 5 and the *Operator's Guide to System Commands*.)

Note When you first enter MAXUSR after a cold start, two events occur. First, the maximum number of users allowed is set (to *n* if *n* is specified, otherwise to the number allowed by the system configuration file). Second, user login is enabled and the login message is sent to user terminals.

When you enter MAXUSR at any other time, only the first event occurs. That is, the maximum number of users is set to the number specified by the system configuration (if *n* is omitted), or is set to *n*.

Adding Remote Partitions (ADDISK)

Remote partitions that are not added to the system by commands in the PRIMOS.COMI file can be added afterwards with the ADDISK command. Before using ADDISK, make sure that the network is operational by using the STATUS NETWORK command.

Note If your system is part of a common file system name space and you are using the Name Server process, do not use ADDISK commands to add remote disks. In this case you can have a maximum of 1260 disks started on your system. See the *Rev. 23.0 Prime Networks Release Notes* for further details.

A maximum of 256 partitions can be started on your system. This total can consist of the following maximum figures: 8 paging partitions, 10 assigned partitions, and 238 (355₈) local and remote partitions accessible through normal file system operations.

The format to add remote partitions is as follows:

ADDISK *diskname-1* [. . . *diskname-9*] -ON *nodename*

nodename is the remote system's name, as listed in the output from the STATUS NETWORK command. The remote system must be RFA-enabled (Remote File Access). For example, to add the disks DAISY and CLOVER located on the remote system named FIELDS, use the following command:

OK, ADDISK DAISY CLOVER -ON FIELDS

You can also invoke CPL programs or COMINPUT (COMI) files that contain a series of ADDISK commands that add remote partitions. The contents of such a CPL program, named SYSTEM>REMOTE_DISKS.CPL in this example, would look like the following:

```
&SEVERITY &ERROR &IGNORE
ADDISK OPRINS -ON SYSJ
ADDISK SFTWR1 SFTWR2 -ON SYSK
ADDISK DBMS0 DATAP -ON SYSM
&RETURN
```

To run the program, use the RESUME command, as follows:

OK, RESUME SYSTEM>REMOTE_DISKS.CPL

If the file is a COMI file, use the COMINPUT command instead. For more information on remote partitions and the ADDISK command, see the *Operator's Guide to System Commands*.

Starting Subsystems

If some subsystems are not started in the PRIMOS.COMI file, you can start them after system startup. In either case, messages are displayed at the supervisor terminal as each subsystem starts up. These messages may not appear immediately after the command is issued, but may take several minutes to appear.

The following sections give examples of operator commands for starting various subsystems, and the messages these commands cause to be displayed at the supervisor terminal.

Starting Distributed Systems Management (DSM): If DSM is not started by your system file, PRIMOS.COMI, use the START_DSM command. The command starts the DSM server (DSMSR), the DSM system manager (SYSTEM_MANAGER), and the DSM logging process (DSM_LOGGER). Server processes for other DSM applications start automatically as required.

Startup of DSM displays the following messages:

```
OK, START_DSM
[START_DSM Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
[16 Aug 90 16:05:56 Thursday]
DSM initialisation started.
OK,
*** DSMSR (user 90 on SYSA) at 16:06
DSM Server is now in steady state.
```

If DSM is started in the PRIMOS.COMI file, the START_DSM command must come after the ADDISK command that starts up the partition on which DSM* resides (if the DSM* directory is not on the command partition). In particular, START_DSM should precede the START_NM, START_NET and COMM_CONTROLLER commands so that DSM logs event and system messages when PRIMENET is started and the communications controllers are downline loaded.

For complete information on DSM, see the *DSM User's Guide*.

Starting the Batch Subsystem: Use the BATCH -START command to start the Batch subsystem. The command starts the Batch monitor, which initiates the subsystem by performing a consistency check on the Batch database. When the Batch monitor finishes this check, it sends messages to the supervisor terminal indicating that it is in operation:

```
OK, BATCH -START
[BATCH Rev. 23.0 Copyright (c) 1990 Prime Computer, Inc.]
Monitor started up.
OK,
*** BATCH_SERVICE (user 94 on SYSA) at 10:41
Monitor in operation.
```

For details on the Batch subsystem, see the *Operator's Guide to the Batch Subsystem*.

Starting the Spooler Subsystem: Use the following two-step procedure to start the Spooler subsystem:

1. Use the COMINPUT command to execute the SPOOL.SHARE.COMI file in the SYSTEM directory. This file shares the segment (2167) used by the Spooler subsystem and initializes its environment with the PROP -COLDSTART command:

```
OK, COMINPUT SYSTEM>SPOOL.SHARE.COMI
```

2. Use one or more PROP -START commands to start up the despooler phantoms that control the printers on your system. You can place the PROP -START commands in the SPOOL.SHARE.COMI file. When a despooler phantom starts up, it displays a message similar to the following example for printer PR0:

```
OK, PROP PR0 -START  
[PROP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]  
OK,  
*** PR0 (user 95 on SYSA) at 10:51  
Despooler for PR0 ready.
```

A despooler phantom is a process that removes (despools) a spooled file from the spool queue and sends it to be printed at the printer that it controls. Despooler phantoms are also called spooler phantoms or printer environment phantoms. For details on the Spooler subsystem, see the *Operator's Guide to the Spooler Subsystem*.

Note If your system has upgraded from a pre-Rev. 21 version of PRIMOS, be sure that the following three commands are not in the PRIMOS.COMI file. These commands were necessary for pre-Rev. 21 versions of PRIMOS. The SYSTEM>SPOOL.SHARE.COMI file shares the Spooler subsystem as of Rev. 21.

```
SHARE SYSTEM>S$2167 2167  
RESUME SYSTEM>S$4000 1/12  
SHARE 2020 700
```

Starting the File Transfer Service (FTS): Use the following procedure to start the FTS subsystem:

1. Share and initialize FTS by using the COMINPUT command to execute the SYSTEM>FTS.SHARE.COMI file:

```
OK, COMINPUT SYSTEM>FTS.SHARE.COMI
```

2. Start the FTS manager (named YTSMAN by default) by using the FTOP -START_MNGR command. The system responds with a message:

```
OK, FTOP -START_MNGR  
[FTOP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]  
Manager YTSMAN phantomed, - user number is 96.
```

3. When the FTS manager is successfully started up, the system responds with the following messages:

```
*** YTSMAN (user 96 on SYSA) at 10:53  
[YTSMAN Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]  
*** YTSMAN (user 96 on SYSA) at 10:53  
YTS manager started.
```

4. Start the FTS servers by using FTOP -START_SRVR commands. The following example shows an FTS server starting under the name FTP and the resulting messages from the system:

```
OK, FTOP -START_SRVR FTP  
[FTOP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]  
Server FTP phantomed, - user number is 97.  
*** FTP (user 97 on SYSA) at 10:55  
10.55.26: [FTP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]  
  
*** FTP (user 97 on SYSA) at 10:55  
10.55.26: FTS Server FTP started up on Tuesday, August 21, 1990
```

For detailed information on the File Transfer Service, see the *PRIMENET Planning and Configuration Guide*, the *Operator's Guide to Prime Networks*, and the *User's Guide to Prime Network Services*.

Other Messages: Certain other messages may appear at system startup. These messages may reflect changes made by the System Administrator to the PRIMOS.COMI file. If messages with which you are unfamiliar appear, note them in the system logbook and ask the System Administrator about their meaning.

Calculating Universal Time

The SET_TIME_INFO command establishes time information, such as the offset of standard local time from Universal time (formerly, Greenwich mean time) and the local applicability of daylight saving time, so that PRIMOS can calculate the current Universal time. SET_TIME_INFO is optional, and can be issued either interactively or from the PRIMOS.COMI file. If SET_TIME_INFO is not used, the local time on your system is not affected.

The `TIMER_PROCESS` phantom that actually calculates the Universal time is started automatically at cold start when the PRIMOS system clock is initialized by the Maintenance Processor's internal battery clock.

For more information on the `SET_TIME_INFO` command, see the *Operator's Guide to System Commands*.

System Configuration and Startup Files

During the startup procedure, PRIMOS configures and initializes itself by reading the system startup file (named `PRIMOS.COMI`) and the system configuration file (usually named `CONFIG`). Both files must be stored in the `CMDNC0` directory on logical device 0 (ldev 0).

A successful configuration and initialization of PRIMOS occurs in three steps:

1. PRIMOS opens the `PRIMOS.COMI` system startup file and reads the `CONFIG -DATA` command (which must be the first noncomment line) to find out the name of the system configuration file. At this point, only this first command is processed.
2. PRIMOS opens the configuration file, reads all the configuration directives in it, closes the file, and processes the directives. After this step, PRIMOS has configured itself.
3. PRIMOS returns to the `PRIMOS.COMI` file and executes the rest of the commands in the file to initialize the system.

You can therefore consider a cold start of PRIMOS as consisting of two phases:

- The *system configuration* phase, when PRIMOS reads the configuration file and configures itself according to the parameters specified by the directives in the file.
After this file is processed, PRIMOS is set up and running, but the system is not completely ready for normal use.
- The *system initialization* phase, when PRIMOS reads the `PRIMOS.COMI` file and initializes the system according to the PRIMOS commands in the file.

The initialization phase includes such actions as configuring asynchronous lines, sharing system segments, adding local and remote partitions, and setting up software products and software subsystems. After system initialization is completed, you can perform additional startup procedures, such as those discussed in the section, *Actions After System Startup*, earlier in this chapter. Afterwards, the system is ready for use by the user community.

Both the system configuration and system startup files are created by the System Administrator. The files should be appropriately protected and should never be modified without the approval of the System Administrator.

The next two sections discuss the system configuration and system startup files and how PRIMOS accesses them.

System Configuration File

Although the system actually opens the PRIMOS.COMI system startup file before opening the system configuration file, the configuration file is discussed first because its contents are processed completely before those of the PRIMOS.COMI file.

The CONFIG -DATA command, which must be the first noncomment line in the PRIMOS.COMI file, tells PRIMOS the name of the configuration file.

The configuration file must be stored in the CMDNCO directory on logical device 0 (ldev 0). The configuration file may have any valid PRIMOS filename, but is usually named CONFIG.

Contents of the Configuration File: The configuration file contains a set of configuration directives that tell PRIMOS what parameters it must use to configure itself at cold start.

The following six directives must be in the configuration file.

- COMDEV
- PAGING
- SYSNAM
- NTUSR
- NPUSR
- GO

These essential directives are discussed in the next paragraphs. Note that beginning at Rev. 22.0, buffers for communications lines are configured by the CAB command (described later in this chapter). Before Rev. 22.0, these buffers were set by the AMLBUF, NTSABF, NTSBUF, and REMBUF configuration directives.

Setting the Command and Paging Partitions: The COMDEV directive specifies which partition is the command partition. The command partition has the logical device number 0 (shown as ldev 0 in the display of the STATUS DISKS command).

The PAGING directive specifies as many as eight paging partitions. The arguments to both the COMDEV and PAGING directives are the physical device

numbers of the appropriate partitions. See the *Operator's Guide to File System Maintenance* for details on constructing physical device numbers (pdev).

Setting the System Name: The SYSNAM directive, which sets the name of the system, should be in the configuration file because cold start will not complete until the system name has been set. If the SYSNAM directive is missing or invalid, you are prompted during cold start to enter a system name at the supervisor terminal. There is no default system name, and your system must have a name, even if PRIMENET is not running. The system name can be changed only at cold start.

When PRIMENET is started with the START_NET command, PRIMENET automatically adopts as its own node name the system name that is specified with the SYSNAM directive. If the -NODE option is used with START_NET, the node name specified must match the system name specified with the SYSNAM directive.

Setting Terminal Users: The NTUSR directive sets the number of directly connected terminal users. You can configure up to 512 (1000₈) terminal users. (This number includes the supervisor terminal.) This directive's value must be set to at least the number of terminals connected to the computer, plus one for the supervisor terminal. Setting the value higher than the number of connected terminals increases the amount of wired memory required for PRIMOS, thus causing more paging and some degradation of system performance.

Setting Phantom Users: The NPUSR directive sets the number of phantom users. You must set the value of NPUSR to at least 4, which is its default value but you need phantoms for subsystems such as DSM and Batch. (For guidelines on how many phantoms your system should have, see the *System Administrator's Guide, Volume I: System Configuration*.) If your system is networked, the configuration file may also contain directives specifying the maximum number of remote users (NRUSR), slave users (NSLUSR), and NTS users (NTSUSR).

Ending the Configuration File: The GO directive must be the final line of the configuration file. When GO is reached, the system configuration phase ends. After the configuration file is processed, PRIMOS is configured. PRIMOS is successfully running when it displays the first OK , prompt:

```
[PRIMOS 23.0 Copyright (c) 1990, Prime Computer, Inc.]
.
.
.
System clock has been initialized.
OK,
```

Next, PRIMOS begins system initialization by returning to the PRIMOS.COMI file and executing all the commands that follow the CONFIG -DATA command. For complete information on configuration directives and the system configuration file, see the *System Administrator's Guide, Volume I: System Configuration*.

Example of a Configuration File: The following example illustrates a configuration file. The symbols /* indicate an explanatory comment and must appear before any comment. Explanatory comments may appear anywhere on a line; nothing after the /* symbols on the line is processed. All numbers in the configuration file must be in octal.

```

/* CONFIG DATA FOR SYSTEM SYSA, REV. 23.0 08/16/90
ASRATE 2010          /* Set 1200 baud rate for system console
SYSNAM SYSA         /* Set name of the system
AMLTIM 2 3410 1130  /* Carrier-check time interval is 0.2 sec.,
                    /* disconnect is 3 min., grace is 1 min.
ASYNC JUMPER 11300 16040 45400 /* Speeds = 4800, 7200, 19200 bps
COMDEV 2460         /* Command device with CMDNCO
PAGING 100461 100661 /* Paging partitions
SYSNAM SYSA         /* Set name of the system
NAMLC 3             /* 3 buffers for assignable lines
NTUSR 100           /* 64 (decimal) terminal users
NPUSR 40            /* 32 (decimal) phantom users
NRUSR 10            /* 8 (decimal) remote users allowed
NSLUSR 20           /* 16 (decimal) slave users
NSEG 10000          /* 4096 (decimal) segments
MIRROR              /* Allow disk mirroring
WIRMEM              /* Size memory for configuration
LOTLIM 3            /* 3 minutes allowed for login
LOGLOG YES          /* Enable use of LOGIN while logged-in
LOUTQM 74           /* Auto logout after 1 hr. of inactivity
DISLOG NO           /* No logout on terminal or line disconnect
LOGMSG NO           /* Do not print login/logout messages
NVMFS 2000          /* VMFA segments for system is 1024 decimal
NLBUF 200           /* 128 (decimal) locate buffers
GO

```

System Startup File

The PRIMOS.COMI system startup file is a command input (COMI) file that performs two actions during a cold start:

1. Specifies the name of the configuration file (with the CONFIG -DATA command).
2. Performs a number of operations necessary to initialize the system (with various PRIMOS commands). These operations include configuring terminal lines (SET_ASYNC command), sharing memory segments (SHARE command), setting buffer sizes for communication lines (CAB command), adding local and remote partitions (ADDISK and/or START_NAMESERVER command), and starting subsystems such as DSM, Batch, the Spooler, the File Transfer Service, and PRIMENET.

The system startup file must reside in the top-level directory, CMDNC0, and have the filename PRIMOS.COMI. (The name C_PRMO is obsolete, but is still supported. If your startup file is named C_PRMO, you should change it to PRIMOS.COMI.) It is the responsibility of the System Administrator to create the PRIMOS.COMI file. Prime ships a template startup file (named PRIMOS.COMI.TEMPLATE) in the PRIRUN directory.

System operators may modify the PRIMOS.COMI file only if directed to do so by the System Administrator. If you are asked to modify the startup file and there is no PRIMOS.COMI file, modify the C_PRMO file and rename it PRIMOS.COMI. If both PRIMOS.COMI and C_PRMO exist, modify PRIMOS.COMI because PRIMOS.COMI is searched for first.

The PRIMOS.COMI File During System Startup: During startup, PRIMOS attaches to the top-level directory, CMDNC0 (on logical device 0) and searches for a startup file in the following order:

1. PRIMOS.COMI.
2. If it does not find PRIMOS.COMI, it looks for C_PRMO.
3. If it does not find C_PRMO, it starts up without the startup and configuration files by prompting you for the COMDEV, PAGING, NTUSR, and SYSNAM parameters. PRIMOS uses default values for the other directives. For details, see the section titled Problems With the Configuration or Startup Files, later in this chapter.

PRIMOS reads the system startup file until it finds the CONFIG -DATA command, which must be the first command in the file. After processing the configuration file, PRIMOS returns to the startup file and performs the system initialization phase by executing the PRIMOS commands following the CONFIG -DATA command.

As PRIMOS reads the system startup file, it displays each line in the file at the supervisor terminal, unless terminal output is turned off by a COMOUTPUT -NTTY command in the file.

System initialization is completed when all the commands in the startup file are executed. After system initialization, you may have to perform additional tasks before the system is ready for use, as described earlier in the section titled Actions After System Startup.

COMI Files and CPL Programs Within the Startup File: During the execution of the startup file, several COMI files are normally invoked with the COMINPUT command. Prime supplies the COMI files for Prime products, and these files are usually stored in the SYSTEM directory.

In addition, the System Administrator may also have built COMI files and CPL programs that are executed from within the startup file.

Setting the Paging Ratio Within the Startup File: The PAGING configuration directive specifies the paging partitions and distributes paging activity across those paging partitions. The default paging ratio for each paging partition is calculated by PRIMOS at cold start and is based on the size of the paging partition in relation to the total number of paging records. For example, if you have two paging partitions and one of them has 15% of the paging records, then that partition's paging ratio is 15% (that is, it is used 15% of the time for paging).

You can, however, fine-tune the paging ratio with the PRIMOS operator command PRATIO. The PRATIO command lets you change the percentage of the system's total paging activity that occurs on each paging partition.

The PRATIO command replaces the PRATIO directive. (If the PRATIO directive is in the system configuration file, that directive is ignored and a warning message is displayed.) The PRATIO command can be included in the PRIMOS.COMI startup file or issued interactively at any time after cold start.

The format of the PRATIO command is

PRATIO *percent_1* [...*percent_8*]

The *percent_1* argument is a decimal integer that specifies the percentage of paging activity that is to take place on the first paging partition. The total of percentages for all paging partitions must equal 100. If the total of the PRATIO values does not add up to 100, the system generates an error message. An error message also is displayed if you have more PRATIO values than there are paging partitions on the system.

Suppose, for example, that the following is your PAGING directive:

```
PAGING 100461 100661
```

By using the following PRATIO command in the PRIMOS.COMI file, you change the default percentage of paging activity of the two paging partitions so that the first partition is used 30% of the time and the second 70%:

```
PRATIO 30 70
```

If you subsequently issue the PRATIO command with the -DISPLAY option, the paging ratios are displayed as follows:

```
OK, PRATIO -DISPLAY
PRATIO values for each paging partition
-----
Partition #1 PDEV = 111161 PRATIO = 70%
Partition #2 PDEV = 71261 PRATIO = 30%
```

Setting Sizes of Line Buffers Within the Startup File: Before Rev. 22.0, the sizes of buffers for communications lines were set by the AMLBUF, NTSABF, NTSBUF, and REMBUF configuration directives. Beginning at Rev. 22.0, these directives are obsolete and the buffers are set by the CAB (Change Asynchronous Buffers) command.

The CAB command sets the size of the input, output, and (where appropriate) DMQ buffers for interactive processes. The CAB command allows you to change buffer sizes at any time the system is running, unlike the old buffer directives that were effective only at cold start. For details on the CAB command and on determining buffer sizes, see the *System Administrator's Guide, Volume II: Communication Lines and Controllers*.

Example of a System Startup File: The following example illustrates a PRIMOS.COMI startup file. The symbols /* indicate an explanatory comment that is not processed by PRIMOS. The numerical arguments may be in octal or decimal, depending on the command.

```

/*System startup file PRIMOS.COMI for SYSA 23.0 08/16/90
CONFIG -DATA CONFIG          /* Specify CONFIG file
ATTACH CMDNC0                /* Make sure we're home
COMO PRIMOS.COMO             /* Open COMO file to record this startup
DATE                          /* Print date of this startup
START_DSM                    /* Start up DSM early
ADDISK 51460 3062 61062 100463 3260 61260 /* Add local disks
/* Async line buffer sizes
CAB -LINE 0 -to 62 -IBS 512 -OBS 512 -DMQS 127 /*Set user lines
CAB -LINE 63 -IBS -OBS          /*Set clockline but not DMQ
SET_TIME_INFO -TZ -0500 -DLST YES /* Set Universal time info
/* Configure AMLC lines with SET_ASYNC commands
SET_ASYNC -LINE 0 -TO 61 -PRO TTY -SPEED CLOCK -DEF
SET_ASYNC -LINE 62 -PRO TTY -LF -DEF -ASGN YES /* LQP printer
SET_ASYNC -LINE 63 -PRO TTYNOP -DEF -ASGN YES -SPEED 300
/* Last AMLC line at 300 baud
START_NET                    /* Start the network
SHARE SYSTEM>ED2000 2000     /* Share the editor (ED)
START_NAMESERVER            /* Start the Name Server process
CO SYSTEM>BASICV.SHARE.COMI 7 /* Share BASICV compiler
CO SYSTEM>CBL.SHARE.COMI 7   /* Share COBOL compiler
CO SYSTEM>FORMS.SHARE.COMI 7 /* Share FORMS library
CO SYSTEM>DBG.SHARE.COMI 7   /* Share debugger
CO SYSTEM>INFORMATION.SHARE.COMI 7 /* Share PRIME INFORMATION
CO SYSTEM>ROAM.SHARE.COMI 7  /* Share ROAM before DBMS
CO SYSTEM>DBMS.SHARE.COMI 7  /* Share DBMS
CO SYSTEM>PRISAM.SHARE.COMI 7 /* Share PRISAM
CO SYSTEM>DISCOVER_DBMS.SHARE.COMI 7 /* Share DISCOVER_DBMS
CO SYSTEM>EMACS.SHARE.COMI 7 /* Share EMACS
CO SYSTEM>FTS.SHARE.COMI 7   /* Share FTS
CO SYSTEM>SPOOL.SHARE.COMI 7 /* Share Spooler
CLOSE 7                      /* Close file unit 7

```

```

/* Start up the Batch, Spooler, and FTS subsystems.
/*
BATCH -START                /* Start up Batch
PROP PRO -START             /* Start up the line printer
PROP LQP -START            /* Start up the LQP printer
FTOP -START_MNGR           /* Start FTS manager YTSMAN
FTOP -START_SRVR FTP       /* Start FTS server under name of FTP
MAXUSR                     /* Allow users to log in
COMOUTPUT -END             /* Close startup COMO file
COMINPUT -END              /* End PRIMOS.COMI

```

Problems During Startup

If the startup procedure fails to work as expected, enter a complete description of the problem in the system logbook (including messages that were displayed at the supervisor terminal) and inform your System Administrator.

There are two general types of failures.

- Problems detected by the Maintenance Processor
- Problems with the configuration or startup files

Both types are explained below.

Problems Detected by the Maintenance Processor

If the Maintenance Processor detects a problem that prevents normal operation of the system, it displays an error message and halts the startup procedure. Maintenance Processor error messages are prefixed with an ERR label. These messages and their causes are listed in Appendix C.

Problems Requiring Your PrimeService Representative: Some ERR messages indicate a Maintenance Processor failure or a CPU circuit failure that must be corrected by your PrimeService representative. For example:

```
ERR116: PRIMOS Boot routine not found.
```

The explanation for these error messages in Appendix C indicates which errors require a call to PrimeService.

Problems You Can Handle: You may be able to correct some of these error conditions, such as the error indicated by the following message:

```
ERR924: MP clock not valid. Reset to 01 Jan 01 01 :01:01 Su.
```

In this case, the Maintenance Processor clock is not valid; thus, PRIMOS cannot use the date and time provided by the clock.

- Enter the current time for the system with the PRIMOS SETIME command while in ST mode to enable users to log in. Do so before you issue the MAXUSR command.
- Set the correct time on the Maintenance Processor clock with the VCP SETIME command described in Chapter 8.

If no error messages appear at the supervisor terminal, the startup procedure has stopped for a reason the Maintenance Processor cannot diagnose and a system hang has occurred. For recovery information, see the section titled Recovering From Halts and Hangs While Booting, in Chapter 6.

Failure of the system to cold start properly can also indicate an incorrect sense-switch setting, or boot-option word, or an incorrect system configuration. Check the sense-switch setting if you used the BOOT command. See Table 4-1 and Appendix A for information on the sense-switch settings and on changing the system configuration file.

Problems With the Configuration or Startup Files

If the startup problem exists with either the startup (PRIMOS.COMI) or configuration files, the cause may be one of the following:

- The PRIMOS.COMI (or C_PRMO) file does not exist.
- The first noncomment line of the PRIMOS.COMI file is not the CONFIG command.
- The system configuration file does not exist or is unreadable.
- The system configuration file contains an invalid directive.
- The PRIMOS.COMI file contains an invalid command.

In these cases, the system attempts to boot without the PRIMOS.COMI or configuration files by prompting you for the COMDEV, PAGING, NTUSR, and SYSNAM configuration parameters and using default values for the other directives. The prompts for the four configuration parameters are as follows:

<i>Prompt</i>	<i>Information to enter</i>
Enter COMMAND DEvIce:	pdev of COMDEV
Enter PAGING device:	pdev of one paging device
Enter Number Terminal USerS:	An octal number, say 2
Enter system name:	The nodename of the system

Enter the physical device numbers (pdev) of the command device (COMDEV) and a single paging partition (PAGING), the number of terminal users (NTUSR), and the name of the system (SYSNAM). Keep the information on the physical device numbers up-to-date in the front of your logbook so it is readily available. For most systems, these prompts indicate an abnormal condition, such as an improper installation, inadvertent deletion of the PRIMOS.COMI or configuration files, or a damaged disk file system.

Supplying these parameters allows PRIMOS to start. You can then use the nonshared editor, NSED, to create a PRIMOS.COMI file and a configuration file, if they do not exist, or to modify them, if they do exist. (See Appendix A for examples of these procedures.) Ask your System Administrator for specific instructions on the system configuration.

To ensure that PRIMOS is configured and initialized according to your site's needs, shut down PRIMOS and reboot with the BOOTP command. Or, if you are satisfied with the default configuration parameters, you can execute the PRIMOS.COMI file (to reinitialize the system or to share system software) by issuing the following command:

```
OK, COMINPUT CMDNC0>PRIMOS.COMI
```

Executing the PRIMOS.COMI file after PRIMOS is running produces the same results as a cold start, except that the system configuration file is not processed. The file CMDNC0>CONFIG.CPL, which allows you to execute the PRIMOS.COMI file without running the configuration file, displays the following message:

```
Primos already running, CONFIG command ignored. (CONFIG.CPL)
```

Invalid Configuration Directives: If the system configuration file contains an invalid directive, one of the following results typically occurs:

- The invalid directive causes the system to display an appropriate error message, stop processing the system configuration file, and attempt to boot without it and the PRIMOS.COMI file by prompting for essential values. Typically, this action results from an error in one of the essential directives (such as COMDEV) discussed above. The procedure for this case is described in the preceding section.
- The system ignores the invalid directive (for example, because it is misspelled) and continues cold start after displaying an appropriate error message. Correct the directive after PRIMOS is running.
- The system supplies a default value for the directive and continues cold start after displaying an appropriate error message. In this case, the directive is valid but the argument is not.

Take the following steps.

- Correct the directive's argument after PRIMOS is running
- Reboot if you are not satisfied with the default value of the argument
- The invalid directive immediately halts the cold start after an appropriate error message is displayed. Generally, the invalid directive is AMLBUF, FILUNT, SMLC, ASYNC JUMPER, or ICS.
 - Boot with the 100000 boot option switch (as described in Appendix A)
 - Use NSED to correct the invalid directive
 - Reboot

Appendix B lists the PRIMOS cold-start error messages and the remedial actions that you should take. If the error is one that you cannot correct, contact your PrimeService representative. For more information on configuration directives, see the *System Administrator's Guide, Volume I: System Configuration*.

Invalid PRIMOS.COMI Commands: If the PRIMOS.COMI file contains an invalid command, the execution of the file generally aborts with an appropriate error message. You can usually continue the system initialization phase with this procedure:

1. Check the screen output to determine which command caused the error.
2. Use the COMINPUT -CONTINUE command to resume execution of the PRIMOS.COMI file.
3. After the file has finished executing, use the STATUS UNITS command to determine if any files were left open, and if so, close them.
4. Correct the invalid command and reissue it interactively.

For details on operator commands, see the *Operator's Guide to System Commands* or, for subsystems such as PRIMENET, refer to the administrator's guide or operator's guide shipped with the subsystem.

Alternative Startup Methods

For information on alternative startup methods in general and on boot option words, see Appendix A. For information on determining physical device numbers, see the *Operator's Guide to File System Maintenance*.

Standard Startup: When you use a standard boot of PRIMOS (either the automated or the BOOTP method), the default sense-switch settings used to start up PRIMOS produce the boot option word 14114.

This sense-switch setting tells the system to use the following combination of devices and programs:

- Use the first disk controller serviced by the system (controller address 26g).
- Use the first disk drive (drive unit 0) on that controller.
- Use the first (or top) disk partition. This partition becomes logical device 0.
- Boot the most recent successful version of the PRIMOS runfile, the pathname of which is in the file `BOOT_RUN_FILE_TREENAME` in the MFD of logical device 0.

Alternative Startup: Occasionally, you may need to start up the system using a different boot process than the standard boot. For example, if your system's main disk drive develops problems, you might want to boot from a different disk drive, from a different disk drive on another disk controller, or from a magnetic tape. You may also want to be prompted for the pdev of the command device, for the pathname of the runfile to be booted, or for the configuration parameters.

When using an alternative boot procedure, you must change the default sense-switch setting (that is, the boot option word) and use the `BOOT` command. For some methods of bootstrapping, you also need to enter the disk partition's physical device number.

Table 4-1, following, lists some common boot option words and their meanings.

Note Beginning at Rev. 21.0, PRIMOS supports a maximum of eight disk controllers (although any given system may support fewer controllers). Each controller supports a maximum of either four or eight disk drives, depending on its type. Therefore, Rev. 21.0 or later PRIMOS can support a maximum of 64 disk drives. However, you can boot only from the first four disk controllers and their associated 16 disk drives. See Appendix A for details on which disk controllers and drives are available for booting.

The general procedure for using an alternative boot procedure is as follows:

1. Determine the boot option word for the device to be booted. This octal number will be used with the `BOOT` command. (Appendix A describes how to construct the boot option word.)
2. At the `CP1>` prompt, issue the `SYSCLR` command.
3. At the `CP1>` prompt, issue the `BOOT` command with the appropriate boot option word.

Table 4-1. Commonly Used Boot Option Words

<i>Boot Option Word</i>	<i>Cntrlr Address</i>	<i>Drive Unit</i>	<i>Partition With BOOT File</i>	<i>Name of PRIMOS Runfile</i>
14114	26 ₈	0	First	In BOOT_RUN_FILE_TREENAME or use PRIRUN>PRIMOS.SAVE
10114	26 ₈	0	First	Prompt for filename.
114	26 ₈	0	Prompt for pdev	Prompt for filename.
114114	26 ₈	0	First	In BOOT_RUN_FILE_TREENAME or use PRIRUN>PRIMOS.SAVE Do not use configuration and startup files.
100114	26 ₈	0	Prompt for pdev	Prompt for filename. Do not use configuration and startup files.
14314	26 ₈	1	First	In BOOT_RUN_FILE_TREENAME or use PRIRUN>PRIMOS.SAVE
14514	26 ₈	2	First	In BOOT_RUN_FILE_TREENAME or use PRIRUN>PRIMOS.SAVE
14134	27 ₈	0	First	In BOOT_RUN_FILE_TREENAME or use PRIRUN>PRIMOS.SAVE
14154	22 ₈	0	First	In BOOT_RUN_FILE_TREENAME or use PRIRUN>PRIMOS.SAVE
14174	23 ₈	0	First	In BOOT_RUN_FILE_TREENAME or use PRIRUN>PRIMOS.SAVE
10005	14 ₈	MT0	On tape	Prompt for filename.

Note You can use the VCP command, STAT, to set whether or not you want the system to autoboot and to set the default boot option word. See the STAT command in Chapter 8.

System Shutdown

5



This chapter discusses the following general procedure for shutting down the system:

1. Prevent additional logins with the MAXUSR 0 command.
2. Warn users of the impending shutdown with the MESSAGE command.
3. Shut down all subsystems, such as Batch, FTS, and the Spooler.
4. Issue a final warning message with the MESSAGE command.
5. Forcibly log out remaining users with the LOGOUT ALL command.
6. Shut down the network with the STOP_NET command.
7. Shut down DSM with the STOP_DSM command.
8. Check that users are logged out with the STATUS USERS command.
9. Shut down PRIMOS with the SHUTDN ALL command.
10. Shut down the equipment.

Caution

To help prevent damage to the file system, shut down PRIMOS (with the SHUTDN ALL command) before removing system power with the ON/INITIATE SHUTDOWN button.

An annotated example of the shutdown process follows the discussions of each of the steps in the shutdown procedure.

This chapter also discusses emergency shutdowns caused by temperature, airflow, and software sensors.

Preventing Logins

As the first step of your shutdown procedure, use the MAXUSR command with an argument of zero:

```
OK, MAXUSR 0
```

The MAXUSR 0 command prevents users from logging in while you are shutting down the system. MAXUSR 0 does not log out users who are currently logged in, but it does prevent logged-in users from starting phantoms. MAXUSR 0 also prevents the Batch monitor from starting new Batch jobs. Batch jobs that are currently running continue to run to completion, unless they are forcibly logged out or the Batch subsystem is stopped.

Warning the User Community

Before shutting down PRIMOS or forcibly logging out users, use the MESSAGE command to warn the user community of the impending shutdown. Warning users ahead of time is not only a matter of courtesy; it also helps prevent the loss of data in case a user is modifying a file but has not yet saved it to disk.

If the shutdown is scheduled far in advance, you should provide an hour's warning. If the shutdown is unplanned, try to provide at least a five-minute warning.

Note When using the MESSAGE command, be sure that you do not include the supervisor terminal's kill character in the text of the message. Doing so prevents words before the kill character from being sent. To find out your terminal's kill character, use the TERM -DISPLAY command.

Contacting Local Users

To contact local users, use the following MESSAGE command format:

MESSAGE ALL -NOW -FORCE

After you enter the command, you may type a message up to 80 characters long. The message is sent when you press RETURN at the end of the message line.

The -NOW option displays the message immediately on the user's screen, instead of when the user returns to PRIMOS command level. The -FORCE option ensures that the message is delivered to anyone who has used the -DEFER or -REJECT option of the MESSAGE command.

For example, use a message similar to the following to warn users:

OK, MESSAGE ALL -NOW -FORCE
SYSTEM SHUTTING DOWN IN 5 MINUTES FOR BACKUPS. PLEASE LOG OUT SOON.

Repeat the message at intervals of one or two minutes. If anyone has a valid reason to use the system for a few minutes, delay the shutdown if possible.

Always explain why the system is shutting down, especially in case of emergencies.

Contacting Remote Systems

If your system is part of a network, you should also warn operators of remote systems, in case remote users ask their operators why they cannot access your system. To contact remote operators (all of whom have User 1 as their user number), use the following command format:

MESSAGE -1 -NOW -ON *systemname*

systemname is the name of the remote system, as shown in a STATUS NETWORK command. For example, if your system is named SYSA and you want to contact the operator of SYSD, use a message similar to the following:

```
OK, MESSAGE -1 -NOW -ON SYSD
SYSA SHUTTING DOWN IN 5 MINUTES FOR BACKUPS. WILL RESTART IN 1 HOUR.
```

For more information on the MESSAGE command, see the *Operator's Guide to System Commands* or the *PRIMOS Commands Reference Guide*.

Shutting Down Subsystems

Before shutting down PRIMOS, stop all subsystems so that

- They can shut down in an orderly manner
- Pending jobs or requests do not start executing while you are performing the PRIMOS shutdown procedure

The next three sections show how to shut down the Batch, Spooler, and FTS subsystems. For other subsystems, refer to the administrator manual or operator manual shipped with the subsystem.

Shutting Down the Batch Subsystem

Use the BATCH -STOP command to stop the Batch subsystem and allow the Batch monitor (a phantom named BATCH_SERVICE) to log itself out gracefully.

The command results in two messages being sent to the supervisor terminal:

- The first acknowledges the stop request.
- The second notifies you of the Batch monitor's logout.

The following example illustrates how to stop the Batch subsystem:

```
OK, BATCH -STOP
[BATCH Rev. 23.0 Copyright (c) 1990 Prime Computer, Inc.]
Stop request issued.
OK,
*** BATCH_SERVICE (user 106 on SYSA) at 18:24
Operator stop.
Phantom 106: Normal logout at 18:24
Time used: 12h 46m connect, 02m 56s CPU, 00m 57s I/O
```

When the `Operator stop.` message is displayed, the monitor has logged out and the Batch subsystem is no longer running. Batch jobs that were running when you stopped the monitor, however, continue running.

Shutting Down the Spooler Subsystem

The `PROP -STOP` command logs out the despooler phantoms, thus preventing the Spooler subsystem from printing any more spooled files. To preserve the integrity of the Spooler database, allow sufficient time for the phantoms to log out.

The format of the `PROP -STOP` command is as follows:

`PROP environment -STOP` { `-FINISH`
 `-IDLE`
 `-NOW` }

environment is a name listed as started in the output of a `PROP -STATUS` command.

`-FINISH` (the default) shuts down the phantom after the current file has finished printing. `-IDLE` shuts down the phantom when it has no more files to print. `-NOW` shuts down the phantom immediately; if a file is being printed, the printing stops and the file is returned to the spool queue.

Use the following procedure to shut down the Spooler subsystem:

1. Use the SPOOL -LIST command to determine if any large files are being printed. If so, you must decide whether to let the files finish printing or abort their printing by using the PROP -ABORT command. Note that you cannot abort a file that is being printed on a remote system.
2. Use the PROP -STATUS command to see which despooler phantoms are running.
3. Use a PROP -STOP command for each of the despooler phantoms.

The following example shows a despooler phantom named COURIER being stopped:

```
OK, PROP -STATUS
[PROP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
COURIER           Idle
OK, PROP COURIER -STOP
[PROP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
OK,
*** COURIER (user 104 on SYSA) at 18:20
Environment for COURIER stopping
Phantom 104: Normal logout at 18:20
Time used:  01h 13m connect, 01m 25s CPU, 00m 52s I/O
```

Shutting Down FTS

When shutting down FTS (File Transfer Service), use the appropriate FTOP commands instead of the LOGOUT ALL command. To preserve the integrity of the FTS database, allow sufficient time for the FTS servers and manager to log out.

Use the following procedure to shut down FTS:

1. Use the FTOP -LIST_SRVR_STS command to determine the name and status of the FTS servers.
2. Use an FTOP -STOP_SRVR command for each active FTS server.
3. Use the FTOP -STOP_MNGR command to stop the FTS manager.

The following example illustrates the use of the FTOP commands to shut down the FTS subsystem. In the example, the FTS server is running under the name FTP and the FTS manager is running under its default name of YTSMAN.

```
OK FTOP -LIST_SRVR_STS
[FTOP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Status of server FTP
-----
Server is running, user number : 111, queue : FTS$1
```

```
OK, FTOP -STOP_SRVR FTP
[FTOP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Server notified to stop.
OK,
*** FTP (user 111 on SYSA) at 18:28
18:28:07: FTS Server FTP closed down on Monday, 7 May 1990

*** FTP (user 111 on SYSA) at 18:28
18:28:09: Server shutdown by operator.

Phantom 111: Normal logout at 18:28
Time used: 00h 04m connect, 00m 09s CPU, 00m 05s I/O
```

```
FTOP -STOP_MNGR
[FTOP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Manager notified to stop.
OK,
*** YTSMAN (user 110 on SYSA) at 18:30
YTSMAN closing down - Operator requested shutdown.

Phantom 110: Normal logout at 18:30
Time used: 00h 04m connect, 00m 10s CPU, 00m 04s I/O
```

Forcing Logouts

About a minute before shutting down PRIMOS, send a final message notifying users of an immediate shutdown. After waiting a minute or so, log out any remaining users.

If a user ignores your request to log out, use the following LOGOUT command format from the supervisor terminal to forcibly log out that user:

LOGOUT -*usernumber*

usernumber is the decimal number of the phantom or terminal user being disconnected. The number must be preceded by a hyphen (for example, LOGOUT -37). Use the STATUS USERS command to list user numbers.

If the user is a local terminal using a remote process, the user terminal is reconnected to its local process. If the user is a remote terminal using a local process, the process is first logged out and returned to the pool of free remote-login processes and then the remote terminal is disconnected from the local system and connected to its own system.

Note PRIMOS allows a logged-out process a maximum of two minutes to complete any sensitive processing, such as closing files or returning a database to a consistent state. Therefore, when forcibly logging out users or phantoms, keep in mind that the process may not be logged out immediately.

With a few exceptions, you can forcibly log out all remote, local, and phantom users at once with the LOGOUT ALL command. The main exceptions are the following:

- User 1 (SYSTEM), the supervisor terminal.
- NETMAN, the PRIMENET server process that allows systems in a network to communicate with each other. Use the STOP_NET command to log out NETMAN and shut down the network gracefully.
- RT_SERVER, the Route-through server that controls the virtual circuit gateways between indirectly connected nodes. The STOP_NET command also logs out this server.
- LOGIN_SERVER, the server that handles any logged-out request, including logins. The STOP_LSR command logs out this server.
- LOGOUT_SERVER, the server that cleans up the environment of a process that is logging out.
- NAME_SERVER, the process that maintains the common file system name space.
- TIMER_PROCESS, the process used by PRIMOS for timing purposes.
- The DSM phantoms. Use the STOP_DSM command to log out the DSM system manager (SYSTEM_MANAGER), the DSM server (DSMSR), the application server process (DSMASR), the DSM logging server (DSM_LOGGER), and, if your system is networked, the DSM network server (DSMNETSR).
- AUDITOR, the server used by the optional Security Monitor facility.
- NTS_SERVER, the NTS connection manager.

The LOGOUT ALL command also causes an implicit MAXUSR 0 to be performed. Therefore, no users can log in until MAXUSR is reset.

Issue the commands LOGOUT ALL, STOP_NET, and STOP_DSM prior to the SHUTDN ALL command, to allow a more orderly shutdown of PRIMOS. Use the STATUS USERS command to make certain that all users (with the above exceptions) have in fact been logged out before you issue the SHUTDN ALL command. Two or three minutes should be sufficient.

Note To ensure an orderly shutdown of all subsystems (such as Batch and the Spooler), you should use the appropriate shutdown command for those subsystems, instead of using only the LOGOUT ALL and SHUTDN ALL commands.

Shutting Down PRIMENET

If you have PRIMENET operating on your system, use the STOP_NET command to shut down the network, as in the following example:

```
OK, STOP_NET
[Stop_Net Rev 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Really? YES
OK,
*** Network shutting down! ***
```

Shutting Down DSM

Shutting down DSM should be the last act in a system shutdown, just as starting DSM should be the first act in starting up PRIMOS. By shutting down DSM last, you ensure the logging of all network and system event messages resulting from the shutdown of other subsystems. Although stopping PRIMENET before DSM may interrupt a DSM remote logging transaction, it is more important that errors occurring from shutting down PRIMENET are logged.

Note Although Prime recommends that you shut DSM down with the STOP_DSM command just before shutting down PRIMOS, you may omit this step and let the SHUTDN ALL command shut down DSM. You may wish to do this if, for example, you wish to log all messages associated with the shutdown, particularly the final message, SHUTDOWN BY AN OPERATOR, with its associated time stamp.

Use the STOP_DSM command to shut down DSM. To ensure a graceful shutdown of DSM, wait until all DSM phantoms are logged out before issuing the SHUTDN ALL command.

The following example shows DSM being shut down and the DSM phantoms logging out.

```
OK, STOP_DSM
[STOP_DSM Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
[16 AUG 90 18:27:56 Thursday]
```

```

DSM shutdown in progress.
OK,
Phantom 98: Normal logout at 18:27
Time used: 04h 09m connect, 00m 38s CPU, 00m 01s I/O.

Phantom 101: Normal logout at 18:27
Time used: 04h 09m connect, 00m 06s CPU, 00m 04s I/O.

Phantom 99: Normal logout at 18:27
Time used: 04h 09m connect, 00m 51s CPU, 00m 20s I/O.

Phantom 100: Normal logout at 18:27
Time used: 04h 09m connect, 00m 23s CPU, 00m 11s I/O.

```

Shutting Down PRIMOS

After using the LOGOUT ALL command and shutting down the network, DSM, and any other phantoms, shut down PRIMOS with the following two-step procedure:

1. Use the STATUS USERS command to make sure all terminal users are logged out and all subsystems are shut down.
2. When you are sure nothing is still running, shut down the system with the SHUTDN ALL command. Answer YES to the command's REALLY? prompt.

After shutting down PRIMOS, you can either leave the system power on or turn it off, as described in the next section.

The following example illustrates the PRIMOS shutdown process with the above two-step procedure:

```

OK, STATUS USERS

```

User	No	oct(dec)	Line Devices
SYSTEM	1	asr	<SYSA>
TIMER_PROCESS	89	kernel	<SYSA>
LOGIN_SERVER	90	LSr	<SYSA> (3)
LOGOUT_SERVER	91	kernel	<SYSA> (SYSTEM IDLE)

```

OK, SHUTDN ALL
REALLY? YES
WAIT,

```

```
PRIMOS NOT IN OPERATION
*** From PRIMOS: Shutdown process completed, system halting.

DPM400: Primary CPU halted at 000006/004577: 005262
        16 Aug 90 18:35:17 Thursday

CP1>
```

Shutting Down Equipment

After you have shut down PRIMOS, shut down equipment in the reverse order of system startup:

1. Make sure that the DPM400 and DPM401 messages are displayed and the PROCESSOR A HALT light is lit.
2. Press the ON/INITIATE SHUTDOWN button to put the power system in the STANDBY state.

Example of a System Shutdown

The following example illustrates a system shutdown. The system in the example is using the PRIMENET, Batch, Spooler, and FTS subsystems.

1. Use the MAXUSR 0 command to prevent new users from logging in:

```
OK, MAXUSR 0
OK,
```

2. Use the MESSAGE command to inform local users and operators of remote systems that a system shutdown will take place soon:

```
OK, MESSAGE ALL -NOW -FORCE
THE SYSTEM IS SHUTTING DOWN IN 5 MINS. PLEASE LOG OUT.
OK, MESSAGE -1 -NOW -ON SYSB
SYSB SHUTTING DOWN IN 5 MINS.
OK,
```

3. Shut down the despooler phantom (named COURIER) used for the system printer :

```
OK, PROP -STATUS
```

[PROP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
COURIER Idle
OK, PROP COURIER -STOP
[PROP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
OK,
*** COURIER (user 104 on SYSA) at 18:20
Environment for COURIER stopping

Phantom 104: Normal logout at 18:20
Time used: 01h 13m connect, 01m 25s CPU, 00m 52s I/O

4. Shut down FTS by stopping the FTS server (named FTP) and the FTS manager (YTSMAN):

OK, FTOP -STOP SRVR FTP
[FTOP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Server notified to stop.

*** FTP (user 111 on SYSA) at 18:28
18:28:07: FTS Server FTP closed down on Monday, 4 May 1987

*** FTP (user 111 on SYSA) at 18:28
18:28:09: Server shutdown by operator.

Phantom 111: Normal logout at 18:28
Time used: 00h 04m connect, 00m 09s CPU, 00m 05s I/OOK,
FTOP -STOP MNGR
[FTOP Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Manager notified to stop.

*** YTSMAN (user 110 on SYSA) at 18:30
YTSMAN closing down - Operator requested shutdown.

Phantom 110: Normal logout at 18:30
Time used: 00h 04m connect, 00m 10s CPU, 00m 04s I/O

5. Shut down the Batch subsystem:

OK, BATCH -STOP
[BATCH Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Stop request issued.

*** BATCH_SERVICE (user 106 on SYSA) at 18:24
Operator stop.

Phantom 106: Normal logout at 18:24
Time used: 12h 46m connect, 02m 56s CPU, 00m 57s I/O

6. Give users a final warning message. Use Ctrl-G to send warning bells:

```
OK, MESSAGE ALL -NOW -FORCE  
*** SYSTEM GOING DOWN IN 1 MINUTE *** Control-G
```

7. Log out any remaining users:

```
OK, LOGOUT ALL
```

8. Shut down PRIMENET (including its servers) with the STOP_NET command:

```
OK, STOP_NET  
[Stop_Net Rev 23.0 Copyright (c) 1990, Prime Computer, Inc.]  
Really? YES  
*** Network shutting down! ***
```

9. Shut down DSM with the STOP_DSM command:

```
OK, STOP_DSM  
[STOP_DSM Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]  
[16 Aug 90 18:27:56 Thursday]  
DSM shutdown in progress.  
OK,  
Phantom 98: Normal logout at 18:27  
Time used: 04h 09m connect, 00m 38s CPU, 00m 01s I/O.  
  
Phantom 101: Normal logout at 18:27  
Time used: 04h 09m connect, 00m 06s CPU, 00m 04s I/O.  
  
Phantom 99: Normal logout at 18:27  
Time used: 04h 09m connect, 00m 51s CPU, 00m 20s I/O.  
  
Phantom 100: Normal logout at 18:27  
Time used: 04h 09m connect, 00m 23s CPU, 00m 11s I/O.
```

10. Before shutting down PRIMOS, use the STATUS USERS command to make sure that all terminal users are logged out and all subsystems are not running:

```
OK, STATUS USERS
```

User	No	Line	oct(dec) Devices
SYSTEM	1	asr	<SYSA>
TIMER_PROCESS	89	kernel	<SYSA>
LOGIN_SERVER	90	LSr	<SYSA> (3)

11. Shut down PRIMOS with the SHUTDN ALL command:

```
OK, SHUTDN ALL
REALLY? YES
WAIT,
PRIMOS NOT IN OPERATION
DPM400: Primary CPU halted at 000006/004577: 005262
        16 Aug 90 18:35:17 Thursday
CP1>
```

12. Turn off power to the system and to peripheral devices (including the disk drives) by pressing the ON/INITIATE SHUTDOWN button. The power system is now in the STANDBY state.

Emergency Shutdown Caused by Sensor Checks

The 5300 Family systems contain two types of environmental sensors to monitor the operating conditions of the CPU. These sensors are strategically placed to provide early warning of possible CPU malfunction due to temperatures that exceed safe operating limits. Each type of sensor detects the possibility of overheating in a separate way.

The two types of environmental sensors are as follows:

Board sensor	Detects when the temperature reaches a critical level on the CPU board.
Airflow sensor	Detects when there is insufficient airflow in a Logic module. Insufficient airflow causes overheating, which can damage the CPU, main memory, or I/O controllers if power to the system is not removed.

Environmental Sensor Shutdowns: When an environmental sensor detects an unsafe condition, the Maintenance Processor immediately starts an emergency shutdown procedure, which includes sending a processor check to PRIMOS. The precise nature of this shutdown procedure depends on which sensor detected the unsafe condition.

During the emergency shutdown procedure, no commands are accepted at the supervisor terminal. The supervisor terminal displays the messages sent by PRIMOS and the Maintenance Processor during the emergency shutdown process.

All environmental emergency shutdowns end by turning off power to the Logic module containing the CPU (including the CPU) and place the power system in the STANDBY state. Under no circumstances should you restore the power until

your PrimeService representative determines why the sensor shut down the system. Possible causes and actions to take are described below.

Soft shutdowns: In addition to the environmental sensors, 5300 Family systems also contain a software sensor that gracefully shuts down PRIMOS and removes power to the main cabinets when you press the ON/INITIATE SHUTDOWN button. This type of shutdown is called a soft shutdown.

Note Environmental and soft shutdowns turn off power to the CPU, the Logic modules, the Device modules, the Status module and to any peripheral cabinets that are connected to the main system PCM. However, they do not turn off power to the supervisor terminal or to any peripheral devices that are not connected to the main system PCM.

Grace Periods of Shutdowns: Table 5-1 lists the grace periods associated with the shutdowns caused by sensors. If PRIMOS is not shut down within the grace period, you will have to run `FIX_DISK` after restarting the system to be sure that the file system is not damaged.

Table 5-1. Sensor Shutdown Grace Periods

<i>Sensor</i>	<i>Grace period minutes</i>
Board	None
Airflow	Two
Software	Five

Board Sensor Shutdowns

When the board sensor detects unsafe temperatures on the CPU board, the Maintenance Processor immediately turns off power to the modules without allowing a grace period. Therefore, PRIMOS is not allowed to shut itself down gracefully, which may result in a broken file system if files have not been closed properly.

WARNING After a shutdown caused by the board sensor, under no circumstances should you restore power until a PrimeService representative has determined what caused the board to overheat and has repaired the problem. After your PrimeService representative has fixed your system, it is strongly recommended that, before you allow users on the system, you run `FIX_DISK` on all partitions to determine if any files were damaged during the emergency shutdown.

Airflow Sensor Shutdowns

When an airflow sensor detects insufficient airflow in a module it is monitoring, the Maintenance Processor begins a fast shutdown sequence. Users are logged out, PRIMOS shuts itself down in an orderly fashion, and power to the system is turned off.

A fast shutdown sequence has a two-minute grace period. If PRIMOS has not shut itself down within this period, the Maintenance Processor turns off power to the system regardless of the state of the CPU.

WARNING

The airflow sensor shuts down the system when there is a failure in the internal cooling mechanism of the system. Under no circumstances should you restore power until the system has been checked by a PrimeService representative.

Example of an Emergency Shutdown

The following example shows a sensor shutdown caused by an insufficient airflow in a Logic module. Messages in capital letters are from PRIMOS; others are from the Maintenance Processor:

```

ERR401: MP detects insufficient air flow
        Please refer to CPU Handbook.
        16 Aug 90 13:33:01 Thursday
PRIMOS SHUTTING DOWN DUE TO SENSOR CHECK.
NO COMMANDS ACCEPTED.
SHUTDOWN COMPLETE
CP1>
DPM400: Primary CPU halted at 000006/004577: 005262
        16 Aug 90 13:35:47 Thursday
WRN400: Maintenance Processor shutting down system power.
        Refer to System Operator's Guide
        16 Aug 90 13:36:13 Thursday
CP1>

```

Software Sensor Shutdowns

The proper method of shutting down PRIMOS is by using the SHUTDN ALL command. If, however, you inadvertently press the ON/INITIATE SHUTDOWN button when PRIMOS is running, the Maintenance Processor has a fail-safe mechanism that protects the PRIMOS file system by performing a soft shutdown.

Caution Although a soft shutdown is designed to protect the PRIMOS file system, you should not use the ON/INITIATE SHUTDOWN button to shut down PRIMOS; instead, use the shutdown procedure described earlier in this chapter, including the SHUTDN ALL command.

A soft shutdown procedure has a five-minute grace period, which is initiated when the Maintenance Processor signals PRIMOS to begin an orderly shutdown. The shutdown takes several minutes, the actual time depending on how many processes PRIMOS must log out. If, however, PRIMOS has not shut itself down within five minutes, the Maintenance Processor shuts down the system regardless of the state of the CPU.

Example of a Soft Shutdown: The following example illustrates the messages that result from a soft shutdown:

```
WRN401: MP detects Soft Shut down request.  
        16 Jul 90 18:25:56 Monday  
PRIMOS SHUTTING DOWN DUE TO SENSOR CHECK.  
NO COMMANDS ACCEPTED.  
SHUTDOWN COMPLETE  
  
DPM400: Primary CPU halted at 000006/004577: 005262  
        16 Jul 90 18:32:17 Monday  
  
WRN400: Maintenance Processor shutting down system power.  
        Please refer to CPU handbook.  
        16 Jul 90 18:35:45 Monday
```

Handling Halts and Hangs

6



Your system is designed to give reliable, efficient service under a wide variety of conditions. At times, however, certain hardware or software failures may cause PRIMOS (or a boot of PRIMOS) to unexpectedly stop functioning. Depending on its nature, such a failure is called a halt or a hang.

This chapter describes the recovery procedures that you use to handle halts and hangs, including

- How to identify halts and hangs
- How to perform cold starts and warm starts
- How to perform full and partial crash tape dumps

General Procedure for Handling Halts and Hangs

The general procedure for handling halts or hangs is described below. The remaining sections of the chapter describe these steps in detail.

1. Determine whether a halt or a hang has occurred.
2. If a hang occurred, try to halt the CPU so that you can treat the problem as a halt. If a halt occurred, identify the type of halt so that you can choose the correct recovery procedure. The recovery procedure, which requires either a warm start or a cold start, also depends on whether your system is running ROAM-based products (such as DISCOVER™, PRISAM™, or DBMS).
3. Perform a crash tape dump if you think one is necessary or if you were so instructed by your System Administrator or PrimeService representative.
4. Perform a cold start or a warm start to restart the system. If you use a warm start and it fails, you must use a cold start.
5. Run FIX_DISK to ensure the integrity of your file system. Use the -FAST option of FIX_DISK on robust partitions.

6. Record in the system logbook all the information about the halt or hang (including the time of the event and, if displayed, halt addresses and the contents of CPU registers) and the actions that you took to correct it.

Cold Start or Warm Start?: When deciding whether to use a cold start or a warm start after a hang or a halt, keep in mind the following rules of thumb:

- In general, cold starts could cause the system to lose data or could damage the file system.
- Warm starts present less chance of causing the system to lose data. Some situations, however, (for example, ECCU halts) do not allow a warm start.

Caution Never use the MASTER CLEAR button (or any VCP command) before you have recorded the halt location in the system logbook and have determined all the recovery actions you will perform. Some recovery actions are ineffective unless they are taken before using MASTER CLEAR or a VCP command such as VIRY.

Identifying Halts and Hangs

If your system suddenly stops working, your first task is to determine whether the problem is a halt or a hang. Two easy ways to distinguish halts from hangs are as follows:

- The DPM400 halt message from the Maintenance Processor is always displayed after halts, but never after hangs.
- The PROCESSOR HALT light on the System Status Panel always comes on after halts, but never after hangs.

The next two sections, titled Hang Symptoms and Halt Symptoms, list the identifying characteristics of hangs and halts.

After you have determined whether the problem is a halt or a hang, refer to the appropriate section of this chapter:

- If the halt or hang occurred while PRIMOS is being booted, go to Recovering From Halts and Hangs While Booting.
- If the hang occurred while PRIMOS was running, go to Recovering From Hangs Under PRIMOS.
- If the halt occurred while PRIMOS was running, first determine the type of halt (by referring to the section, Types of Halts) and then go to Recovering From Halts Under PRIMOS.

Hang Symptoms

Hangs are identified by these symptoms:

- The PROCESSOR HALT light on the System Status Panel is off, which normally indicates that the CPU is running. The system, however, does not respond to commands from user terminals or the supervisor terminal.
- The supervisor terminal may or may not function in CP mode.
- The DPM400 halt message is not displayed at the supervisor terminal, but some Maintenance Processor error messages (with the ERR prefix) may be displayed.

To recover from the hang, go to the section *Recovering From Halts and Hangs While Booting* or go to the section *Recovering From Hangs Under PRIMOS*, depending on when the hang occurred.

Halt Symptoms

Halts are identified by one or more of these symptoms:

- The PROCESSOR HALT light on the System Status Panel is on, which indicates that the CPU is not running.
- The halt places the supervisor terminal in CP mode, as indicated by the `CP1>` prompt.
- The DPM400 halt message from the Maintenance Processor is displayed at the supervisor terminal, as in the following example:

```
DPM400: Primary CPU halted at 000006/004577: 005262  
16 Aug 90 18:35:17 Thursday
```

Depending on the type of halt, you may see additional messages.

- ECCU and Immediate halts cause one of the three DPM70x messages to be displayed (in addition to the DPM400 message) if the Maintenance Processor determined that the halt was caused by a hardware failure.
 - The DPM703 message indicates an ECCU halt.
 - The DPM701 and DPM702 messages indicate immediate halts.

Both of these types of halts and their accompanying messages are explained under *Type of Halts* below.

- Forced shutdown halts and trapped halts cause PRIMOS to display appropriate messages (in addition to any Maintenance Processor messages).

Both of these types of halts and their accompanying messages are explained under Type of Halts below.

After you identify the halt, your next action depends on when the halt occurred:

- If the halt occurred while PRIMOS is being booted, go to the section titled Recovering From Halts and Hangs While Booting.
- If the halt occurred while PRIMOS was running, first identify the type of halt (by reading the next section, Types of Halts) and then go to the section Recovering From Halts Under PRIMOS.

Types of Halts

The PRIMOS halt mechanism is designed so that halts affect the integrity of the file system as little as possible. For recovery purposes, halts can be grouped into four types:

- Forced shutdown halts
- Trapped halts
- ECCU halts
- Immediate halts (including machine checks, but not ECCU halts)

You can recognize the type of halt by the message displayed by PRIMOS or the Maintenance Processor. Table 6-1 summarizes the halt types and messages. The next four sections describe the halts in detail.

Table 6-1. Types of Halts

<i>Halt Type</i>	<i>Messages From PRIMOS or Maintenance Processor</i>
Forced shutdown	*** From PRIMOS: Forced Shutdown in progress. *** From PRIMOS: Forced Shutdown! *** From PRIMOS: Forced Shutdown completed successfully.
Trapped	PRIMOS HALTED AT xxxxxx/yyyyyy

Table 6-1. Types of Halts (continued)

<i>Halt Type</i>	<i>Messages From PRIMOS or Maintenance Processor</i>
ECCU	DPM703: Memory parity (ECCU)
Immediate	No PRIMOS message; possible Maintenance Processor message: DPM701: Machine check. DPM702: Missing memory module.

Forced Shutdown Halts

Forced shutdown halts are considered orderly shutdowns of PRIMOS. An orderly shutdown normally gives PRIMOS time to perform a graceful shutdown of all disks, thus preserving the integrity of the file system. During the forced shutdown, PRIMOS displays a series of three messages to keep you informed of the state of the shutdown procedure:

- *** From PRIMOS: Forced Shutdown in progress.
- *** From PRIMOS: Forced Shutdown!
- *** From PRIMOS: Forced Shutdown completed successfully.

All three messages are displayed on the supervisor terminal. (The second message is also displayed on all connected user terminals.) The DPM400 halt message is also displayed at the supervisor terminal.

The third message (***) is especially important because it tells you that PRIMOS successfully completed all the tasks of the shutdown procedure, thus assuring the integrity of the file system. Keep in mind that on a system with many logged-in users, it may take as long as 3 to 5 minutes between the second and third messages, and even as long as 10 minutes in some extreme cases.

Unsuccessful Forced Shutdown Halt: If the third message is not displayed within 10 minutes after the second message, then the forced shutdown halt was unsuccessful. The system will hang or continue to run in an unpredictable state. To recover from an unsuccessful forced shutdown halt, use one of these procedures, which are discussed in more detail later in the chapter:

- If the system hangs, treat it as a normal hang, as explained in the section below, *Recovering From Hangs Under PRIMOS*.
- If the system continues to run, use the SHUTDN ALL command to stop PRIMOS. (If this does not work, use the VCP command STOP.)

WARNING Do not under any circumstances let the system continue to run after an unsuccessful forced shutdown halt.

After you cold start the system, ensure the integrity of the file system by running full FIX_DISK on standard partitions and fast FIX_DISK (with the -FAST option) on robust partitions.

Note As of Rev. 21.0.2, forced shutdown halts are not affected by the TPDUMP configuration directive introduced at Rev. 21.0.0. Even if TPDUMP YES is in the configuration file, PRIMOS continues with the forced shutdown and does not stop for a crash tape dump. This means that you do not have to perform a warm start as documented for Rev. 21.0.0. You should, therefore, not use TPDUMP in your configuration file. (If, however, TPDUMP is in the file, the PRIMOS cold-start routine still accepts the directive, even though it has no effect on halts.)

Trapped Halts

Trapped halts occur when an invalid instruction is trapped by the PRIMOS fault-handling mechanism. By trapping the instruction, the fault handler gives PRIMOS enough time to stop disk DMX transfers before the CPU is actually stopped. Trapped halts thus prevent the CPU from stopping while a record is being written to disk (which would result in a broken file system because of that partial record).

You will know that a trapped halt has occurred because PRIMOS displays a message in the following format at the supervisor terminal:

```
PRIMOS HALTED AT xxxxxx/yyyyyy
```

xxxxxx/yyyyyy (where xxxxxx is the segment number and yyyyyy is the offset) specifies the location in memory where PRIMOS actually encountered the halt instruction. Note that this message is displayed only after a trapped halt.

The following example illustrates the PRIMOS and Maintenance Processor messages that result from a trapped halt:

```
PRIMOS HALTED AT 000006/040660
```

```
DPM400: Primary CPU halted at 000006/004577: 005262  
17 Jul 990 18:35:17 Friday
```

```
CP1>
```


Recovering From Halts and Hangs While Booting

If the halt or hang occurs while PRIMOS is being booted, the action you take depends on what stage of the boot process the system is in. You can determine the stage by the messages displayed at the supervisor terminal.

Use this procedure to recover from a hang or a halt while booting PRIMOS:

1. Make sure that the system disks are operational and that the disk drives containing the command and paging partitions are not write-protected.
2. Check the messages on the supervisor terminal:
 - If a Maintenance Processor error message is displayed, refer to Appendix C for an appropriate response.
 - If no message is displayed, press the MASTER CLEAR button and enter the BOOTP command at the CP1> prompt. If this action does not work, turn the power off and on by pressing the ON/INITIATE SHUTDOWN button twice. PRIMOS should autoboot.
 - If the halt occurred after the DPM007 message displayed, first try an autoboot by pressing the ON/INITIATE SHUTDOWN button twice. If this action does not work, the disks or PRIMOS itself (such as the BOOT program) may be corrupt. Another possibility is that the preboot program (CPBOOT) on the Maintenance Processor's floppy diskette may be corrupt; if it is, replace the diskette.
 - If a message from PRIMOS is displayed, refer to Appendix B for an appropriate response. For instructions on recovering from a system crash, refer to the section titled Booting From Tape, in Appendix A.
3. If you still cannot boot, call your PrimeService representative.

You can assume that PRIMOS is running successfully when the first OK, prompt appears at the supervisor terminal.

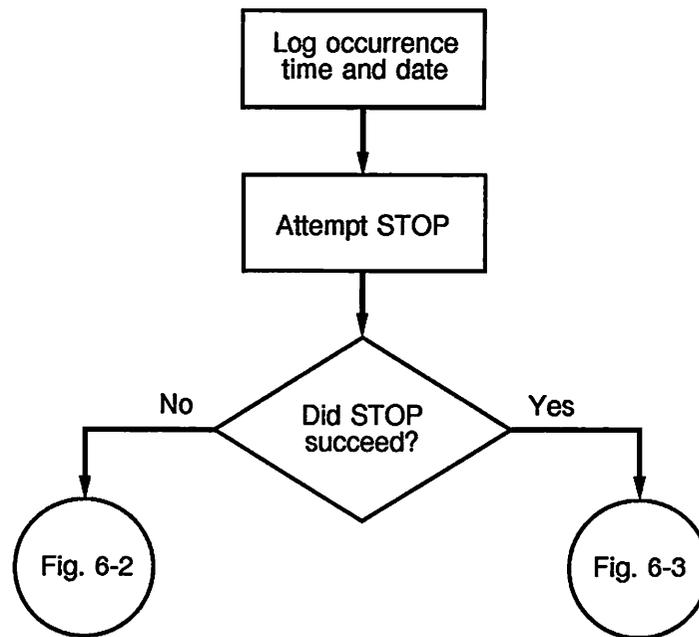
Recovering From Hangs Under PRIMOS

When a hang occurs while PRIMOS is running, your first step is to try to force the CPU to halt so that you can treat the problem as a normal halt, as described in the next section, Recovering From Halts Under PRIMOS.

Use the procedure below to recover from hangs when PRIMOS is running. Figure 6-1 is a flow chart of Steps 1 and 2, and Figure 6-2 details Steps 3 and 4.

1. Enter in the system logbook the time and date of the hang. If the supervisor terminal is not in CP mode, press the ESC key twice. (If the CP1> prompt does not appear, go to Step 3 and press the MASTER CLEAR button.)
2. Use the STOP command to halt the CPU:
 - o If the STOP command does not work, go to Step 3. (See Figure 6-2.)
 - o If the STOP command halts the CPU, go to the section titled Recovering From Halts Under PRIMOS and treat the problem as a halt. (See Figure 6-3.) You know that the CPU halted if the PROCESSOR HALT light is on and the DPM400 halt message is displayed at the supervisor terminal.

```
CP1> STOP
DPM400: Primary CPU halted at 000006/037515: 013404
        17 Jul 90 13:43:27 Friday
CP1>
```



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Figure 6-1. Recovering From Hangs (Steps 1-2)

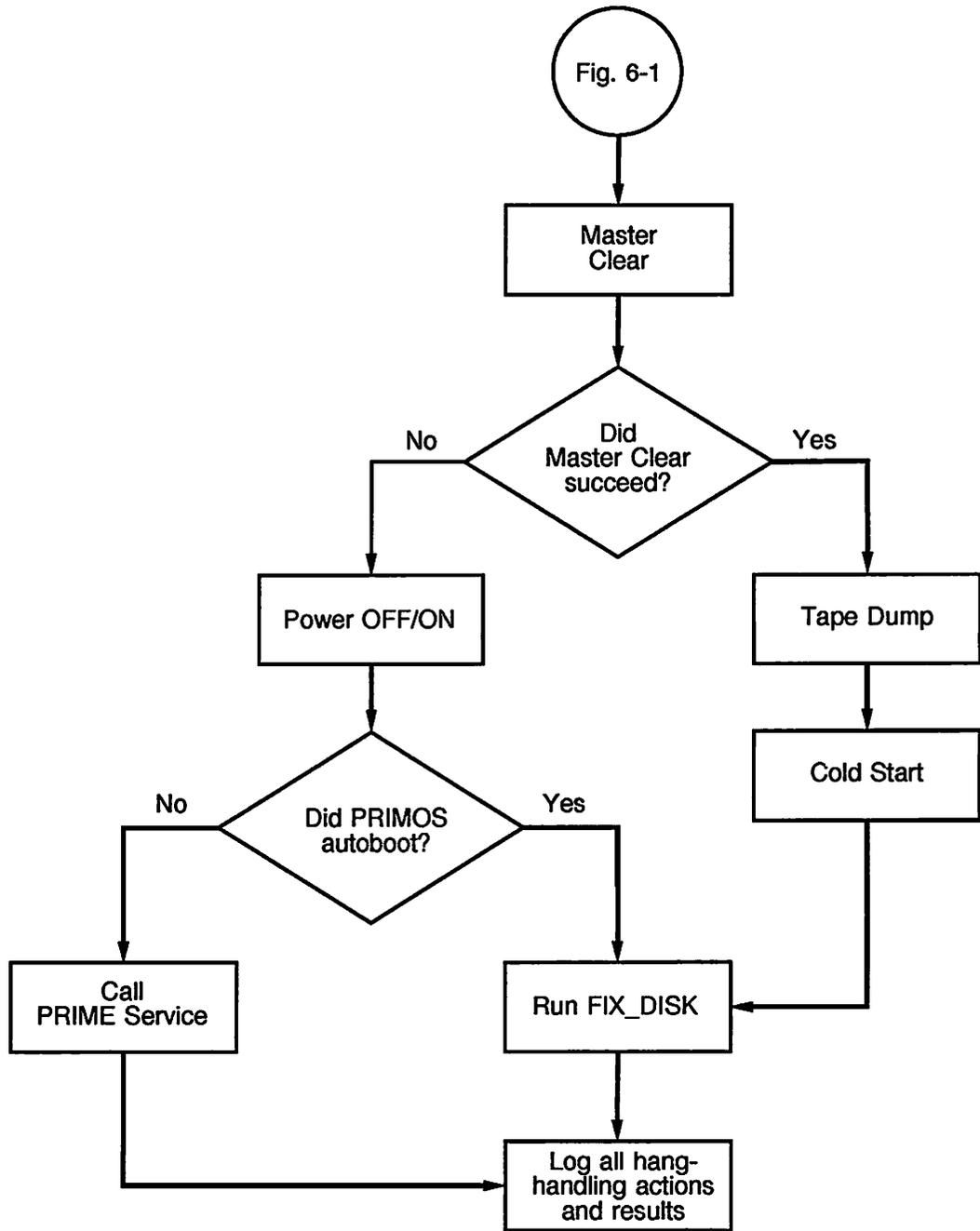
3. If the STOP command did not work at Step 2, press the MASTER CLEAR button on the System Status Panel to initialize the system:
 - If the MASTER CLEAR button works, a series of DPM messages will indicate that the Master Clear was successful. Perform a tape dump in case your PrimeService representative needs this information to determine the cause of the hang. (See the section Performing Tape Dumps, later in this chapter.) Then cold start the system.
 - If the Master Clear does not work, press the ON/INITIATE SHUTDOWN button twice to turn the system power off and on. The system should initialize and autoboot PRIMOS. If it does not, contact your PrimeService representative.
4. Record all hang-handling actions you take, and their results, in the system logbook. If PRIMOS booted successfully, run full FIX_DISK on standard partitions and fast FIX_DISK on robust partitions to ensure the integrity of the file system.

Recovering From Halts Under PRIMOS

To recover from a halt, you must use a cold start or a warm start to get PRIMOS running again. The sections titled Warm Starts and Cold Starts, both later in this chapter, describe each type of restart.

Use the procedure below to recover from a halt incurred when PRIMOS was running. Figure 6-3 is a flow chart of these steps.

1. Examine the halt message to determine which type of halt occurred. (Refer to Types of Halts, earlier in this chapter.) Record the message in your system logbook, together with the time and date of the halt, values from the DSW registers, and any other information displayed by the Maintenance Processor.
2. If you wish (or have been so instructed by your System Administrator or your PrimeService representative), use the VCP commands TAPEDUMP or PARTIAL_TAPEDUMP to perform a crash tape dump. Your PrimeService representative may need this information to determine the cause of the halt. Be sure to perform the tape dump before using any other VCP command, because such commands may corrupt the state of the data in memory and make the information saved by a tape dump useless. (For tape dumps, see the section Performing Tape Dumps, later in this chapter.)



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Figure 6-2. Recovering From Hangs (Steps 3-4)

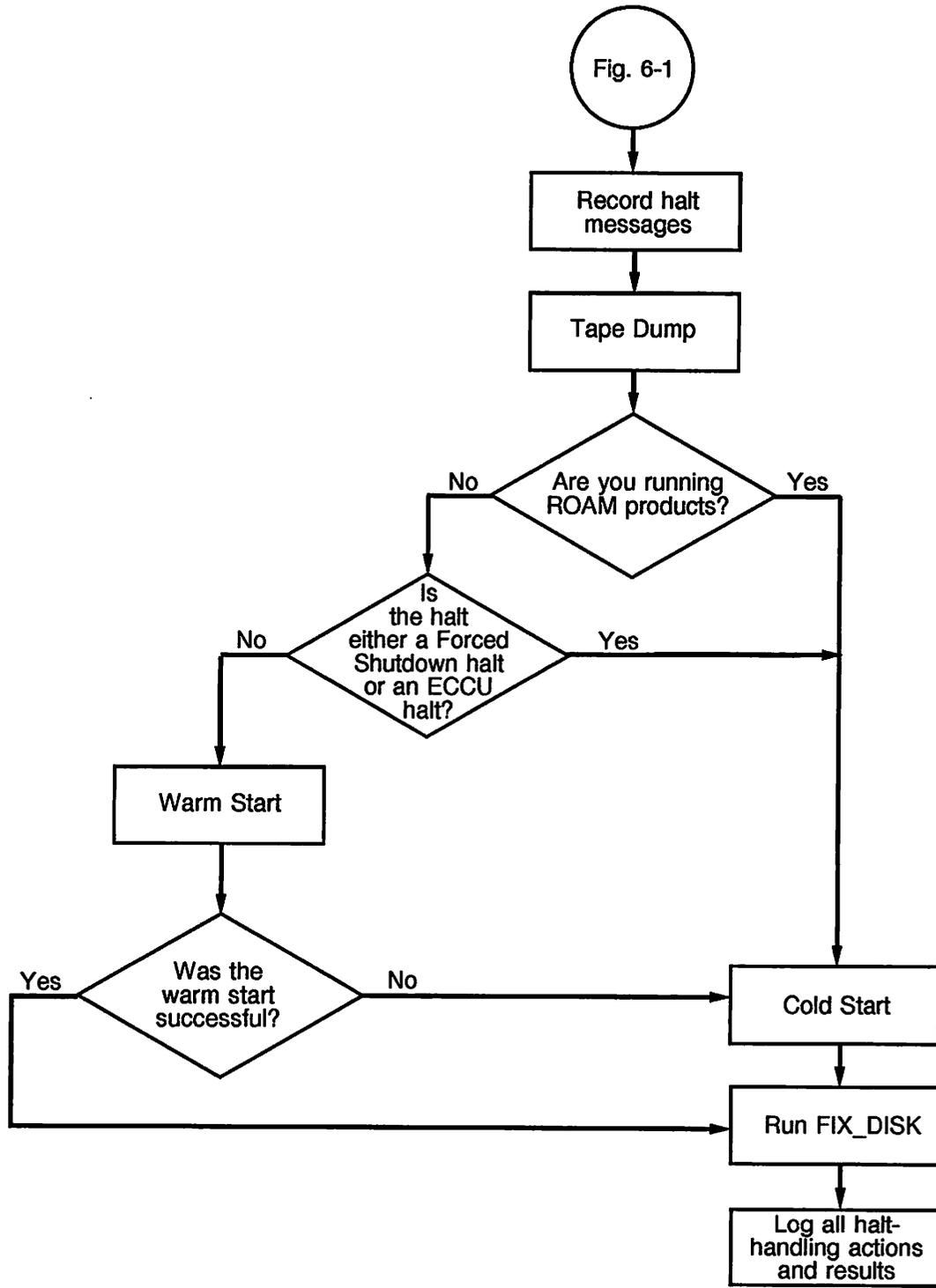
3. Use a warm start or a cold start to get the system running again:
 - o If your system *is not* running ROAM-based products, use Table 6-2.
 - o If your system *is* running ROAM-based products, use a cold start.
4. Run full FIX_DISK on standard partitions and fast FIX_DISK on robust partitions to ensure the integrity of the file system. (The only exception is if a successful shutdown halt occurs and you receive no messages from ADDISK commands about running FIX_DISK.)
5. Record all your halt-handling actions and their results in the system logbook. This information is helpful to your System Analyst or to your PrimeService representative in determining the cause of the halt.

If you cannot restart the system by following the above prescribed procedure, or if halts and hangs recur, call your PrimeService representative.

For systems that do not run ROAM-based products, Table 6-2 summarizes the recovery procedures for each type of halt. The following four sections contain more details.

Table 6-2. Halt Actions on Non-ROAM System

<i>Message Displayed</i>	<i>Type of Halt/Corrective Action</i>
*** From PRIMOS: Forced Shutdown in progress.	Forced shutdown halt
*** From PRIMOS: Forced Shutdown!	1. Cold start
*** From PRIMOS: Forced Shutdown completed successfully.	2. Run full FIX_DISK if specified in ADDISK message
PRIMOS HALTED AT xxxxxx/yyyyyy	Trapped halt
	1. Warm start; if this fails, cold start
	2. Run full FIX_DISK
DPM703: Memory parity (ECCU)	ECCU halt
	1. Cold start
	2. Run full FIX_DISK
No PRIMOS message. Possible Maintenance Processor message:	Immediate halt
DPM701: Machine check.	1. Warm start; if this fails, cold start
DPM702: Missing memory module.	2. Run full FIX_DISK



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Figure 6-3. Recovering From Halts Under PRIMOS

Recovering From Forced Shutdown Halts

The procedure for recovering from a forced shutdown halt depends on whether PRIMOS successfully performed the forced shutdown. A successful forced shutdown halt is signaled by the third forced shutdown message from PRIMOS:

```
*** From PRIMOS: Forced Shutdown completed successfully.
```

Use this procedure to recover from a forced shutdown:

1. Cold start the system, regardless of whether you are running ROAM-based products.
2. Run `FIX_DISK`:
 - o For unsuccessful forced shutdown halts, run full `FIX_DISK` on standard partitions and fast `FIX_DISK` on robust partitions.
 - o For successful forced shutdown halts, you do not have to run `FIX_DISK`, unless you receive the following message from an `ADDISK` command during the booting procedure:

```
(Quota system may be incorrect; run FIX_DISK.)
```

In this case, run fast `FIX_DISK` on both standard and robust partitions.

Recovering From Trapped Halts

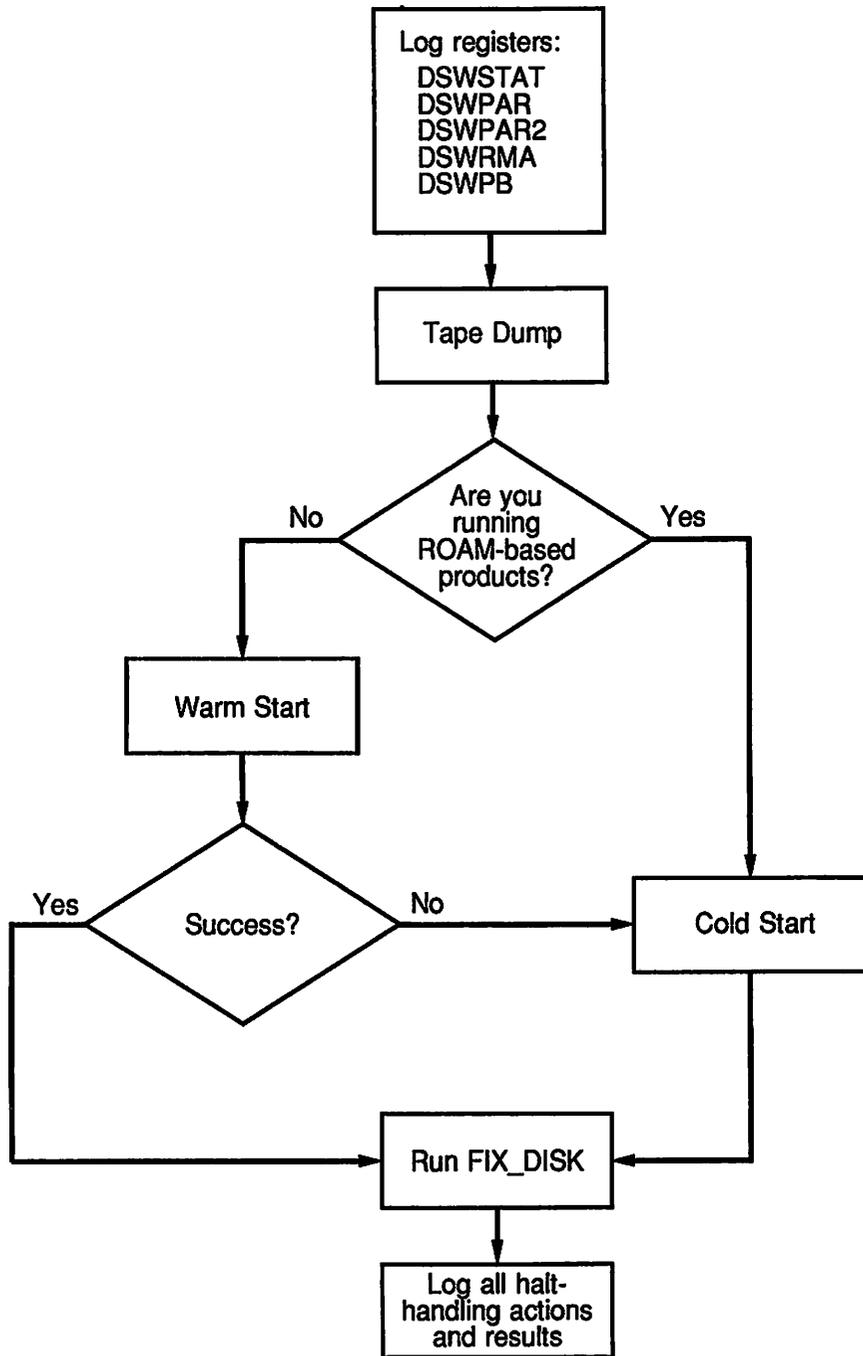
For trapped halts, use this recovery procedure:

1. If you are running ROAM-based products, cold start the system. If you are not running ROAM-based products, warm start the system; if the warm start fails, cold start.
2. After system startup, run full `FIX_DISK` on standard partitions and fast `FIX_DISK` on robust partitions.

Recovering From ECCU Halts

For ECCU halts, use this recovery procedure:

1. Cold start the system, regardless of whether you are running ROAM-based products.
2. After system startup, run full `FIX_DISK` on standard partitions and fast `FIX_DISK` on robust partitions.



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Figure 6-4. Warm Start

3. Use the WARMSTART command to warm start the system. If the warm start is successful, PRIMOS is restarted after the following messages are displayed:

```
CP1> WARMSTART
DPM006: Central Processor system initialization completed.
      14 Aug 90 14:05:23 Tuesday
SYSTEM WARM STARTING, PLEASE WAIT

***** WARM START *****
```

A warm start may take about 90 seconds before the WARM START message appears at user terminals. (It takes slightly longer for the message to appear at the supervisor terminal.) Do not assume a warm start has failed without waiting at least 90 seconds and checking the user terminals for the WARM START message.

4. If the warm start fails, either no message is displayed or the system halts. In this case, perform a cold start.
5. After the system is running, ensure the integrity of the file system by running full FIX_DISK on standard partitions and fast FIX_DISK on robust partitions. Be sure to record all your halt-handling actions and their results in the system logbook.

Cold Starts

In general, cold start PRIMOS after these situations:

- Forced shutdown halts
- ECCU halts
- Any halt if your system is running ROAM-based products
- Any time a warm start is unsuccessful

Use this procedure to cold start your system:

1. Be sure that you enter in the system logbook all information displayed at the supervisor terminal and log the DSW registers.
2. If you want to perform a tape dump, you must do so before proceeding to the next step.

3. From CP mode, use the BOOTP command:

```
CP1> BOOTP
```

4. After the system is running, ensure the integrity of the file system by running full FIX_DISK on standard partitions and fast FIX_DISK on robust partitions. You do not have to run FIX_DISK after a successful forced shutdown halt, however, unless an ADDISK command displays this message:

```
(Quota system may be incorrect; run FIX_DISK.)
```

Note that a robust partition that is improperly shut down cannot be added with the ADDISK command, but instead will produce this message:

```
*** Robust Partition pdev has not been properly shutdown.  
*** Fast FIX_DISK has to be run before it can be added.
```

You must run fast FIX_DISK on the robust partition as the message states. For details on FIX_DISK and robust partitions, see the *Operator's Guide to File System Maintenance*.

Caution

If you do not heed the message from ADDISK to run FIX_DISK, you risk losing files due to file system problems such as unrecoverable disk errors, pointer mismatches, or errors indicated by the message Directory Damaged.

Tape Dumps

A tape dump (also called a crash dump) is the writing of the contents of memory to tape after a system halt. The tape dump operation preserves a record of the state of the system at the time that the halt occurred. Tape dumps are extremely useful in helping your PrimeService representative determine the cause of a halt.

A tape dump, which can be performed only from CP mode, must be the first operation performed after a halt. RUN, BOOT, WARMSTART, VIRY, or other VCP commands cause operations that corrupt the state of the system, thus making the information saved by a tape dump useless. In addition, do not use the MASTER CLEAR button before you have recorded the halt location and determined the recovery actions you will take.

4. Label the tape with the date and time of the halt, the CPU type, and the tape density. Record the tape dump in the system logbook and give the tape to your PrimeService representative.

If a fatal tape error occurs during the tape dump (for example, the tape is write-protected because of a missing write-enable ring), the system halts and this message is displayed at the supervisor terminal:

```
Fatal tape error, dump failed.
```

Example of a Full Tape Dump: The following example shows the procedure for performing a full tape dump. The tape dump requires two reels. The example assumes that the system halted and that you mounted a tape on MT0:

```
DPM400: Primary CPU halted at 000055/012133: 000000
      17 Aug 90 14:27:58 Friday
```

```
CP1> TAPEDUMP 0
DPM006: Central Processor system initialization completed.
      17 Aug 90 14:29:55 Friday
```

```
Mount next reel on same tape unit. Enter RUN to continue.
DPM400: Primary CPU halted at 000014/011127: 104347
      17 Aug 90 14:39:25 Friday
```

```
CP1> RUN
Dump completed.
DPM400: Primary CPU halted at 000014/000431: 003776
      17 Aug 90 15:04:20 Friday
```

```
CP1>
```

Partial Tape Dumps

PRIMOS allows you to perform partial tape dumps, in which only parts of memory are written to tape. Unlike a full tape dump, a partial tape dump does not dump unused physical memory. Partial tape dumps are more suitable for Prime's machines with larger memory.

Partial tape dumps are performed with the `PARTIAL_TAPEDUMP VCP` command. Only prespecified segments of memory are dumped. These segments consist of a set of default segments, plus any other segments that you may have specified with two PRIMOS operator commands:

- Some or all of the DTAR1 shared segments (2000₈-3777₈)
- Some specific DTAR2 (4000₈-5777₈) and/or DTAR3 (6000₈-7777₈) segments for all users
- All shared segments for specific users (for example, a terminal user who is running debugging programs or the network server process NETMAN)

In addition, you can use the RESET_DUMP command to reset the segments to the original default values.

Use this procedure to set up the segments for a partial tape dump:

1. Make a list of the segments and users that you want dumped, in addition to the default values.
2. While PRIMOS is running, use the DUMP_SEGMENT and/or DUMP_USER commands to add segments to the default set. These values will be in effect when PRIMOS halts. Use the LIST_DUMP command to check the values.

The last sections of this chapter describe the four PRIMOS operator commands for partial tape dumps.

Performing the Partial Tape Dump: After you have set up the segments for the partial tape dump, use this procedure to perform the tape dump:

1. After PRIMOS halts, mount a scratch tape on a tape drive. Make sure the write-ring is in place and the drive unit is online.
2. From CP mode, issue the PARTIAL_TAPEDUMP command. The command takes as its argument the decimal number of the tape drive. In this example, the tape is mounted on tape drive 0:

```
CP1> PARTIAL_TAPEDUMP 0
```

The CPU writes the data to the tape, rewinds it, and halts. If the tape does not rewind, repeat this step. A successful tape dump is indicated by the message Dump completed.

3. If the tape dump requires more than one tape reel, the CPU halts and you are notified with this prompt:

Mount next reel on same tape unit. Enter RUN to continue.

Mount another tape reel on the same drive and enter the RUN command at the CP1> prompt. If still another tape reel is required, repeat this step. On a multireel dump, the Dump completed message is not displayed until after the final reel.

Dump User Segments

DAVIS
NETMAN
OK,

The second part assumes that PRIMOS has halted and that you mounted a tape on tape unit 0. Remember to ensure that the write-ring is in place and the tape drive is online.

DPM400: Primary CPU halted at 000006/005534: 003776
17 Aug 90 10:07:49 Friday

CP1> PARTIAL_TAPE_DUMP 0
DPM006: Central Processor system initialization completed.
17 Aug 90 10:08:57 Friday

Dump completed.
DPM400: Primary CPU halted at 000014/012527: 003776
17 Aug 90 10:11:23 Friday

CP1>

The DUMP_SEGMENT Command: The DUMP_SEGMENT command (abbreviated DMPS) specifies which additional segments for all logged-in users are written to tape during a partial tape dump. The segments, which must be specified in octal, are in addition to those currently listed by the LIST_DUMP command.

The DUMP_SEGMENT command has three command formats. You must specify the segment numbers in octal in all three formats.

The first command format uses only segment numbers (a maximum of ten segments per command line):

DUMP_SEGMENT *segment_number-1* [. . . *segment_number-10*]

For example,

OK, DUMP_SEGMENT 6000 6001 6002 6003 6004

The second format uses the -RANGE option (abbreviated -R) with two numbers that specify a range of contiguous segments:

DUMP_SEGMENT -RANGE *low_segment_number high_segment_number*

low_segment_number cannot be lower than 2000₈ and *high_segment_number* cannot be higher than 7777₈. For example, the following `-RANGE` command accomplishes the same result as the previous example:

```
OK, DUMP_SEGMENT -RANGE 6000 6004
```

The third format combines the first two formats, with the `-RANGE` option specified last. For example,

```
OK, DUMP_SEGMENT 6000 6001 6003 6004 -RANGE 2000 2500
```

A `-HELP` option (abbreviated `-H`) displays the command syntax.

The DUMP_USER Command: The `DUMP_USER` command (abbreviated `DMPU`) specifies that all segments for a particular user (that is, segments 4000₈-7777₈) are to be dumped to tape.

You can specify a maximum of 10 users per command line. The maximum number of users that you can add depends on the amount of dynamic storage available on your system. You will know that this limit has been reached if you receive the following error message after using the `DUMP_USER` command:

```
Error encountered trying to allocate storage.
```

If a designated user is logged in at the time of the halt, all of that user's segments are dumped during a partial tape dump; if the user is not logged in, nothing is dumped for the user.

The `DUMP_USER` command format is as follows:

```
DUMP_USER username-1 [. . . username-10]
```

For example, the following command specifies that all segments are to be dumped for users SMITH, PETER, FTP, and NETMAN:

```
OK, DUMP_USER SMITH PETER FTP NETMAN
```

A `-HELP` option (abbreviated `-H`) displays the command syntax.

The RESET_DUMP Command: The `RESET_DUMP` command (abbreviated `RDMP`) resets the values for a partial tape dump to the default segments, which are listed above in the section Preparing for the Partial Tape Dump.

A `-HELP` option (abbreviated `-H`) displays the command syntax.

The LIST_DUMP Command: The LIST_DUMP command (abbreviated LDMP) displays the current segments that will be dumped for a partial tape dump. These segments are always the default set of segments plus any that you added using the DUMP_SEGMENT and DUMP_USER commands.

A -HELP option (abbreviated -H) displays the command syntax.

6250-bpi Tape Dumps

Previous to Rev. 22.1, all full and partial crash tape dumps were done at 1600 bits per inch (bpi). As of Rev. 22.1, PRIMOS can perform tape dumps at 6250 bpi for both full tape dumps and partial tape dumps.

To perform 6250-bpi tape dumps, your system must have a tape drive that can write at 6250 bpi. If you do not have a 6250-bpi tape drive, you can still perform 1600-bpi tape dumps as documented above.

6250-bpi tape dumps require fewer tape reels than 1600-bpi tape dumps. For example, a full tape dump on a system with 64MB of memory requires four tape reels at 1600 bpi, while a 6250-bpi tape dump uses only one reel. Fewer reels also mean faster tape dumps, because a fair amount of the time is spent in rewinding and mounting the additional tapes.

You initiate the 6250-bpi tape dumps with the VCP command, RUN 773. The RUN 773 command works on all 50 Series machines.

Note Any VCP command that initiates a 1600-bpi tape dump cannot perform a 6250-bpi tape dump. These commands include the TAPEDUMP and PARTIAL_TAPEDUMP commands as well as the RUN 775, RUN 776, and RUN 777 commands.

Procedure for 6250-bpi Tape Dump: The RUN 773 command initiates a 6250-bpi tape dump to tape drive 0 (MT0). See the next section for tape dumps to other tape drives.

The procedure for a 6250-bpi tape dump, which is performed at the CP1> prompt, is as follows:

1. Mount a tape on tape drive 0. Make sure that the write-enable ring is on and that the drive is online. You do not have to manually set the density because the software will set it.
2. Issue the SYSCLR command.
3. Issue the RUN 773 command. The following prompt will be displayed:

Enter P for a partial dump, Enter F for a full dump:

Beginning full dump.
Dump completed.
DPM400: CPU halted at 000014/013070: 003776
06 Aug 90 09:03:12 Monday

CP1>

Using Another Tape Drive: To perform a 6250-bpi tape dump to a tape unit other than unit 0, use the following sequence of VCP commands and responses:

```
SYSCLR  
ACCESS 7  
773  
/  
SS unit  
RUN
```

The ACCESS command, which can be abbreviated as A, is terminated by the / (slash) subcommand of ACCESS. (Note that you do not have to press the RETURN key after pressing the / key.) *unit* is the number of the tape drive. After you issue the RUN command, you are prompted for a full or partial dump as described above.

Example of a 6250-bpi Tape Dump on MT1: The following example shows the procedure for performing a partial tape dump at 6250 bpi on tape drive 1 (MT1).

DPM400: CPU halted at 000006/006163: 003776
07 Aug 90 11:12:55 Tuesday

```
CP1> SYSCLR  
DPM006: Central Processor system initialization completed.  
07 Aug 90 11:13:17 Tuesday
```

```
CP1> ACCESS 7  
000000/000007: 001000 773  
000000/000010: 000000 /  
CP1> SS 1
```

```
CP1> RUN  
Enter P for a partial dump, Enter F for a full dump: P  
Beginning partial dump.  
Dump completed.  
DPM400: CPU halted at 000014/013070: 003776  
07 Aug 90 11:14:24 Tuesday
```

CP1>

Using the VCP

7



When you use the Virtual Control Panel (VCP), you are communicating directly with the Maintenance Processor, not with PRIMOS, and therefore you can use only VCP commands. The VCP is available for use whether or not PRIMOS is running.

To use the VCP, the supervisor terminal must be in CP mode with the CP1> prompt displayed at the terminal. The supervisor terminal is placed in CP mode in the following situations:

- When you press the ESC key twice from either USER or ST mode.
- When the CPU is not running. For example, a halt of PRIMOS automatically places the supervisor terminal in CP mode, regardless of whether the halt was caused by a normal system shutdown (with the SHUTDOWN ALL command) or by an unexpected error. System shutdowns are also initiated by the Maintenance Processor when it detects hardware error conditions, such as an overheating board. Note, however, that some hangs may not place the supervisor terminal in CP mode.

If you intend to use the VCP to perform system test and maintenance activities or to debug an operating system, you should become familiar with the following three topics:

- VCP specifiers
- Communication registers between the VCP and CPU
- Sense-switch settings

These three topics are covered in this chapter, in addition to other information about using the VCP. For a complete description of available VCP commands, see Chapter 8.

Typical Uses of the VCP

Some typical situations in which you would use the VCP are the following:

- Booting PRIMOS for a system startup (see Chapter 4) or booting standalone utilities such as MAKE (See Appendix A.)
- Handling halts and hangs, including warm starting PRIMOS (See Chapter 6.)
- Switching the supervisor terminal between ST and USER modes when PRIMOS is running (See Chapter 3.)
- Making another local terminal or a remote terminal function as the supervisor terminal (See Chapter 3 and Appendix D.)
- Performing crash tape dumps (See Chapter 6.)
- Controlling the output sent to the supervisor terminal while it is in CP or USER modes (See Chapter 3.)

VCP Special Characters

Table 7-1 lists the keys that have special control purposes in CP mode.

Table 7-1. VCP Special Characters

<i>Key</i>	<i>Function</i>
Backspace	Deletes previous character
?	Kills command line up to question mark
Return	Executes current command line
CONTROL-P	Aborts current command line

VCP Mode Specifiers

The VCP has two modes: Data mode and Address mode. When executing commands, the VCP assumes that certain settings are in effect for these modes. These settings can be changed by five VCP commands called mode specifiers (:B, :O, :H, :D, :A). Mode specifiers determine which numerical (or ASCII)

format the VCP uses to interpret and display both memory addresses and the data in those addresses.

To determine the current settings of the VCP mode specifiers, use the VCP STAT command.

The meanings of the Data and Address modes are as follows:

- Data mode is the numerical or ASCII format in which a VCP command displays data and interprets user input for certain commands. The default setting of the Data mode is octal, and therefore data displayed by a VCP command are shown in octal numbers. For example, by default, the ACCESS command displays the contents (data) of a particular memory address as octal numbers.
- Address mode determines two numerical formats: the numerical base (radix) that the VCP uses to interpret a memory address (that is, the numerical argument that you use in a command), and the numerical format in which that address is displayed. The default setting of the Address mode is also octal.

Because memory addresses must be specified in numbers, Address mode cannot be set to an ASCII setting. For example, if the Address mode is set to octal and the Data mode is set to ASCII, the command ACCESS 2345 accesses the memory location that has octal 2345 as its address, and then displays the address itself in octal followed by the contents in ASCII format. If, however, the Address mode is set to binary, ACCESS 2345 is an invalid command because 2345 is not a binary number. Instead, you would use ACCESS 10011100101.

For general VCP operation, you should not change the Data and Address modes from octal. (Instructions and examples in this book assume that the modes are octal, unless otherwise specified.)

You may want to change one or both modes, however, if you are performing system test and maintenance activities or are debugging an operating system. If you do, it is recommended that you reset them to octal when you have finished, so that subsequent use of the VCP does not result in misinterpretation of commands or output.

Changing Data and Address Modes: By using one of the mode specifiers in Table 7-2, you can change the Data mode so that data is displayed either in ASCII or in numerical base (radix) format other than octal, and the Address mode so that addresses are interpreted and displayed in another base format.

Table 7-2. VCP Mode Specifiers

<i>Mode Specifier</i>	<i>Sets Data Mode to</i>	<i>Sets Address Mode to</i>
:O	Octal (default)	Octal (default)
:B	Binary	Binary
:D	Decimal	Decimal
:H	Hexadecimal	Hexadecimal
:A	ASCII	(Not valid)

To change a mode, use mode specifiers as follows:

- On the command line by themselves.

For example, the following command changes the Data mode to binary and the Address mode to decimal:

```
CP1> :B :D
```

- On the command line preceding another command.

In this case, the mode settings are first changed and then the command accepts numerical input and displays data according to the new mode settings. For example, the following command tells the VCP to first change the Data mode to ASCII and the Address mode to decimal, and then to display (in ASCII) the contents of decimal memory addresses 1000 through 2000:

```
CP1> :A :D DUMP 1000 2000
```

After the command has finished executing, the Data mode remains set to ASCII and the Address mode to decimal.

When changing modes, keep the following points in mind:

- You can use one or two mode specifiers on a command line. If you use only one mode specifier, you are changing the Data mode only.
- If you use two mode specifiers on a command line, the first specifier changes the Data mode and the second changes the Address mode.

You cannot change the Address mode by itself. To change the Address mode, you must use a Data mode specifier preceding the Address mode specifier.

- Certain numerical output performed by the VCP is not affected by the modes in effect at the time. For example, the message output when the CPU halts always represents the halt address and its contents in octal (:O). Similarly, microverification error codes output by the Maintenance Processor are always displayed in hexadecimal (:H).

VCP Device

The Maintenance Processor has one floppy diskette drive, Device 0. Device 0 contains the system disk, which stores the files needed for verification, diagnostic, and booting purposes and the History File, in which the Maintenance Processor logs warning and error messages that will help your System Administrator or PrimeService representative to diagnose system problems.

Device 0 is the only device in the 5300 Family systems. Thus, there are no device specifiers as there are in other Prime systems.

VCP-to-CPU Registers

Older Prime machines did not have a Virtual Control Panel, but instead had a physical control panel with switches and lights. By manipulating these switches, the operator could communicate with the registers in the CPU that represented these switches and lights.

The CPU in the 5300 Family of Prime machines also contains registers that represent these physical switches and lights. Instead of using switches, though, you communicate with the CPU through the VCP, which contains commands that can manipulate the CPU registers.

The VCP thus enables you to directly control the CPU; for example:

- The SS command sets the sense-switch register to a specific value. Other commands that change or access the sense-switch register are ACCESS, BOOT, BOOTP, BOOTT, COPY, DISPLAY, DISPLAYC, DUMP, FILL, LIGHTS, LIGHTSC, LOADTM, PARTIAL_TAPEDUMP, RCP, RUN, SSTEP, TAPEDUMP, TRACE, and WARMSTART.
- The SD command sets the data switches to a specific value.
- The FETCH command performs a Fetch operation based on the current sense switches and address register. The result, which is put in the data register by the CPU, is displayed by the VCP.

- The STORE command stores a value in memory based on the current sense switches and address register. The number specified on the STORE command line is placed into the data register, and this value is then stored in memory.
- The LIGHTS command displays the current value of the LIGHTS data register.

Although the registers involved are only 16 bits wide, many of the functions involve values larger than 16 bits. For example, accessing main memory involves 23 bits when accessing physical memory and 28 bits when accessing mapped memory.

To provide this functionality, the VCP uses the sense switches to communicate additional addressing information to the CPU whenever it performs an operation involving memory or register addressing. Prime systems also use the sense-switch settings to further define certain operations. These settings allow you to access more than the first 128KB of memory and to access registers.

Understanding the sense-switch register is crucial when you use the VCP to access main memory or registers.

Sense-switch Settings

The VCP assumes a default sense-switch setting when you use certain commands. This setting is used by the VCP to indicate the precise nature of the addressing to be performed by the CPU. When power to the VCP is first turned on, the default sense-switch setting is zero (000000₈). Normally, the VCP sets the sense switches automatically.

When the VCP requests information from the CPU or provides information to it, the sense-switch setting is often used to provide additional information concerning the operation. At times the automatic setting is not desired or may be inconsistent with the user's wishes. In these cases, it is important to understand how the CPU interprets the sense switches so that you can both understand the settings constructed by the VCP and construct your own settings.

The sense switches are interpreted in four ways. These interpretations depend on the current state of the CPU:

- When the CPU is stopped, the CPU itself interprets the sense switches along with the address register. Sense switches specify segment numbers and, in some operations, select register files, mapped memory, or absolute memory. The address register specifies the location, which is a halfword or register number. Setting the data switches on the VCP when the CPU is stopped sets the address register but does not set the data register.

Specifying a Register: If bit 1 of the sense switch is set (=1), the halfword-number part of the specified address (in the address register) represents a register address. In this case, bits 2 and 4 of the sense-switch setting control which of four register sets are accessed and which half of the specified register is accessed, as shown in Table 7-3.

Table 7-3. Specifying a Register

Bit	Off	On
2	Reference current register set. Bits 9 – 11 of address are ignored.	Reference absolute register sets. Bits 9 – 11 of address register specify the register set number
4	Reference low halfword.	Reference high halfword.

Bit 3 of the sense-switch setting must be zero. Bits 5-16 of the sense-switch setting are ignored, and should be zero. Bits 1-8 of the address register are always ignored, and bits 12-16 of the address register specify the register number.

Specifying Main Memory: If bit 1 of the sense-switch register is reset (=0), the address register represents the halfword-number part of a main memory address. In this case, bit 4 of the sense-switch register controls whether the access is done through mapped (virtual) memory or absolute (physical) memory, as shown in Table 7-4.

Table 7-4. Specifying Main Memory

Bit 4	Result
Off	Reference mapped memory. Bits 5-16 of sense-switch register is segment number. Reference is made to a register file location if the CPU is in S, R, or V mode with one of the following: (a) segmentation disabled and the address register is 0 ₈ -37 ₈ (b) segmentation enabled and the address register is 0 ₈ -7 ₈ (See address traps in <i>System Architecture Reference Guide</i> .)
On	Reference absolute memory. Bits 10-16 of sense-switch register are high-order bits of 23-bit physical address.

and then use the LIGHTS or LIGHTSC command to display the value in the data lights, as follows:

1. Use the SD command to set the segment number:

```
CP1> SD 140000
CP1> SD 10sss
CP1> SD 0
```

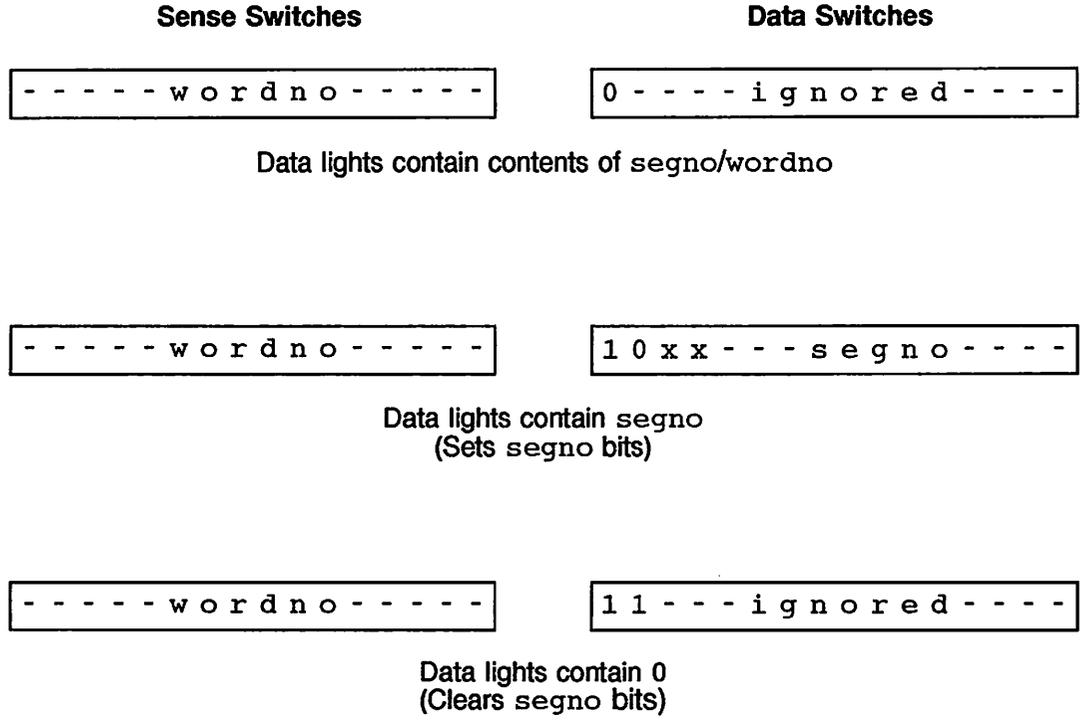
The first command clears the segment number and sets it to zero. Substitute the four-digit octal segment number for *sss*.

2. Use the SS command to set the halfword number:

```
CP1> SS offset
```

3. Use the LIGHTSC command to view the contents of the location. (Use CONTROL-P to stop the output and return to CP mode.)

Figure 7-2 illustrates the use and meaning of the sense and data switches while PRIMOS is running.



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Figure 7-2. Sense-switch Meaning When PRIMOS Is Running

Sense-switch Setting During System Test and Maintenance

Many system test and maintenance (T&M) programs interact with the user through the sense and data switches. Because these programs require the sense and data switches to remain set during the execution of the program, certain VCP commands should not be issued once the sense and data switches are set up.

During T&M, issuing any VCP command that accepts an address or register argument disrupts the current sense and data switch settings. Therefore, to set up sense and data switches and then start running a program at a specific address, load the address into the P register (word 7) before you use the SS and SD commands to set up the sense and data switches. Then, use either the RUN or RCP command without an argument.

Setting the Sense-switch Register

There are four ways to set the sense switches as seen by the CPU:

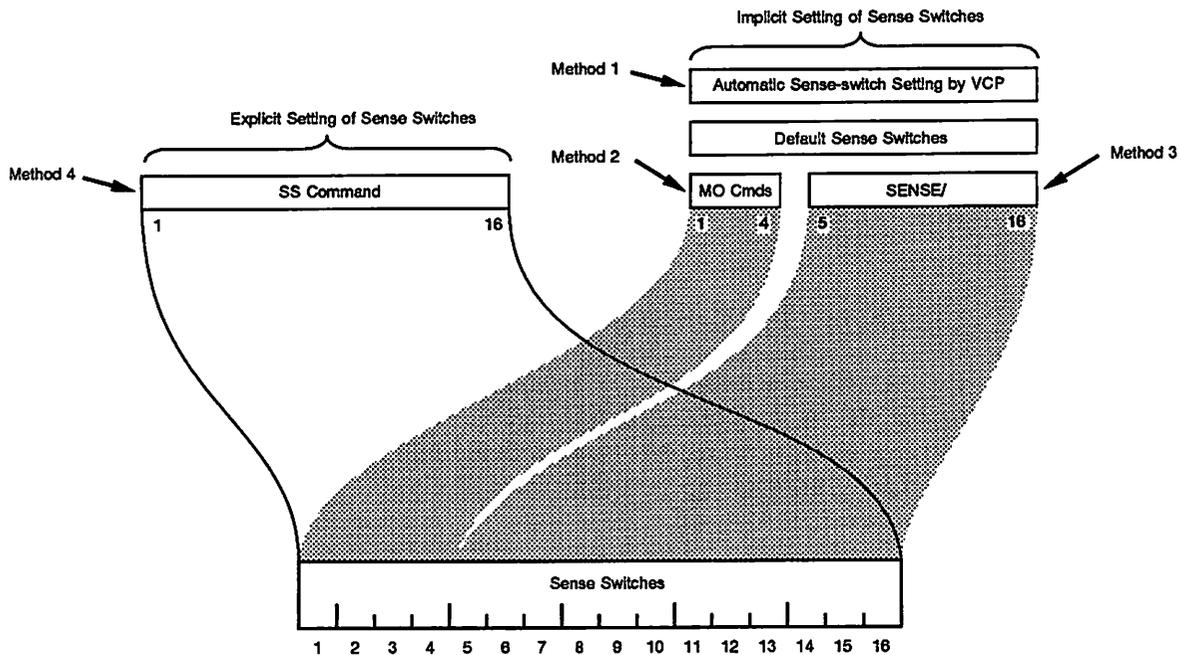
- **Method 1:** Implicitly request information from the VCP that causes it to automatically set the sense (and data) switches to honor the request.
- **Method 2:** Use MO commands that change bits 1-4 of the default sense-switch setting. The VCP always supplies these bits when an implicit reference to a sense-switch setting is made.
- **Method 3:** Specify bits 5-16 of the sense-switch setting when giving an address to a VCP command. This affects not only the current command, but also sets bits 5-16 of the default sense-switch setting. Bits 1-4 of the default sense-switch setting can be changed only with the MO commands of method 4.
- **Method 4:** Explicitly set the sense-switch setting using an SS command. This action causes the CPU to immediately see the new setting. Subsequent commands such as FETCH, STORE, LIGHTS, DISPLAY, RUN (without arguments), and RCP (without arguments) cause the CPU to use the specified sense-switch setting. When the VCP has to change the sense-switch setting as seen by the CPU (for example, because of a RUN command with an argument), the setting specified by an SS command is overridden. This setting is restored upon completion of the VCP command that changed the sense-switch setting.

Figure 7-3 shows the interaction among these four methods.

Method 1 occurs when the VCP needs to set the sense and data switches to perform its functions. For example, when the CPU halts, the VCP must extract information from the CPU to produce the DPM400 halt message, and this extraction causes the automatic setting of the sense and data switches.

Methods 2 and 3 implicitly change the default sense-switch setting. (The default setting is initially 0.) The default sense-switch setting is used by all VCP commands that take a main memory address as an argument. These commands allow bits 5-16 of the default sense-switch setting to be changed when the command is executed, as explained below. Bits 1-4 of the default sense-switch setting, however, may be changed only with MO commands.

Method 4 explicitly sets the sense-switch values as seen by the CPU. (Similarly, the SD command sets the data-switch values as seen by the CPU.) Setting the sense and data switches in this manner immediately changes the values as seen by the CPU, the results of which may be seen by using commands such as LIGHTS, FETCH, STORE, and so forth. This setting is overridden whenever a VCP command is specified along with an address in main memory.



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Figure 7-3. Setting the Sense-switch Register

The settings specified by the SS and SD command are restored after any operation that implicitly disrupts the sense and data switches (such as an ACCESS or DUMP command). In contrast, on older Prime machines the values specified in an SS or SD command are lost as soon as such an operation is performed, which results in the sense and data switches remaining in the state in which the operation left them.

These VCP commands assume a default sense-switch setting:

ACCESS	DUMP
COPY	FILL
DISPLAY	RCP
DISPLAY	RUN

All of the commands listed above accept an address argument. The address argument has the following format:

[sense/]offset

In most cases, specifying *offset* is sufficient. If you omit *sense*, the default sense-switch setting is used. If you specify *sense*, bits 5-16 of *sense* are passed to the CPU as bits 5-16 of the sense switches, although bits 1-4 of the sense switches still default to bits 1-4 of the default sense-switch setting. Bits 1-4 of *sense* are ignored.

In addition, specifying *sense* at any time changes bits 5-16 of the default sense-switch setting, and changes subsequent specifications of *address* without *sense* to use the new values of bits 5-16 of the default sense-switch setting.

Displaying the Sense-switch Setting

The ACCESS, DUMP, FETCH, and STORE commands display the sense-switch setting, the contents of the address register, and the contents of the data register. (When you specify a register name with the ACCESS and the DUMP commands, the data register contents are displayed twice: once for the high half and once for the low half.)

The first number displayed is the sense-switch setting. The first four bits of this setting show what kind of access is being performed. When the Address mode is octal (:O), the first four bits correspond to the first two digits. These bits correspond exactly to the sense-switch bits 1-4 described above in the section titled Sense-switch Meaning When the CPU Is Stopped. Normally, these two octal digits have one of the following six values.

<i>Octal Value</i>	<i>Meaning</i>
00	Mapped main memory is accessed. The low-order 12 bits, or 4 octal digits, of the sense switches specify the segment number. The address register contains the offset within the segment. If this number is less than 10 ₈ with segmentation enabled, or if it is less than 40 ₈ and the CPU is not in 32I mode with segmentation enabled, a register is accessed, not main memory.
01	Absolute main memory is accessed. The contents of the sense switches (the low-order 7 bits, or 3 octal digits) are the high-order 7 bits of the 23-bit address in physical memory. The address register contains the low-order 16 bits of the 23-bit address in physical memory.
10	The low half of the current register set is accessed. The low-order 5 bits of the address register specify the register number.
11	The high half of the current register set is accessed. The low-order 5 bits of the address register specify the register number.
14	The low half of a specified register set is accessed. Bits 9 through 11 of the address register specify the register file number, and bits 12 through 16 (the low-order 5 bits) specify the register number.
15	The high half of a specified register set is accessed. Bits 9 through 11 of the address register specify the register file number, and bits 12 through 16 (the low-order 5 bits) specify the register number.

When you use the ACCESS or DUMP command to access a register by name, both the high and low halfwords of the register are displayed. The displayed sense-switch setting shows only one setting of bit 4, the high/low halfword bit. This bit is always on in this case.

This bit has the same value as bit 4 of the default sense switches and, therefore, reflects the setting of the last MO RFH or MO RFL command. Bit 4 indicates which half of the register can be modified by an ACCESS command. Because both halves of the register are displayed, bit 4 of the actual sense switches provided to the CPU is toggled to obtain the register contents.

VCP Commands

8



This chapter lists and explains all available VCP commands. VCP commands can be divided into two categories:

- Commands that are intended for general use by System Operators. These commands are listed in Table 8-1.
- Commands that may be used by System Operators, but that are actually intended for use by PrimeService representatives or by users debugging an operating system.

Caution

Use of a command that is not listed in Table 8-1 can produce unexpected results if you do not fully understand the actions of the command.

Many VCP commands require that the CPU be stopped. If you use one of these commands while the CPU is running, the Maintenance Processor does not execute the command and instead displays this message:

```
DPM300: Can't while CPU is running.
```

To execute such a command, you must shut down PRIMOS.

A few VCP commands require the CPU to be running. If you use one of these commands while the CPU is stopped, the Maintenance Processor does not execute the command and instead displays this message:

```
DPM307: Can't unless CPU is running.
```

Also keep in mind that CONTROL-P aborts a VCP command.

Table 8-1. VCP Commands for Normal System Use

BOOT	HELP	STAT
BOOTP	LISTREV	STOP
BOOTT	MO ST	SYSCLR
BREAKOFF	MO USER	SYSOUT
BREAKON	PARTIAL_TAPEDUMP	TAPEDUMP
DATE	PASSWORD	VIRY
DISABLE	PRIVILEGE	WARMSTART
ENABLE	RUN	
HALT	SETIME	

Dictionary of VCP Commands

This section lists and explains all available VCP commands. Mode specifiers (such as :B) can precede any VCP command. For more information on specifiers, in addition to that discussed below, see the section in Chapter 7 titled VCP Mode Specifiers.

► :O, :B, :D, :H, :A

The mode specifiers set the Data mode and the Address mode.

The Data and Address modes determine how the VCP interprets the radix (base) of numbers. The VCP separates numeric parameters into two categories: data and address. By using mode specifiers, you can control the VCP's interpretation of numerical data and addresses, both as they are displayed by a command and as user input for the command.

Mode specifiers are described in Table 8-2.

Table 8-2. Effects of Mode Specifiers on Data Mode and Address Mode

<i>Mode Specifier</i>	<i>Sets Data mode to:</i>	<i>Sets Address mode to:</i>
:O	Octal (default)	Octal (default)
:B	Binary	Binary
:D	Decimal	Decimal
:H	Hexadecimal	Hexadecimal
:A	ASCII	(Not valid)

You can use one or two mode specifiers before all commands, or alone on the VCP command line. In all cases, the rules are as follows:

- If you use two mode specifiers, the first specifier sets the Data mode and the second the Address mode.
- If you use only one mode specifier, only the Data mode is changed.
- ASCII mode (:A) is not valid for Address mode.

In this example, the Data mode is set to binary and the Address mode to hexadecimal:

```
CP1> :B :H
```

The default mode for both Data and Address at system power-on is octal (:O). Using the VIRY command also resets both modes to octal.

Note also that certain numerical output by the VCP is not affected by the current mode settings. For example, the CPU halt message always represents the halt address and its contents in octal (:O). Similarly, microverification error codes are always displayed in hexadecimal (:H).

To find the current settings of the Data and Address modes, use the STAT command and look in the third group of information. For more information on these modes, see the section titled VCP Specifiers, in Chapter 7.

► ACCESS

The ACCESS command displays the contents of a main memory location or of a register.

The ACCESS command has two command formats, depending on whether you are accessing a memory location or a register. Both formats can be preceded by one or two of the mode specifiers described above.

Accessing an Address: To display the contents of a main memory location, use the following format:

ACCESS *address*

address is a number (in the current Address mode) that represents the halfword in memory to be accessed.

You can supply a sense-switch setting to the command by specifying *address* in the following format:

[*sense*]/*offset*

sense is typically a segment number in mapped memory. *offset* is the number (in the current Address mode) that represents the halfword in memory to be accessed.

If you specify *sense*, only the low-order 12 bits are used; the high-order 4 bits are set from the default sense-switch setting. (The default for these 4 bits is four zeros.) Specifying *sense* also causes bits 5-16 of the default sense-switch setting to be set to *sense*. Thus, bits 5-16 of the default sense-switch setting stay at the *sense* you specify until you change them.

If you do not specify *sense*, the default sense-switch setting (which initially is 0) is used. For more information on the meaning of the sense-switch setting, see Chapter 7.

Accessing a Register: Use the following format to display the contents of a named register in the current register set or the absolute register set of the CPU:

ACCESS *register*

register is a mnemonic keyword designating which register is to be accessed. See Table 8-4 under the DUMP command for a list of register mnemonics.

The setting of MO RFH/RFL affects only the halfword of the register that is modified. Both halfwords of the register are displayed.

ACCESS Command Interaction: When you use the ACCESS command, the address of the specified halfword or register is displayed, followed by its contents. When you access main memory, one halfword is displayed. When you access a register, the full 32-bit contents are displayed.

When the addresses are displayed, the cursor remains on the same line, waiting for you to issue one of the ACCESS subcommands listed in Table 8-3.

Table 8-3. ACCESS Subcommands

<i>Subcommand or Key</i>	<i>Meaning</i>
Return key	Accesses next memory location or register.
^ key	Accesses previous memory location or register.
<i>number</i>	Modifies memory location or half-register to value of <i>number</i> . (The last MO RFH or MO RFL command determines which halfword of a register is modified. The default at system power-on is MO RFL.)
: key	Used with the mode specifiers (:O, :D, :H, :B, :A) to change the Data and Address modes. If the Address mode is changed, it does not affect the way in which <i>address</i> is interpreted. The address is interpreted according to the Address mode in effect before the ACCESS command was issued.
/ key	Exits and returns to CP mode. The memory location or register just displayed is not modified.

► **BOOT *ss_number* [*ds_number*]**

The BOOT command initiates the preboot program (CPBOOT) that boots PRIMOS or any other bootable program (such as standalone MAKE or a test and maintenance program).

The preboot program is initiated with the sense switches set to *ss_number* and, optionally, the data switches set to *ds_number*. Both values must be in octal. The default setting for both switches is 0000. *ds_number*, which is seldom used for standard boots of PRIMOS, is described in Appendix A in the section titled Boot Option Words.

ss_number is normally used to specify the boot option word that designates the disk or tape device from which the program is to be booted, as well as other information such as the pathname of the PRIMOS runfile. *ss_number* can be constructed from the values in Table A-1 and Table A-2 (both in Appendix A).

Note Before using the BOOT command, make sure that Address mode is in the default octal setting (:O). If the Address mode is set to a radix other than octal, the value of *ss_number* (normally entered in octal) can be misinterpreted. If this situation occurs, the Maintenance Processor issues the following warning:

```
WRN004: Mode specifier is not set to Octal.
```

The BOOT command still executes, however, using the current Address mode, which may produce an error and cause the system not to boot. For example, with Address mode set to hexadecimal, an attempt to boot from disk 0 on controller address 26₈ and be prompted for the file to boot, results in the following error:

```
CP1> BOOT 10114
WRN004: Mode specifier is not set to Octal.
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
OPTION B and OPTION B' not supported.
DPM400: Primary CPU halted at 005626: 003776
      10 Aug 90 15:04:27 Friday
CP1>
```

Using the BOOT Command: Use the following command sequence to boot PRIMOS or other utilities:

```
CP1> SYSCLR
CP1> BOOT ss_number
```

The SYSCLR command must be issued immediately before the BOOT command. The BOOT command uses the sense-switch setting (specified by *ss_number*) to boot the CPU. This setting is interpreted by the preboot program, which uses the value specified by *ss_number* to determine what kind of boot is desired and from what device.

For example, BOOT 14114 (the most commonly used value of *ss_number*) tells the preboot program to boot PRIMOS (using the default boot runfile pathname for PRIMOS) from the disk in drive 0 associated with the controller at address 26₈.

BOOT 10114, to use another example, may be used to bring up PRIMOS, MAKE.SAVE, or COPY_DISK.SAVE from disk 0 on the controller at address 26₈. However, when you are prompted for it, you must specify the correct runfile pathname (CMDNC0>MAKE.SAVE, for example). (For details, see the section Boot Option Words, in Appendix A.)

After the BOOT command boots PRIMOS, the supervisor terminal is automatically placed in ST mode. Unless the CPU halts, all messages displayed on the supervisor terminal after the BOOT command boots PRIMOS are displayed by the preboot program or by PRIMOS.

BOOTP is the recommended command for booting PRIMOS because it automatically verifies the CPU.

► **BOOTP** [*ss_number*]

The BOOTP command boots PRIMOS automatically.

BOOTP initiates essentially the same process that occurs when the system is powered on with the ON/INITIATE SHUTDOWN button. Using BOOTP is also similar to using a BOOT 14114 command.

The optional *ss_number*, which sets the sense-switch setting, specifies a boot option word for a nonstandard boot. That is, *ss_number* is interpreted by the preboot (CPU bootstrap) program to determine what kind of boot is desired and from what device. See Appendix A for further details on nonstandard boots and values for *ss_number*.

The BOOTP command initiates the following procedure:

1. Loads and verifies the CPU verification microcode
2. Executes the CPU verification microcode to verify the CPU
3. Loads and verifies the CPU Instruction Set microcode
4. Initializes certain CPU registers
5. Loads (and verifies) the Decode Net into the CPU
6. Loads and executes the preboot (CPBOOT) program, starting up PRIMOS
7. Places the supervisor terminal in ST mode

Steps 6 and 7 are equivalent to a BOOT 14114 command.

► **BOOTT** [*ss_number*]

The BOOTT command initiates a boot sequence that stops at the filename prompt.

BOOTT is similar to a BOOT 10114 command. That is, BOOTT assumes that the file to be booted is on the same device the boot is read from, but prompts for the filename of the file to boot with the prompt RUNFILE TREEName=. The BOOTT command performs the same loading and initialization procedure as the BOOTP command.

The optional *ss_number*, which sets the sense-switch setting, can be used to include other boot switch options. *ss_number* is interpreted by the preboot program to determine what kind of boot is desired and from what device. (For details, see the section Boot Option Words, in Appendix A.)

► BREAKOFF

The BREAKOFF command disables Terminal Break mode. For details on Terminal Break mode, see the BREAKON command below. BREAKOFF is the initial default. Because Terminal Break mode is stored in nonvolatile memory, the default becomes whatever you set it to with BREAKOFF or BREAKON.

The BREAKOFF command sets Terminal Break mode to off, which means that the Maintenance Processor will ignore breaks that occur on the Local 1 and Local 2 terminals. When such breaks occur, the Maintenance Processor automatically resets the break and continues with normal operations without prompting for a password.

► BREAKON

The BREAKON command enables Terminal Break mode.

Terminal Break mode is a security feature that helps prevent unauthorized users from accessing the Local 1 and Local 2 terminals. (Normally, the Local 1 terminal is the supervisor terminal.) This feature works in conjunction with the PASSWORD command.

If Terminal Break mode is enabled (set to on), the Maintenance Processor treats breaks detected on enabled Local 1 and 2 terminals the same way it treats enabled terminals that have just become active. In these cases, the user is prompted for a password. The password is whatever word has been set with the PASSWORD command. (As shipped from Prime, the password is a null line. However, the password may have been changed when the system was installed.)

Thus, if Terminal Break mode is on and you subsequently turn off power to the supervisor terminal while the system has power, whoever restores power to the supervisor terminal is prompted for a password. The user must enter the correct password to regain access to the terminal.

The user has three tries or 40 seconds (whichever comes first) to enter the correct password. If the correct password is not entered, the supervisor terminal locks up; to unlock it you must restart the system by pressing the ON/INITIATE SHUTDOWN button on the System Status Panel.

To find out if Terminal Break mode is on or off, use the STAT command and look for this status line in the `Terminal`s group of information:

```
Password Prompt on Terminal break option on
```

Terminal Break mode is stored in a nonvolatile portion of memory and is therefore retained even when the system power is turned off. To disable Terminal Break mode, use the BREAKOFF command. BREAKOFF is the initial default. Because Terminal Break mode is stored in nonvolatile memory, the default becomes whatever you set it to with BREAKOFF or BREAKON.

► COPY *start end destination*

The COPY command copies data from specified memory locations to other memory locations.

The block of main memory starting at address *start* and ending at address *end* is copied to the block starting at address *destination*. If the two blocks overlap in physical memory, the copy is not performed correctly.

For example, if *destination* falls between *start* and *end*, the data from *start* to *destination* is replicated starting at *destination*, continuing through *end*, and proceeding to the address specified by the result of $end - start + destination$. The original data stored between *destination* and *end* is lost.

The format of *start*, *end*, and *destination* is as follows:

[sense]/offset

Specifying *sense* for *start* sets the sense switches for the entire operation. (See Chapter 7 for further information on sense-switch settings.) Specifying *sense* for *end* and *destination* does not affect the copy operation. Instead, bits 5-16 of the sense-switch setting specified for *start* are used. However, bits 5-16 of the default sense-switch setting are changed to the specified value. This change can affect the operation of the next VCP command that you use.

► DATE

The DATE command displays the date and time as maintained by the Maintenance Processor's clock, which has battery backup.

The DATE output is in this format:

dd mon yy hh:mm:ss day

dd, *mon*, and *yy* are today's date, month, and year, respectively. *hh*, *mm*, and *ss* is the time in hours (24-hour format), minutes, and seconds. *day* is the current day. The following example illustrates the DATE format:

```
CP1> DATE
18 July 90 09:19:33 Wednesday
CP1>
```

When PRIMOS is running, it keeps track of the time and date separately from the Maintenance Processor clock. During a cold start or a warm start of PRIMOS, PRIMOS reads the date and time from the Maintenance Processor clock and uses the information to set its own date and time.

The two clocks can sometimes go out of synchronization, particularly if the SETIME command is used to change the date and time for either PRIMOS or the Maintenance Processor but not both. If the time and date as reported by both the PRIMOS and VCP DATE commands are not the same, first determine the correct time and date and then use the PRIMOS and VCP SETIME commands to update both clocks.

If the date and time are not valid because the battery has failed, the system time and date are initialized, and this message is displayed:

```
ERR924: MP clock not valid. Reset to: 01 Jan 01 01:01:00 Su.
```

The time and date are set to a known value so that the clock may be used by the Maintenance Processor software, even though the value is meaningless to a user. Reset the clocks as described above.

► DIRECTORY

The DIRECTORY command displays the contents of the floppy diskette in the diskette drive.

The listing of the directory contents includes a header identifying the CPU (for example, P5340), the manufacturing revision level, and the manufacturing part number for the diskette drive (for example, DSK7084-927). The contents listing consists of the following information.

<i>Label</i>	<i>Meaning</i>
FILENAME	Name of the file (maximum of 8 characters)
EXT	Filename extension, which designates the type of file: PMA (executable); UC (microcode); MSG (message); HST (history); DN (decode net); SV (sysverify microcode).
LENGTH	File length in decimal, given in 8-bit bytes.
REV#	Engineering revision level of the file.

The following example illustrates the output of the DIRECTORY command.

```
CP1> DIRECTORY
      CPU ASSY P5340 SYSTEM FLOPPY DISK
      MANUFACTURING REVISION LEVEL - Rev B
      MANUFACTURING PART NO. DSK7084-927
```

FILENAME	EXT	LENGTH	REV#
CPBOOT	PMA	17054	18
UCODE	UC	229376	20
ERROR	MSG	7916	3
HELP		2327	2
HISTORY	HST	131072	1
MPCODE		92366	2
CPU_ID		15	1
DNET	DN	1024	20
SYSV10	SV	229376	4
CONFIG	PMA	13048	1
CHKSYS	PMA	229376	2
CPUTEST	PMA	229346	3

CP1>

If a read error occurs during the listing, an error message is displayed. If you receive an error message when reading the diskette, the diskette may be corrupt, and therefore may not allow the system to boot subsequently. If the error persists, replace the diskette or call your PrimeService representative.

▶ **DISABLE** $\left\{ \begin{array}{l} :1 \\ :2 \\ :3 \end{array} \right\}$

The **DISABLE** command disables a specified terminal. The terminal to be disabled is the Local 1, the Local 2, or the remote terminal, depending on the specifier, or argument:

<i>Specifier</i>	<i>Terminal</i>
:1	Local 1
:2	Local 2
:3	Remote

The action of the **DISABLE** command depends on the status of the specified terminal when the command is issued:

- If the terminal is enabled when the command is issued, then the terminal is immediately disabled and the following message is displayed at all terminals that are presently enabled:

DPM902: Local port is being disabled.

- If the terminal is the privileged terminal (as set by the PRIVILEGE command or the REMOTE PRIVILEGED button), the terminal is not affected and the following message is displayed at all presently enabled terminals:

DPM904: Not allowed to disable privileged port.

When the system is powered on or reset with the VIRY command, the Local 1 terminal is enabled and privileged, and the Local 2 and Remote terminals are disabled. When a terminal is disabled, no communication between it and the Maintenance Processor is acted on. For further information on local and remote terminals, see Chapter 3.

► **DISPLAY** *address*

The DISPLAY command displays the contents of a virtual memory address. This command functions only when PRIMOS is running.

The format of *address* is as follows:

[*segno*]/*address*

segno is the segment number. If you do not specify *segno*, the default is the last segment that was accessed.

The VCP passes the specified address to PRIMOS via the sense switches, and PRIMOS returns the contents of the address in the LIGHTS register. The VCP then displays the contents of the LIGHTS register. (The LIGHTS register represents an internal communication path between the VCP and the CPU.) If the specified address does not reside in main memory, the returned contents are all zeros.

► **DISPLAYC** *address*

The DISPLAYC command continuously monitors and displays the contents of the specified address. This command works only when PRIMOS is running.

DISPLAYC is similar to the DISPLAY command, except that DISPLAYC continues to display the contents of the memory location until you press CONTROL-P. The address contents are displayed whenever they change.

► **DSW**

The DSW command displays the data in these DSW registers:

DSWSTAT	DSWRMA
DSWPAR	DSWPB
DSWPAR2	

The display does not include the characters DSW in the register names.

This command can be used whether or not the CPU is running.

► **DUMP**

The DUMP command displays the contents of a block of main memory or of a register. DUMP displays locations in segment 0 unless you specify a segment, in which case that segment becomes the default until you again change segments.

The DUMP command has two command formats, depending on whether you are accessing a register or a memory location. The DUMP command is typically used only to display the contents of registers after a halt.

Displaying a Register: You can use the DUMP command to display the contents (both high and low sides) of a register (such as DSWSTAT and DSWPARITY) after an abnormal halt of PRIMOS. To display the contents of a register, use this format:

DUMP *register*

register is a mnemonic keyword from Table 8-4 that designates which register in the current register set is displayed.

Displaying Memory Locations: To display a part of main memory, use the following command format:

DUMP *start end*

The block of main memory starting at location *start* and ending at location *end* is displayed. This form of the DUMP command is typically used only to display the contents of main memory during development of the operating system.

Table 8-4 lists the hexadecimal addresses and the mnemonics for the register files.

Table 8-4. Register File Mnemonics

<i>Hex Address</i>	<i>Register Mnemonic</i>	<i>Hex Address</i>	<i>Register Mnemonic</i>
9000/0000	GR0	D000/0000	TR0
9000/0001	GR1	D000/0001	TR1
9000/0002	GR2	D000/0002	TR2
9000/0003	GR3	D000/0003	TR3
9000/0004	GR4	D000/0004	TR4
9000/0005	GR5	D000/0005	TR5
9000/0006	GR6	D000/0006	TR6
9000/0007	GR7	D000/0007	TR7
9000/0008	FAR0	D000/0008	TR8
9000/0009	FLR0	D000/0009	TR9
9000/000A	FAR1	D000/000A	TR10
9000/000B	VSC	D000/000B	TR11
9000/000C	PB	D000/000C	REOIV
9000/000D	SB	D000/000D	RDSAVE
9000/000E	LB	D000/000E	CFF00
9000/000F	XB	D000/000F	RATMP
9000/0010	DTAR3	D000/0010	RMASAVE
9000/0011	DTAR2	D000/0011	PARREG0
9000/0012	DTAR1	D000/0012	DSWBCY
9000/0013	DTAR0	D000/0013	PARREG2
9000/0014	KEYS	D000/0014	DSWPAR2
9000/0015	OWNER	D000/0015	PBSAVE
9000/0016	FCODE	D000/0016	SYSREG1
9000/0017	FADDR	D000/0017	DSWPARITY
9000/0018	TIMER	D000/0018	PSWPB
9000/0019	CR31	D000/0019	PSWKEYS
9000/001A	CR32	D000/001A	PLA

Table 8-4. Register File Mnemonics (continued)

<i>Hex Address</i>	<i>Register Mnemonic</i>	<i>Hex Address</i>	<i>Register Mnemonic</i>
9000/001B	CR33	D000/001B	PLB
9000/001C	TPB	D000/001C	DSWRMA
9000/001D	TSB	D000/001D	DSWSTAT
9000/001E	TLB	D000/001E	DSWPB
9000/001F	XEQPB	D000/001F	RSVPTR
D000/00C0	DGR0	D000/00D0	MINUS1
D000/00C1	DGR1	D000/00D1	ONE32
D000/00C2	DGR2	D000/00D2	KMASK
D000/00C3	DGR3	D000/00D3	C3FF
D000/00C4	DGR4	D000/00D4	C8000
D000/00C5	DGR5	D000/00D5	C0D0D
D000/00C6	DGR6	D000/00D6	C9C00
D000/00C7	DGR7	D000/00D7	CB1E0
D000/00C8	DGR10	D000/00D8	C6666
D000/00C9	DGR11	D000/00D9	C5K
D000/00CA	DGR12	D000/00DA	DP6
D000/00CB	DGR13	D000/00DB	MPFLAG32
D000/00CC	DGR14	D000/00DC	RDSAVE
D000/00CD	DGR15	D000/00DD	DP3
D000/00CE	DGR16	D000/00DE	DP2
D000/00CF	DGR17	D000/00DF	DP1

► ENABLE $\left\{ \begin{array}{l} :1 \\ :2 \\ :3 \end{array} \right\}$ [-NOPASS]

The ENABLE command enables a specified terminal.

The terminal to be enabled is designated by the appropriate specifier:

<i>Specifier</i>	<i>Terminal</i>
:1	Local 1
:2	Local 2
:3	Remote

The action of the ENABLE command depends on the status of the specified terminal when the command is issued:

- If the terminal is already enabled when the command is issued, the terminal is not affected and the following message is displayed on all enabled terminals:

DPM900: Port is already enabled.

- If the terminal is active but disabled when the command is issued, the terminal is immediately enabled and one of the following message is displayed on all enabled terminals:

DPM901: Local port is being enabled.
DPM901: Remote port is being enabled.

- If the terminal is not active and not enabled, the terminal is enabled, but the DPM901 message is preceded by the following message that is displayed on all enabled terminals:

DPM907: Port is not active.

The user is prompted for the password when the terminal does become active, unless you used the -NOPASS option.

Local 1 and Local 2 terminals are always active. The Remote terminal is active only when the modem connection has been successfully made.

Using the -NOPASS Option: If the terminal is already active when the ENABLE command is issued and you use the -NOPASS option, the terminal is enabled but the user is not asked for the password. The terminal immediately echoes what is being displayed at the privileged terminal.

Omitting the -NOPASS Option: If you do not use the -NOPASS option with the ENABLE command, the user is asked for a password with the following prompt:

DPM203: Please enter password:

The password is whatever word was set at the Local 1 terminal by using the PASSWORD command. As shipped from Prime, the default password is a null line (that is, press RETURN without typing anything), but the password may have been changed when the system was installed.

The user is allotted 40 seconds or three tries at entering the correct password, whichever comes first. If the user enters an incorrect password, the following message is displayed:

ERR205: Incorrect password entered.

The system prompts again for a password if the user has not used up the three attempts or 40-second allotted time.

If the user takes over 40 seconds to enter the password, the Maintenance Processor ignores your enable request and displays the following message:

DPM908: No response for password from requested terminal.

During the time that the terminal user is being prompted for a password, the privileged terminal cannot accept commands. Instead, the privileged terminal is considered to be nonprivileged for that time. The reason is that the Maintenance Processor is using its main input queue for the password information and that information cannot be corrupted with input from other terminals.

For more information about enabling and privileging the Remote terminal, see Chapters 2 and 3 and Appendix D.

Note You should enable a terminal only when requested by a user on that terminal. If you enable the Local 2 or remote terminals without using the -NOPASS option and no one is at that terminal to enter a password, your terminal will not accept commands for 40 seconds. After the 40-second allotted time period has elapsed, your terminal returns to its previous privileged state and displays the DPM908 message.

► **FETCH**

The FETCH command fetches data according to the current sense-switch and data-switch settings.

The sense-switch and data-switch settings were previously set using the SS and SD commands. The fetched data is displayed in the current Data and Address modes. The VCP performs the CPU fetch function and then displays the sense-switch and data-switch values, followed by the results of the fetch operation, each as a 16-bit halfword.

FETCH is typically used only as part of system test and maintenance procedures or during development of the operating system.

► **FILL** *start end data*

The FILL command initializes a block of memory with specified data. The contents of memory from location *start* to location *end* are filled with the value of the number specified by *data*. Both *start* and *end* are of the following format:

[sense]/offset

If you specify *sense* on the command line, whether in *start* or *end*, bits 5-16 of the default sense-switch setting are changed for subsequent commands.

If you specify *sense* for *end*, *sense* is not used to determine the ending address. (The fill operation does not cross a 128KB boundary.) The sense-switch setting of the ending address will be the same as the sense-switch setting of the starting address. If you do not specify *sense* for *start*, the default sense-switch setting is used.

► **HALT**

The HALT command, which stops the CPU, is identical to the STOP command. For details, see the STOP command.

► **HELP**

The HELP command displays a list of VCP commands (and their syntax) available on the Maintenance Processor.

After every 20 lines of output, the display pauses to allow you to read the text and prints a `More?` prompt. At this prompt, either press RETURN (or type any other character except N) to continue displaying the rest of the list, or press N to abort the listing and return to CP mode.

If a help file is not found, you receive this message:

DPM206: No Help available.

► HISTORY

The HISTORY command invokes the History File Editor and presents the Editor prompt, HST>.

Your system contains a History File, which is used by the Maintenance Processor to record some of its most important messages. PRIMOS messages are not stored. The History File is located on the diskette.

When the Maintenance Processor detects a system error, it displays a message about that event and then logs the same message in the History File. (The only difference is that History File entries are limited to 235 characters. A message longer than that is displayed in full on the supervisor terminal, but is truncated after the 235th character when entered on the History File.)

The messages that are logged include

- Most error messages (ERR prefix)
- Many warning messages (WRN prefix)
- Some informational messages (such as DPM100)

Each message includes a date stamp.

If the Maintenance Processor cannot write to the History File for any reason, it displays this error message:

```
Error writing history file.
```

You should have a backup diskette to replace a bad diskette.

If you use the W subcommand and the Maintenance Processor detects a write error, it displays the error message below and returns you to CP mode:

```
Write History Error.
```

The probable cause of the write error is that the diskette is write-protected.

Accessing the History File: The History File Editor allows a user to review the contents of the History File and add comments to it. Table 8-5 lists the subcommands that you can enter at the HST> prompt of the History File Editor. When you issue the HISTORY command, the History File Editor displays its HST> prompt.

If your system is having hardware problems, your PrimeService representative can review the History File to try to determine the cause of the problems.

Table 8-5. HISTORY Subcommands

<i>Subcommand</i>	<i>Meaning</i>
^ (shift-6)	Displays the previous entry.
N	Displays the next entry.
E	Goes to the last (most recent) entry and displays it.
N + - n	Display the entry + or - n entries from the current entry.
P + - n	Display the next (+) or previous (-) n entries from the current entry. P by itself displays the current entry.
SD dd mm yy + - n	Search for and display the next (+) or previous (-) n entries with matching dates in the format day (dd), month (mm), and year (yy). May use @ as a wildcard for the dates.
ST hh mm ss + - n	Search for and display the next (+) or previous (-) n entries with matching times in the format hours (hh), minutes (mm), seconds (ss). May use @ as a wildcard for the times.
SE error + - n	Search for and display the next (+) or previous (-) n matching error type (ERRxxx).
W comment	Writes a comment into the comment area at the end of the current entry. The comment can have a maximum of 40 characters. The end of the comment is signaled by either a dollar sign (\$) followed by a carriage return, or by the 81st character.
Q	Exits the History File Editor and returns to CP mode.

The History File can store 512 256-byte message entries. Entries are stored in a sequential, circular order, so that when the file becomes full, the next message overwrites the oldest entry.

Each error message is stored in a 256-byte sector of the History File, with the next available sector being reserved as a comment area into which a user can enter a comment with the W subcommand of the History File Editor. (The first 21 bytes of the message sector are used for the date stamp and error type, and the rest of the 235 bytes are used for the message's text.) The comment area is intended to allow some form of explanation or note about the error message.

The History File Editor reads entries only in sequential order, in much the same manner as the PRIMOS line editor (ED) prints a line in a text file. That is, when you read an entry (with the P or N subcommand, for example), the file pointer moves to point to that entry. If you then wanted to read an entry that was not the immediate previous or next entry, you would have to use either the P or the N subcommand to move the pointer to that message. When you first invoke the History File Editor, its file pointer is set to the first (that is, oldest) message logged in the file.

For example, you would use the following procedure to read the last (that is, newest) five messages logged on the History File:

1. Use the HISTORY command to invoke the History File Editor. The HST> prompt is displayed and the file pointer is set to the first (oldest) message on the disk.
2. Use the E subcommand to read the last (most recent) entry and move the file pointer to that entry.
3. Use the N -5 subcommand to move the file pointer to the fifth message from the end.
4. Either use the P 5 subcommand to print the next five messages at once, or use individual P subcommands (without arguments) to step through the messages.

Note Keep in mind this access method when you enter a comment in the comment area of a logged message. You must first read the error entry so that the file pointer is pointing to the correct comment area, and then use the W subcommand to enter the comment.

► LDNET [*filename*]

The LDNET command loads a Decode Net file.

The LDNET command searches the load device for a Decode Net file (with an extension of DN in a DIRECTORY command listing) and loads the file into the Decode Net RAM. If you do not specify *filename*, the first file with an extension of DN found on the load device is used. If the load is successful, this message is displayed:

```
DPM008: Microcode file filename successfully loaded.
```

If the file is missing, this messages is displayed:

```
ERR140: Unable to open file filename.
```

If you receive message ERR140, contact your PrimeService representative because the system cannot boot without a Decode Net file.

► LIGHTS

The LIGHTS command displays the current value of the LIGHTS register. The LIGHTS register is an internal communication path between the VCP and the CPU. The LIGHTS command, which executes only when PRIMOS is running, is typically used only during system test and maintenance, or during development of the operating system.

► LIGHTSC

The LIGHTSC command continuously monitors the contents of the LIGHTS register and displays the current value whenever it differs from the last value displayed.

Press CONTROL-P to halt the continuous display and return to CP mode. The LIGHTSC command executes only when PRIMOS is running.

► LISTREV

The LISTREV command lists the system serial number, CPU type, and the required revision level for each board in the CPU.

The LISTREV display is in this format:

```
Code inserted is for processor: Ptype
Part number: xxxx-xxx CPU - Rev y
Part number: xxxx-xxx MEM - Rev y

Boot Prom Rev zzzz
```

serial_number is the serial number of the machine, *type* is the processor mnemonic, *xxxx-xxx* is the part number, and *y* is the revision level.

► LOADM filename

The LOADM command loads a microcode file into the CPU.

During the loading procedure, a Loading . . . message displays, the LOADM command asserts a system-clear line to the CPU, loads the microcode file (named *filename*) from the load device to the CPU, and returns to CP mode. The system-clear line remains set throughout the LOADM command and is deasserted at the end to allow microcode execution to proceed. If the microcode file is loaded successfully, the Maintenance Processor does an implicit SYSCLR command and displays these messages:

```
DPM008: Microcode file filename successfully loaded.
DPM006: Central Processor system initialization completed.
18 July 1990 16:34:44 Wednesday
```

If LOADM cannot load the file, the Maintenance Processor displays the ERR140 error message. To be sure the file loaded correctly, use the VERIFYM command.

► LOADTM filename [ss_number]

The LOADTM command loads a PMA file (named *filename*) from the load device into the main memory of the CPU.

The steps performed by the LOADTM command are the same as those for the RUNTM command, except that no RUN command is issued by the Maintenance Processor. See the RUNTM command for further information.

► **MO ABS**

The MO ABS command places the VCP in Absolute Addressing mode.

When the Maintenance Processor is in Absolute Addressing mode, all address specifications to VCP commands that reference main memory are interpreted as absolute (physical) memory addresses.

The MO ABS command sets bits 1, 2, and 4 of the default sense-switch setting as follows:

<i>Bit</i>	<i>Setting</i>
1	Off
2	Off
4	On

To return to the default Mapped Addressing mode, use the MO MAP command.

► **MO BRIEF**

The MO BRIEF command places the Maintenance Processor in Brief Message mode.

When the Maintenance Processor is in Brief Message mode, some error messages are not displayed. Maintenance Processor error messages, which are documented in Appendix C, begin with the ERR prefix. Maintenance Processor informational messages (DPM prefix) and warning messages (WRN prefix) are always displayed, regardless of whether Brief or Full Message mode is in effect.

Brief Message mode is the default mode when the system power is turned on. To change to Full Message mode, use the MO FULL command. Full Message mode is generally used only by your PrimeService representative or someone debugging a system.

► **MO FULL**

The MO FULL command places the Maintenance Processor in Full Message mode.

During Full Message mode, all Maintenance Processor error messages (ERR prefix) are displayed, unlike Brief Message mode in which only some error messages are displayed. Typically, Full Message mode is used only by your PrimeService representative. To return to the default Brief Message mode, use the MO BRIEF command.

► **MO MAP**

The MO MAP command places the VCP in Mapped Addressing mode.

Mapped Addressing mode is the default mode when the system power comes on. During Mapped Addressing mode, all address specifications to VCP commands that reference main memory are interpreted as mapped (or virtual) addresses in this general format:

segno/wordno

The MO MAP command sets bits 1, 2, and 4 of the default sense-switch setting as follows:

<i>Bit</i>	<i>Setting</i>
1	Off
2	Off
4	Off

To change to Absolute Addressing mode, use the MO ABS command.

► **MO PDA [-OFF]**

The MO PDA command places the VCP in PDA (Processor Diagnostic Aid) mode. This mode allows the Local 2 port (the spare port) to be a communication link between the PDA software and the VCP.

The MO PDA command does not work unless your system has a PDA installed. Normally, systems are not shipped with a PDA. To diagnose a problem, however, a PrimeService representative may temporarily install a PDA on your system and use this command.

During PDA mode, the VCP communicates with the CPU's PDA. All characters sent by the PDA are displayed on all enabled terminals, but all characters sent by the CPU are ignored. To exit PDA mode and return to CP mode, use either the MO PDA -OFF command or the ENABLE :2 command.

► **MO RFABS**

The MO RFABS command places the VCP in Absolute-register-set Addressing mode.

During Absolute-register-set Addressing mode, all address specifications to VCP commands that reference main memory are interpreted as references to absolute registers. The *sense* portion of all such references is ignored, except that it changes bits 5-16 of the default sense-switch setting. Bits 9-16 of the *offset* portion determine the register number (bits 12-16) and the register file (bits 9-11). Bits 1-8 of *offset* are ignored.

The MO RFABS command sets bits 1, 2, and 4 of the default sense-switch setting as follows:

<i>Bit</i>	<i>Setting</i>
1	On
2	On
4	On

Because bit 4 is turned on, MO RFABS also does an implicit MO RFH. Use the MO MAP command to return to the default Mapped Addressing mode.

► MO RFCRS

The MO RFCRS command places the VCP in Current-register-set Addressing mode.

During Current-register-set Addressing mode, all address specifications to VCP commands that reference main memory are interpreted as references to registers in the current register set.

The *sense* portion of all such references is ignored, except that it changes bits 5-16 of the default sense-switch setting. Bits 12-16 of the *offset* portion determine the register number in the current register set. Bits 1-11 of *offset* are ignored.

The MO RFCRS command sets bits 1, 2, and 4 of the default sense-switch setting as follows:

<i>Bit</i>	<i>Setting</i>
1	On
2	Off
4	On

Because bit 4 is turned on, MO RFCRS also does an implicit MO RFH. To return to the default Mapped Addressing mode, use the MO MAP command. To reference registers in register sets other than the current register set, use the MO RFABS command.

► MO RFH

The MO RFH command specifies that the high-order 16-bit halfword of an accessed register is to be modified.

When you access the register file using the *register* form of the ACCESS command, entering a new value for a register modifies the high-order halfword

of the register. To modify the low-order halfword, issue the MO RFL command. MO RFL is the default mode when the system powers on.

Besides affecting how the ACCESS command works when you access registers by name, the MO RFH command affects how registers are displayed and modified when you specify them by number. MO RFH can even have the same effect as the MO ABS command, because MO RFH sets bits 1, 2, and 4 of the default sense-switch setting as follows:

<i>Bit</i>	<i>Setting</i>
1	Unchanged
2	Unchanged
4	On

If bit 1 is already set (=1) by using a MO RFCRS or MO RFABS command, MO RFH causes the high-order halfword of registers to be accessed when addresses are specified to VCP commands. If bit 1 is reset (=0), MO RFH has the same effect as MO ABS, and registers are not necessarily accessed when addresses are specified to VCP commands; instead, absolute memory is referenced.

► MO RFL

The MO RFL command specifies that the low-order 16-bit halfword of an accessed register is to be modified.

When you access the register file using the *register* form of the ACCESS command, entering a new value for a register modifies the low-order halfword of the register. To modify the high-order halfword, use the MO RFH command. MO RFL is the default mode when the system powers on.

Besides affecting how the ACCESS command behaves when you access registers by name, MO RFL affects how registers are displayed and modified when you specify them by number. The MO RFL command can even have the same effect as the MO MAP command, because MO RFL sets bits 1, 2, and 4 of the default sense-switch setting, as follows:

<i>Bit</i>	<i>Setting</i>
1	Unchanged
2	Unchanged
4	Off

If bit 1 is already set (=1) by using the MO RFCRS or MO RFABS command, MO RFL causes the low-order halfword of registers to be accessed when addresses are specified to VCP commands. If bit 1 is reset (=0), MO RFL has the same effect as MO MAP, and registers are not necessarily accessed when

addresses are specified to VCP commands; instead, mapped memory is referenced.

► **MO ST**

The **MO ST** command places the supervisor terminal in Supervisor Terminal (ST) mode.

While you are in ST mode, all user input and displayed output at the supervisor terminal is controlled by PRIMOS. When PRIMOS is running, the supervisor terminal is logged in as SYSTEM (User 1), and has extended capabilities. To change from ST mode to CP mode, press the ESC key twice.

The **MO ST** command also performs an implicit **SYSOUT INT** command, thus placing the supervisor terminal in Interleave mode. The implicit **SYSOUT INT**, however, does not affect the current setting of the output mode for USER and CP modes. Thus, if that setting is Buffer mode (**SYSOUT BUFF**), it will be used again when you enter USER or CP mode.

The Maintenance Processor does an implicit **MO ST** when executing these commands:

BOOT	PARTIAL_TAPEDUMP	VPSD
BOOTP	RUN	WARMSTART
BOOTT	TAPEDUMP	

If PRIMOS halts the CPU while the supervisor terminal is in ST mode, the supervisor terminal is automatically placed in CP mode after a message concerning the CPU halt is displayed. For more information on ST mode, see Chapter 3.

► **MO USER**

The **MO USER** command places the supervisor terminal in User Terminal (USER) mode.

During USER mode, all user input and output that is normally displayed at the supervisor terminal is routed through the user port. If a terminal is connected to the user port, USER mode allows you to use the supervisor terminal as a normal user terminal. While in USER mode, you have no special privileges other than those PRIMOS grants to you as a normal user based on your login name.

When you first enter USER mode, you do not receive the PRIMOS OK, system prompt. Instead, PRIMOS waits for you to enter a logged-out command, such as LOGIN.

To return to CP mode from USER mode, press the ESC key twice. Note that if the system key switch is locked, any attempt to press the ESC key to exit USER mode is ignored. This restriction is useful when you have to leave the supervisor terminal unattended. By switching from ST mode to USER mode, locking the

switch, and removing the key, you prevent anyone else from using the terminal in ST mode.

While in USER mode, the output mode for the supervisor terminal is the mode set by the last SYSOUT command. (The default at power-on is SYSOUT BUFF for Buffer mode.) In Buffer mode, system messages for User 1 are stored in a buffer and displayed when you return to ST mode. To respond to those messages, you must enter ST mode. You can change the current setting of the output mode with the SYSOUT command. If PRIMOS halts while you are in USER mode, the supervisor terminal is automatically placed in CP mode.

USER mode is not available at the remote terminal when it is privileged. If MO USER is issued in this case, the Maintenance Processor ignores the command and displays this message:

```
DPM207: Can't from Remote terminal
```

For details on operating in USER mode, see Chapter 3.

Note After you enter USER mode, the supervisor terminal may not respond to any typed characters. This condition can occur if PRIMOS is not fully started up or if the user port is not connected to the system as a normal, operable, user terminal line. To return to CP mode in this situation, press the ESC key twice.

► PARTIAL_TAPEDUMP *drive_number*

The PARTIAL_TAPEDUMP command performs a partial memory dump to tape. *drive_number* is a number from 0 through 3 (inclusive) and is the tape drive on which the tape is mounted. For example, use this command to perform a partial tape dump on tape drive 0 (MT0):

```
CP1> PARTIAL_TAPEDUMP 0
```

The CPU immediately halts if you specify the wrong tape drive or if the tape drive is off line, not ready, or not write-enabled. Correct any problems related to the tape drive and reissue the command.

If you are going to perform a tape dump after a halt of PRIMOS, do not use the SYSCLR command before using the PARTIAL_TAPEDUMP command. The PARTIAL_TAPEDUMP command performs an implicit SYSCLR and RUN 777 followed by a SYSOUT INT. The sense-switch setting is changed to reflect the requested tape drive. The CPU then writes the necessary information to the tape, rewinds it, and halts. See Chapter 6 for further information on the PARTIAL_TAPEDUMP command and on setting up and performing partial tape dumps.

► **PASSWORD**

The **PASSWORD** command sets a password on terminal ports.

Passwords help prevent unauthorized access to the Local 1, Local 2, and Remote terminals. If the Terminal Break mode is enabled with the **BREAKON** command, passwords also provide protection to a terminal when a break occurs.

You can issue the **PASSWORD** command only from the Local 1 terminal. If you issue **PASSWORD** from another terminal, the command is ignored with this message:

DPM205: Can only do from the Local 1 terminal.

When the Local 2 or the Remote terminal is enabled and a connection is made to it, the user is prompted for the password, unless the terminal was enabled by using the **-NOPASS** option of the **ENABLE** command. Likewise, if the Terminal Break mode is on, a user at any one of the three terminals is prompted for the password if a terminal break occurs.

While the user is entering the password, the privileged terminal does not accept other input, but is considered to be nonprivileged for that time. The reason is that the Maintenance Processor is using its main input buffer for the password information and that information cannot be corrupted with input from other terminals. The password is stored in a nonvolatile portion of memory and is therefore retained even when the system power is turned off.

Password Conventions: These rules apply when you are set a password:

- Passwords have a maximum of eight characters.
- Passwords must consist only of alphanumeric characters and the first character must be a letter. Lowercase characters are mapped into uppercase.
- Entering only a carriage return sets a null password.
- Press **CONTROL-P** to abort the **PASSWORD** command while setting the password. You are returned to **CP** mode and the existing password is not changed.
- The default password when the system is shipped from Prime is a null password, but it may have been changed to a non-null password when the system was installed.

Setting Passwords: Use this procedure to set a password:

1. After you issue the **PASSWORD** command, the Maintenance Processor prompts for the password that is currently in effect:

DPM202: Please enter old password:

2. Enter the old password. If you enter an incorrect password, the procedure is aborted, you are returned to CP mode, and this message is displayed:

ERR205: Incorrect password entered.

3. If you entered the correct current password at step 2, you enter the new password at this prompt:

DPM203: Please enter password:

4. You are then asked to verify the new password. Reenter the new password at this prompt:

DPM204: Verify new password:

5. If you reentered the correct new password at step 4, the new password replaces the old one. If you enter a password at step 4 that is different from the one at step 3, the new password is rejected, the ERR205 message is displayed, and the old password remains in effect.

► **PRIVILEGE** $\left\{ \begin{array}{l} :1 \\ :2 \\ :3 \end{array} \right\}$

The PRIVILEGE command makes a terminal function as the supervisor terminal.

The terminal that is to be the supervisor terminal must be connected to the specified port and the port must be enabled. Commands typed at the privileged terminal are acted upon by the Maintenance Processor.

The terminals are specified as follows:

<i>Specifier</i>	<i>Terminal</i>
:1	Local 1
:2	Local 2
:3	Remote

The action of the PRIVILEGE command depends on the status of the specified terminal:

- If the terminal is already privileged, the terminal is not affected and this message is displayed at all enabled terminals:

DPM906: Terminal is already privileged.

- If the terminal is not privileged, the Maintenance Processor checks to see if it is enabled. The terminal must be enabled (either by the ENABLE command, or by the REMOTE ENABLE button for the Remote terminal) before it can be privileged. If the terminal is not enabled, the terminal will not be privileged and this message is displayed on all enabled terminals:

DPM907: Terminal is not active.

- If the terminal is enabled, the Maintenance Processor displays the following message at all enabled terminals and then changes privilege from the current privileged terminal to the specified terminal:

DPM905: Terminal is being privileged.

After a terminal is privileged, VCP commands can be executed from it. The terminal that was previously privileged reverts to being an enabled (but nonprivileged) terminal that can only monitor commands entered at the privileged terminal.

Only one terminal can be privileged at any time and only that terminal can issue commands of any kind. You can quickly tell which terminal is privileged by the prompt that is displayed at all enabled terminals:

<i>Privileged Terminal</i>	<i>CP Mode Prompt</i>
Local 1	CP1>
Local 2	CP2>
Remote	CP*>

Note If you mistakenly privilege the Local 2 or the Remote terminal, you can recover by using the REMOTE ENABLE and REMOTE PRIVILEGED buttons as follows.

In the case of mistakenly privileging the Local 2 terminal

1. Use the buttons to enable and privilege the Remote terminal.
2. Use the REMOTE PRIVILEGED button to remove privilege from the Remote terminal, automatically returning privilege to the Local 1 terminal.

In the case of mistakenly privileging the Remote terminal, simply use the REMOTE PRIVILEGED button to remove privilege from the Remote terminal and return privilege to the Local 1 terminal. Both of these procedures result in privileging the enabled Local 1 terminal.

For more information on privileging remote terminals, see Chapter 2 and Appendix D.

► RCP [*address*]

The RCP command is identical to the RUN command, except that, with RCP, the supervisor terminal remains in CP mode instead of entering ST mode. For details, see the RUN command.

► RUN [*address*]

The RUN command starts the CPU running and enters ST mode.

address can be a virtual address if the CPU is in segmented mode. The RUN command puts *address* into the PB register and starts the CPU. If you do not specify *address*, the current value of PB is used and the CPU is started after the last instruction it executed. (See the *System Architecture Reference Guide* for information on the PB register.)

Whether or not you specify *address*, the settings specified by the most recent SS and SD commands are restored before execution begins.

Use this format for *address*:

[*sense*]/*offset*

If you do not specify *sense*, the default sense-switch setting is used. If you specify *sense*, the command also changes bits 5-16 of the default sense-switch setting.

The Maintenance Processor automatically enters ST mode after a RUN command and implicitly issues a SYSOUT INT command.

► RUND *filename*

The RUND command loads and executes a diagnostic microcode file.

RUND loads the specified diagnostic microcode file (*filename*) into the Control Store and releases the system-clear line, allowing the microdiagnostic to execute.

RUND Operation: When you use RUND, its command sequence works as follows:

1. Issues a SYSCLR to the CPU.
2. Loads the microcode file from the load device to the CPU and verifies the file. (Steps 1 and 2 are similar to a LOADM command.)
3. Releases the system-clear line, thereby allowing the microdiagnostics to begin execution, and displays this message:

DPM009: Diagnostic *filename* beginning execution.

4. If Full Message mode is in effect, displays this message after each successful microdiagnostic test:

DPM010: Test #n successfully completed.

5. Displays this message when the diagnostic overlay has successfully completed:

DPM012: Diagnostic overlay successfully completed.

If it detects a failure, displays this message followed by one of the messages shown in brackets indicating what optimal replacement unit (OR_UNIT) probably failed:

```
ERR100: Failure detected in test filename.
OR_UNIT: x =>
    [ECS is suspect]
    [IS is suspect]
    [MC is suspect]
    [MC and IS are equally suspect]
    [MC and ECS are equally suspect]
    [MC most likely suspect, then ECS, then IS]
    [IS most likely suspect, then ECS]
    [ECS most likely suspect, then IS]
    [TEST_TNUM . . . any chip could be suspect]
    [ECS most likely suspect, then MC]
    [IS most likely suspect, then ECS, then MC]
    [Undefined OR unit]
```

x is a number returned by the diagnostic. The messages indicate that the CPU board is the field replaceable unit (FRU).

6. Returns to CP mode.

► **RUNDC *filename***

The RUNDC command loads a diagnostic microcode file (specified by *filename*) and executes it continuously without returning to CP mode.

The RUNDC command follows the same procedure as the RUND command until step 6. At each completion of the execution of a diagnostic overlay with the RUNDC command, the Maintenance Processor restarts the execution of that diagnostic (regardless of whether it passed or failed on its previous execution) by asserting the system-clear line to the CPU and then releasing it to allow the microdiagnostic to restart execution from the beginning. Press CONTROL-P to abort the execution sequence and return to CP mode.

► **RUNTM *filename* [*ss_number*]**

The RUNTM command loads and executes a PMA program file.

The RUNTM command reads the specified PMA file from the load device and loads it into the CPU's main memory. When you use RUNTM, its command sequence works as follows:

1. Loads the file named *filename* from the load device into main memory.

If the load is successful, continues with step 3. If, however, it detects a failure in loading the PMA file, displays one of these error messages and returns to CP mode:

```
ERR112: File filename not found.  
ERR121: File filename is not a valid PMA file.  
ERR200: Read error on file filename
```

2. Loads the sense switches with *ss_number*. If the Data mode specifier is not octal, warning message WRN004 is displayed before the sense switch registers are set to *ss_number*. *ss_number* is interpreted in octal, the default Data mode.
3. Issues a RUN command.

► **SD *data***

The SD command sets the data-switch register to a specified value.

The data switches are set to the value of the number *data*. The data switches are a path of internal communication between the VCP and the CPU. These switches are referenced when VCP commands (such as STORE) are executed and when PRIMOS or certain system test and maintenance routines are running.

► **SETIME *-mmdyy -hhmmw***

The SETIME command sets the date and time on the Maintenance Processor's clock.

The Maintenance Processor clock, which provides the date and time to set the PRIMOS software clock at both warm and cold starts and which has battery backup, keeps time even when the system power is turned off. To display the clock's time, use the DATE command. Table 8-6 shows the meanings and valid values of the SETIME arguments.

Table 8-6. SETIME Arguments

<i>Field</i>	<i>Meaning</i>	<i>Valid Range</i>
<i>mm</i>	Month of the year	01 - 12 (01 = January, 12 = December)
<i>dd</i>	Day of the month	01 - 31
<i>yy</i>	Year 19yy	00 - 99
<i>hh</i>	Hour (24-hour format)	00 - 23
<i>mm</i>	Minute of the hour	00 - 59
<i>w</i>	Day of the week	1 - 7 (1 = Sunday 5 = Thursday 2 = Monday 6 = Friday 3 = Tuesday 7 = Saturday 4 = Wednesday)

When you use the SETIME command, the date and time specifications must be preceded by a hyphen. In this example, the command sets the calendar date to July 18, 1990, the time to 3:46 p.m., and the day of the week to Wednesday:

```
CP1> SETIME -071890 -15462
18 July 90 15:46:00 Wednesday
CP1>
```

Note that the day of the week (*w*) is not checked against the specified date (*mmdyy*) to make sure it is a valid date, but the day is maintained as time passes and is used by the Maintenance Processor to report the day of the week with the DATE command.

Daylight Saving Time: The Maintenance Processor clock does not make any changes with respect to daylight saving time as previous processor clocks did. This is because of the varying implementations of daylight saving time in various parts of the world. Therefore, you must manually make adjustments to both the Maintenance Processor clock and to PRIMOS when the time changes.

Currently, in the United States, you should move the time ahead from 1:59:59 a.m. to 3:00:00 a.m. on the first Sunday in April and move the time back to 1:00:00 a.m. at 1:59:59 a.m. on the last Sunday in October.

Clock Initialization: If the Maintenance Processor clock's date and time are invalid, the clock is initialized to 01 Jan 01 01:01:01 Sunday and an error message is displayed:

```
ERR924: MP clock not valid. Reset to 01 Jan 01 01:01:00 Su.
```

The time and date are set to a known value so that the clock may be used by the Maintenance Processor software, even though the value is meaningless to a user. When the clock is initialized, reset the clock as described above.

Two instances of when invalid dates and times occur are when the clock battery fails and when you use the SETIME command with incorrect values. (For example, you specified a date or time with the required number of digits, but some of the digits are out of range.)

Differences Between the PRIMOS and VCP Times: It is possible for the PRIMOS clock and the Maintenance Processor clock to go out of synchronization, particularly if the SETIME command is used to change the date and time for either PRIMOS or the Maintenance Processor, but not both. If the time and date as reported by both the PRIMOS and VCP DATE commands do not agree, determine the correct time and date and use the PRIMOS and VCP SETIME commands to update both clocks.

Although the VCP SETIME command closely resembles the PRIMOS SETIME command, there is one subtle differences:

- The VCP SETIME command requires the day of the week (*w*) to be specified, whereas PRIMOS calculates it.

► **SS *number***

The SS command sets the sense-switch register to a specified value.

The sense switches are set to the value of *number*. The sense switches are a path of internal communication between the VCP and the CPU. These switches are referenced when VCP commands (such as FETCH) are executed and also when PRIMOS or certain system test and maintenance routines are running.

► **STAT [-CLEAR]**

The STAT command displays the current state of the Maintenance Processor and the system. The STAT command also allows you to set the baud rates of the various terminals.

Information from the STAT command is displayed in five sections as shown in the example following the description of terms displayed in the STAT output.

<i>Section</i>	<i>Information Listed</i>
Power Fails	Number and types of power fails. <i>Recoverable</i> power fails are power losses that are shorter than the ride-through time of the power supplies. No action is required on a recoverable power fail.

<i>Section</i>	<i>Information Listed</i>
Power fails (continued)	<p><i>Nonrecoverable</i> power fails are power losses that are longer than the ride-through time of the power supplies but shorter than the ride-through time of the UPS. A warm start is generally required after a nonrecoverable power fail.</p> <p><i>Faults</i> are not power fails but are actually power supply failures.</p> <p><i>UPS Activity</i> is a count of the number of times the UPS has been activated.</p>
Terminals	<p>State of the three terminals (<i>Local 1</i>, <i>Local 2</i>, and <i>Remote</i>) that can communicate with the Maintenance Processor.</p> <p>The privileged terminal (marked as <i>Active</i> and <i>Enabled</i>) is designated as <i>Primary</i> and is usually the Local 1 terminal.</p> <p>The other two terminals are designated as <i>Secondary</i> and marked as <i>Active</i> or <i>Inactive</i>, and <i>Enabled</i> or <i>Disabled</i>.</p> <p>The Terminal Break mode (see the BREAKON command) is indicated as <i>on</i> or <i>off</i> on the Password Prompt on Terminal break option line.</p>
Configuration	<p>Status of some configuration information of the Maintenance Processor.</p> <p><i>Data Mode</i> and <i>Address Mode</i> list the current settings of the Data and Address modes.</p> <p>State of the CPU. Either <i>Yes</i> or <i>No</i> is listed for <i>Microcode Loaded</i>, <i>Microcode Running</i>, and <i>System Running</i>.</p>
System Serial #	The serial number of the system.
Autoboot	Answer Y to the Toggle it query to prevent an autoboot of PRIMOS. The system will boot to the CP1> prompt. N is the default, meaning the system will autoboot.
Boot device	The boot device switch octal value is shown. You can modify it by answering Y to the query. You will be prompted for the new value and it is displayed. N is the default.
Baud rate	Baud rates of the Local 1 terminal when in ST, USER, and PDA modes and of the modem for the remote terminal. You are asked if you wish to change these rates with the query Reset baud rates? (Y/N) ? If you reset the baud rates, they become effective after you use the VIRY command or after you power down and power up the system.

The STAT output stops after a screenful of information and a More? prompt is displayed. Use CONTROL-P to stop the output, or type any other character to continue.

The following example illustrates the display of the STAT command:

```
CP1> STAT
Maintenance Processor Status Information

Power Fails
Recoverable: 001 Nonrecoverable: 000 Faults: 000
UPS Activity: 000

Terminals
Local 1: Active Enabled Primary
Local 2: Active Disabled Secondary
Remote : Inactive Disabled Secondary
Password Prompt on Terminal break option off

Data Mode: Octal
Address Mode: Octal
Microcode Loaded Yes
Microcode Running Yes
System Running Yes
More?Y

System Serial #FN027388

Autoboot: YES, Toggle it - Y/[N] N

Boot device = 14114
Modify boot device - Y/[N] N

System console baud rate = 9600
User console baud rate = 9600
PDA console baud rate = 19200
Modem baud rate = 9600

Reset baud rates (Y/[N])? Y
A=300 B=600 C=1200 D=2400 E=9600 F=19200
Enter System console baud rate choice Return

Rate not modified
System console baud rate = 9600
CP1>
```

The -CLEAR option resets all the power-fail counters to 0. For example, if the display showed Recoverable Power Fails to be 039, the STAT -CLEAR command would reset that counter to 000.

► **STOP**

The STOP command halts the CPU.

You normally use the STOP command to stop PRIMOS if it appears to be hung. (See Chapter 6 for details on hangs.)

When the CPU halts, the Maintenance Processor places the supervisor terminal in CP mode and displays the DPM400 halt message in this format:

```
DPM400: Primary CPU halted at address: data
      date
```

address is the address of the last instruction in main memory that was executed, *data* is the address contents displayed as a 16-bit halfword, and *date* is the day, month, year, time, and day of the week when the halt occurred.

Caution To ensure the integrity of the file system, do not use the STOP command to shut down PRIMOS when it is running normally. Use the shutdown procedure outlined in Chapter 5.

► **STORE *data***

The STORE command stores the specified value of the number *data* according to the previously set sense and data switches. The VCP performs the CPU Store function and then outputs the values of the sense and data switches followed by the results of the STORE, each as a 16-bit halfword.

► **SYSCLR [*address*]**

The SYSCLR command clears the CPU hardware and begins execution of the microcode.

The SYSCLR command performs the same function as the MASTER CLEAR button on the System Status Panel. During the SYSCLR operation, the CPU hardware is initialized with microcode beginning execution at location 200₈. You can indicate another microlocation by specifying *address*.

The first time that you use SYSCLR after a halt, you are asked to confirm the SYSCLR operation with this prompt:

```
Really?
```

The Really? prompt gives you time to reconsider whether you really want the SYSCLR operation to continue. A SYSCLR operation destroys information in controllers; such information may be useful in analyzing a crash dump. If you are going to perform a tape dump after a halt of PRIMOS, do not use the

SYSCLR command before using the TAPEDUMP or PARTIAL_TAPEDUMP command.

Enter YES at the Really? prompt to continue with the SYSCLR operation. If you type anything other than YES, the command aborts and displays this message:

DPM311: Sysclr not performed.

SYSCLR Operation: The SYSCLR procedure places the CPU in a known starting position, initializes the CPU and the I/O controller lines, and resets the CPU high-speed register file locations. The functions of the SYSCLR command depend on the microcode loaded in the Control Store at the time you issued the command. If the microcode is not loaded, the Maintenance Processor does not perform a SYSCLR, but instead displays this message:

DPM305: Can't SYSCLR unless microcode loaded.

Following the SYSCLR, the Maintenance Processor expects a response character from the CPU. Valid response conditions include those that can be returned from a CPU microdiagnostic routine and the response following the system initialization portion of the base Instruction Set microcode. If either of these is received, the Maintenance Processor processes it and returns to CP mode. Depending on the response character, a SYSCLR operation can have one of these results:

- If no response is received or any other character is received, the Maintenance Processor notifies you with this message and returns to CP mode:

ERR301: CPU not responding

- If an invalid character is received, the Maintenance Processor displays the character in hexadecimal in this message:

ERR901: Unexpected character received from CPU: *char*.

- If the SYSCLR is successful, this message indicates that the CPU has been verified:

DPM006: Central Processor system initialization completed.

If an error message is issued instead of the DPM006 message, press the MASTER CLEAR button on the System Status Panel. If this action fails, press the ON/INITIATE SHUTDOWN button. If that fails, contact your PrimeService representative.

► SYSOUT {
 BUFF
 IGN
 INT }

The SYSOUT command controls the disposition of supervisor terminal output from the CPU while the supervisor terminal is in CP mode or in USER mode.

When PRIMOS is running and you are in either CP mode or USER mode, the default method of handling system messages sent to User 1 (the supervisor terminal) is Buffer mode. The Maintenance Processor stores the messages in a buffer and displays them when you return to ST mode. (System messages are sent by the Maintenance Processor, by subsystems such as Batch, by users, or by PRIMOS itself.)

By using the SYSOUT command, you can change the output mode to Buffer mode (SYSOUT BUFF), Ignore mode (SYSOUT IGN), or Interleave mode (SYSOUT INT). These three modes are summarized in Table 8-7.

Note that the SYSOUT command affects only the current setting of the output mode for CP and USER modes, and does not apply to ST mode. When you are in ST mode, Interleave mode is the only available output mode. When you change to USER or CP mode, the current setting of the output mode for that terminal mode is read from the Maintenance Processor's memory and used.

Table 8-7. SYSOUT Command Formats

<i>Command</i>	<i>Meaning</i>
SYSOUT BUFF	Buffer mode. System messages to User 1 (the supervisor terminal) are stored in a buffer when you are in CP or USER modes and displayed at once when you return to ST mode. Buffer mode is the default mode for USER and CP modes.
SYSOUT IGN	Ignore mode. When you are in USER or CP mode, system messages are discarded and you never see them.
SYSOUT INT	Interleave mode. When you are in USER or CP mode, system messages are displayed immediately at your terminal, interleaved with the normal screen output. To respond to a system message when you are in USER or CP mode, you may have to change to ST mode.

If you change the current output mode, the mode that you specify with SYSOUT is retained in the Maintenance Processor's memory until you do one of the following:

- Issue another SYSOUT command
- Reset the VCP with the VIRY command
- Turn off power by pressing the ON/INITIATE SHUTDOWN button on the System Status Panel

Interleave mode is recommended if you are going to be in USER mode for a long time. Although Interleave mode may sometimes cause your screen output to look garbled, it allows you to become immediately aware of any event on the system that requires quick intervention. For the same reason, Ignore mode is not recommended because you may never see an important system message.

For more information on these message output modes, see the section titled Controlling Supervisor Terminal Output, in Chapter 3.

► **TAPEDUMP** *drive_number*

The TAPEDUMP command performs a memory dump to magnetic tape.

drive_number, a number from 0 through 3, is the tape drive on which the tape is mounted. The sense-switch setting is changed to reflect the requested tape drive. For example, use this command to specify tape drive 0 (MT0):

```
CP1> TAPEDUMP 0
```

The CPU writes the necessary information to the tape, rewinds it, and halts. The CPU immediately halts if you specify the wrong tape drive or if the tape drive is off line, not ready, or not write-enabled. If this is the case, correct any problems related to the tape drive, then reissue the TAPEDUMP command.

Use the TAPEDUMP command only when PRIMOS has halted (or you forcibly halted it after a hang) and you do not know the cause of the halt or hang. (See Chapter 6 for further information on halts, hangs, and performing tape dumps.) Do not use the SYSCLR command before using the TAPEDUMP command, because TAPEDUMP includes an implicit SYSCLR.

Note You can duplicate the action of the TAPEDUMP command by using the SYSCLR command followed by a RUN command with the appropriate argument. For example, RUN 775 writes the tape dump to tape drive 0 (MT0) and RUN 776 writes to tape drive 1 (MT1).

► **VERIFYM** *filename*

The VERIFYM command verifies the contents of the CPU's microcode image against the file named *filename*.

The file can be a verification file or a regular microcode file. (Use the DIRECTORY command to list the available filenames.) If the file is not a verification file, the Maintenance Processor has to decode the file before performing the verification. If you do not specify a filename, the command aborts with this error message:

ERR909: Missing Argument(s) on Command Line.

During the VERIFYM operation, the system-clear line to the CPU is asserted while the contents of the microcode store are compared against the contents of the named file. If the microcode image from the CPU matches the microcode file, the Maintenance Processor returns to CP mode and displays this message:

DPM011: Microcode file *filename* successfully verified.

If a file verification error occurs but is successfully corrected when the Maintenance Processor retries the operation, this message is displayed:

ERR130: Recoverable Verification error on file *filename*.

Unsuccessful verification is signaled with one of these error messages, which are self-explanatory:

- ERR140: File *filename* not found.
- ERR120: File *filename* is not a valid Microcode file.
- ERR131: Verification error on file *filename*
- ERR200: Read error on file *filename*

If you had set Full Message mode (with the MO FULL command), the Maintenance Processor also displays information on each microcode word that fails verification. These messages are displayed in this format:

```
ERR375: Verification error on file filename, word nnnn
      Data expected:
      aaaa bbbb cccc dddd eeee ffff gggg hhhh
      Data found   :
      iiii jjjj kkkk llll mmmm nnnn oooo pppp
```

If you receive verification errors, contact your PrimeService representative.

The VIRY command takes at least five minutes to execute because of the exhaustive verification sequence performed on the equipment. If you are pressed for time but want the Maintenance Processor to perform some verification tests, use the SYSCLR command instead.

► **VPSD**

The VPSD command invokes the VPSD debugger.

If the VPSD configuration directive is in the system configuration file, the VPSD debugger is loaded into wired memory at cold start and is available for use after PRIMOS has halted. The VPSD command starts up the VPSD debugger by performing an implicit SYSCLR, SYSOUT INT, and RUN 600.

Most installations do not use the VPSD configuration directive because the hard-wired debugger decreases the amount of available physical memory and because this debugger is normally used only during development of the operating system.

Even if the system configuration file does not contain the VPSD directive, you can use the PRIMOS command VPSD to invoke the VPSD debugger under PRIMOS. For detailed information on the VPSD debugger and its commands, see the *Assembly Language Programmer's Guide*.

Caution Do not use the VPSD command unless both of the following conditions are true:

- PRIMOS was running before the halt.
- The VPSD configuration directive was in the system configuration file when PRIMOS was cold started.

Unexpected results can occur if either of these conditions is not true when you issue the VPSD command. If such problems occur, press the MASTER CLEAR button on the System Status Panel to clear the error. If that action fails, use the ON/INITIATE SHUTDOWN button to restart the system.

► **VSENS [*supply* [C]]**

The VSENS command displays power supply voltages from one or both of the power supplies in the system.

supply is a decimal number of either 0 or 1 that specifies the particular power supply. If you specify *supply*, only the voltage from that power supply is displayed.

If you do not specify *supply*, the Maintenance Processor displays voltages of both power supplies.

The display from the VSENS command uses this format:

```
Voltage from XXX power supply n: x.xxx
```

XXX is either CPU or I/O meaning the Maintenance Processor is monitoring the power supply in that module. *n* is either 0 or 1 and *x.xxx* is the voltage.

If you specify the C (for Continuous) argument after *supply*, that power supply's voltage is displayed continuously at one second intervals. Use CONTROL-P to stop execution of the command.

Caution

When you use the C argument, the Maintenance Processor does not automatically monitor the voltages of the power supplies for the duration of the command. The reason is that the Maintenance Processor has only one A/D converter. During continuous display, the A/D converter is used exclusively for the command and requests for the A/D by the automatic monitor are ignored.

► **WARMSTART**

The WARMSTART command attempts a warm start of PRIMOS.

Use the WARMSTART command after PRIMOS has unexpectedly halted or after a power fail. Use the WARMSTART command only if PRIMOS was running at the time of the halt or if the DPM400 halt message was displayed.

When using the WARMSTART command, be sure to allow at least one or two minutes for the warm start procedure to finish, at which time PRIMOS displays this message:

```
***** WARM START *****
```

You must cold start PRIMOS if you do not receive this message, or if you do receive it but the CPU subsequently halts.

The action of the WARMSTART command depends on the state of the system:

- If you use WARMSTART after a PRIMOS halt, it performs an implicit sequence of SYSCLR, RUN, RUN commands, and places the supervisor terminal in ST mode.
- If you use WARMSTART after a power fail (for example, when the ERR001 message is displayed), the CPU has lost its microcode and Decode Net images but not its main memory.

In this case, the WARMSTART command reloads the base microcode, issues a SYSCLR, reloads the Decode Net file, issues a second SYSCLR, and finally performs the above sequence of SYSCLR, RUN, RUN. Note that in this case, the supervisor terminal remains in CP mode.

For more information on when to warm start PRIMOS, see Chapter 6.

Appendixes



Alternative Bootstraps

A

■ ■ ■ ■ ■ ■ ■ ■

Chapter 4 contains instructions for autobooting PRIMOS from disk by using the VCP command BOOTP or by pressing the ON/INITIATE SHUTDOWN button on the System Status Panel.

There are other methods of booting PRIMOS from disk or tape, as well as methods for booting standalone utilities. This appendix contains information on these alternative bootstraps, including the following:

- Constructing octal values (known as boot option words) to use with the BOOT command to boot PRIMOS from various disk and tape devices
- Using various methods to boot PRIMOS from disk, including booting without the system configuration and system startup files, which may be necessary if one or both of these files are damaged
- Booting MAKE and COPY_DISK standalone
- Generating a magnetic tape for use in emergency situations to boot the system (when booting PRIMOS from tape)
- Booting PRIMOS and utilities from MAGSAV-format magnetic tape (for example, if your system disk pack crashes or fails to boot)

Two reference sections at the end of the appendix provide information on the following topics:

- The preboot program on the Maintenance Processor's diskette, including a breakdown of the octal boot device switch used with the BOOT command
- The PRIMOS BOOT program on disks and on magnetic tapes

For a list of the informational and error messages generated during a cold start of PRIMOS, see Appendix B.

Boot Changes at Rev. 20

If you are familiar with booting pre-Rev. 20 versions of PRIMOS, you should be aware of some of the boot changes made at Rev. 20.0 (which remain in effect for subsequent revisions):

- PRIMOS II (DOS) is obsolete because it is no longer used to boot PRIMOS; all its functionality has been incorporated into PRIMOS.
- The name of the cold-start image of PRIMOS is PRIRUN>PRIMOS.SAVE instead of the older names of PRIRUN>PRIMOS or PRIRUN>*COLDS.
- PRIMOS can be booted directly from tape.
- Setting the 100000 switch in the BOOT command option word (explained below) causes PRIMOS to query the operator for the values of the COMDEV, PAGING, NTUSR, and SYSNAM directives and to ignore both the system configuration file and the PRIMOS.COMI startup file. This switch is useful when one or both of these files are damaged and cannot be used for booting.

The 100000 switch prevents initialization of communications controllers (such as ICS3). If a system boot halts due to ICS initialization errors, this switch allows you to bring PRIMOS up in order to correct errors in the DOWN_LINE_LOAD* directory.

- When PRIMOS queries for the physical device number of the COMDEV, the operator is allowed to enter a value of 100000, indicating a null pdev. This value is useful in recovering from crashes and in building new systems.

Boot Option Words

The BOOTP command autoboots PRIMOS by telling the Maintenance Processor's bootstrap program (CPBOOT) to use the following default set of devices and runfiles:

- Use the first disk controller serviced by the system (controller address 26₈).
- Use the first disk drive (drive unit 0) on the controller.
- Use the PRIMOS MFD>BOOT runfile located on the first (or top) disk partition of drive 0. This partition becomes logical device 0.
- Use the most recently successful booted version of the PRIMOS.SAVE runfile. The pathname of this successful version is in the file BOOT_RUN_FILE_TREENAME in the MFD of logical device 0. If this file does not exist, use the default pathname of PRIRUN>PRIMOS.SAVE.

If you do not want to use the BOOTP command, you can use the BOOT command with an octal number; for example,

```
CP1> BOOT 14514
```

The octal number, 14514 in this example, is called the **boot option word**. The boot option word tells the CPBOOT program to use other devices or runfiles, or to prompt you for the pdevs of the devices or the names of the runfiles. The next sections describe the meaning of the boot option word.

Format of the BOOT Command

Although the above example of the BOOT command uses one octal number as an argument, the BOOT command format actually allows it to accept either one or two octal numbers as arguments. The command format is as follows:

BOOT [xxx]yyy [zzzzz]

Both xxxyyy and the optional zzzzz are six-digit octal numbers that control the action of the Maintenance Processor's CPBOOT program, as follows:

- yyy is called the **boot device switch** because it tells CPBOOT from which device the boot will occur (that is, where the BOOT file is located). (On disks, the BOOT file is named MFD>BOOT.) You must specify yyy because otherwise CPBOOT will not know which device to access. The boot device switch specifies three things about the device from which the boot will occur:
 - The type of device (that is, either disk or tape).
 - The octal address of the device's controller. You can boot from any one of four disk controllers (addresses 26₈, 27₈, 22₈, and 23₈) or from either of two tape controllers (addresses 14₈ and 13₈).
 - The unit number of the device on the controller. You can boot any one of four disk drives (drives 0-3) on a disk controller or from any one of eight tape drives (MT0-MT7) on the tape controllers.
- xxx is called the **boot option switch** because it specifies certain optional boot actions. One action, for example, is telling CPBOOT that the file to be booted (such as PRIRUN>PRIMOS.SAVE) is located on the same device (specified by yyy) as the BOOT file. xxx is optional, but is generally used. If xxx is not used, it defaults to 000, so that a BOOT 114 command is actually BOOT 000114.
- zzzzz is called the **data switch option** because it changes the data switches to control diagnostics built in to the CPBOOT program.

The xxxyyy argument (made up of the yyy boot device switch and the xxx boot option switch) is called the **sense switch option** because it changes the sense switches by setting (switching) the 16 bits that comprise the sense-switch register.

Together, the *xxxyyy* sense switch option and the *zzzzzz* data switch option make up the boot option word. Keep in mind, though, that the boot option word is usually the same as the sense switch option because the data switch option is seldom used. Note also that the boot option word is sometimes called the **boot switch setting** because it changes the sense and data switches.

Constructing the Boot Option Word

Before using the **BOOT** command, you must calculate the value of the boot option word. Because most boot operations do not use the data switch option, this section assumes that you calculate only the value of the *xxxyyy* sense switch option to produce the boot option word. For the data switch option, see the section below, **Data Switch Options**.

Use the following procedure to produce the octal number of the boot option word:

1. To specify the value of *yyy* (boot device switch), choose one octal number from Table A-1. Remember that you are specifying the controller address and unit number of a disk drive or tape drive. The unit number of a disk drive is generally indicated by the number on a button on the drive and is part of the *pdev* that was used with **MAKE** to create the partitions on the drive.
2. To specify the value of *xxx* (boot option switch), choose one or more numbers from Table A-2. If you choose more than one number, add them to produce *xxx*. This step is optional because only the boot device switch is mandatory.
3. Add the values *yyy* and *xxx* to produce the boot option word. You are adding in octal but there are no carries with these numbers. See the next section, **Examples of Constructing Boot Option Words**.

Table A-1. Boot Device Switches

<i>Booting From Disk</i>			<i>Booting From Tape</i>		
<i>Octal Value</i>	<i>Disk Drive</i>	<i>Control-ler Ad-dress</i>	<i>Octal Value</i>	<i>Tape Drive</i>	<i>Control-ler Address</i>
114	0	26 ₈	005	0	14 ₈
314	1	26 ₈	205	1	14 ₈
514	2	26 ₈	405	2	14 ₈
714	3	26 ₈	605	3	14 ₈
134	0	27 ₈	025	4	13 ₈
334	1	27 ₈	225	5	13 ₈
534	2	27 ₈	425	6	13 ₈
734	3	27 ₈	625	7	13 ₈
154	0	22 ₈			
354	1	22 ₈			
554	2	22 ₈			
754	3	22 ₈			
174	0	23 ₈			
374	1	23 ₈			
574	2	23 ₈			
774	3	23 ₈			

Table A-2. Boot Option Switches

Octal Value	Meaning
100000	<p>(Bit 1) Do not read the existing system configuration file or the existing system startup file (PRIMOS.COMI or C_PRMO), and do not initialize communication controllers. Instead, prompt for the pdevs of COMDEV and PAGING and for the number of terminal users (NTUSR), and let all other configuration parameters assume their default values. After the command partition is started up, prompt for the name of the system (SYSNAM).</p> <p>This switch is particularly useful when you are recovering from a crash or when you do not want to boot with the existing configuration and startup files.</p>
010000	<p>(Bit 4) Assume that the file to be booted resides on the same device that the boot was read from; otherwise use the PHYSICAL_DEVICE= prompt to prompt for the pdev of the partition or the tape drive where the boot file resides. The 010000 and 004000 options are added to an octal value in Table A-1 to automatically boot PRIMOS.</p>
004000	<p>(Bit 5) Assume that the pathname of PRIMOS is the same as the last time PRIMOS was successfully booted. (The name of the file that contains the pathname of the runfile used for the last successful boot of PRIMOS is MFD>BOOT_RUN_FILE_TREENAME .) If the file named BOOT_RUN_FILE_TREENAME does not exist or it does not contain a valid pathname, use, by default, the pathname PRIRUN>PRIMOS.SAVE as the file to be booted.</p> <p>If you do not specify the 004000 option, you are queried for a runfile pathname with the RUN_FILE_TREENAME= prompt. At this prompt, enter an appropriate pathname (such as PRIRUN>PRIMOS.SAVE or CMDNC0>MAKE.SAVE). If you enter a null line (that is, only a carriage return), the system attempts to boot PRIMOS using the pathname in MFD>BOOT_RUN_FILE_TREENAME, as if you had specified this option.</p> <p>If that is not possible, the system uses the default pathname of PRIRUN>PRIMOS.SAVE. If you add 010000 and 004000 boot switches (resulting in the value 14000), and then add this value to one of the octal values in Table A-1, you produce a boot option word that automatically boots PRIMOS (that is, an autoboot of PRIMOS).</p>
002000	<p>(Bit 6) Halt immediately after loading the file to be booted but before starting execution of the file. This switch allows you to modify selected memory locations and is provided primarily to allow PrimeService representatives to run test and maintenance programs or to debug PRIMOS. You then reset the switches to the values used for the start of the boot and use the RUN command to start the program running.</p>
001000	<p>(Bit 7) Do not boot the system in machine check mode. This option is used primarily for debugging faulty hardware, and may also be used to get around ECCU (Error Correction Code Uncorrectable) uncorrectable memory errors or ECCC (ECC Correctable) correctable memory errors.</p>

Table A-2. Boot Option Switches (continued)

Octal Value	Meaning																				
000040	(Bit 11) Valid only when booting from magnetic tape, this option causes the boot to halt immediately to allow you to set the supervisor terminal baud rate to a rate other than the default of 300 baud. Select another baud rate by setting locations 1004 ₈ , 1005 ₈ , and 1006 ₈ as follows:																				
	<table border="1"> <thead> <tr> <th>Speed baud</th> <th>1004₈</th> <th>1005₈</th> <th>1006₈</th> </tr> </thead> <tbody> <tr> <td>110</td> <td>110</td> <td>27</td> <td>74006</td> </tr> <tr> <td>300</td> <td>1010</td> <td>76</td> <td>34006</td> </tr> <tr> <td>1200</td> <td>2010</td> <td>373</td> <td>34006</td> </tr> <tr> <td>9600</td> <td>3410</td> <td>3735</td> <td>34006</td> </tr> </tbody> </table>	Speed baud	1004 ₈	1005 ₈	1006 ₈	110	110	27	74006	300	1010	76	34006	1200	2010	373	34006	9600	3410	3735	34006
Speed baud	1004 ₈	1005 ₈	1006 ₈																		
110	110	27	74006																		
300	1010	76	34006																		
1200	2010	373	34006																		
9600	3410	3735	34006																		
	Enter RUN to continue with the boot after modifying the default baud rate. After the modification, as with the 002000 option discussed previously, the switches must be set back to their values at the start of the boot.																				
	If this option is not specified when booting from tape, the supervisor terminal defaults to 300 baud. This option cannot be specified when booting from disk. The supervisor terminal baud rate when booting from disk is set when the boot is installed.																				

Examples of Constructing Boot Option Words

A standard boot of PRIMOS uses the BOOT 14114 command, which is the same as the BOOTP command. Because numbers containing less than six digits are automatically given leading zeros, the 14114 argument is actually 014114, which translates to the following:

- The 114 value (actually 000114) is the boot device switch (yyy) from Table A-1 and specifies that you are booting from drive unit 0 on disk controller 26₈.
- The 014 value (actually 014000) is the boot option switch (xxx) from Table A-2 and is made up of the 010000 and 004000 boot option switches added together.

Added up, the boot switches produce the 14114 boot option word:

000114	Use MFD>BOOT file from disk drive 0 on controller 26 ₈ .
010000	File to be booted is on same partition as MFD>BOOT file.
004000	Filename to boot is in MFD>BOOT_RUN_FILE_TREE_NAME.
014114	Resulting boot option word; the command will be BOOT 14114.

To take another example, suppose you wanted to boot PRIMOS from drive 1 on disk controller 27₈, and you did not want to be prompted for the location (physical device number) of the device with the file to be booted (PRIMOS.SAVE in this example) or for the pathname of the PRIMOS runfile (that is, PRIRUN>PRIMOS.SAVE).

In this case, construct the boot option word by using the three values below. (The 334 value is from Table A-1 and the 010000 and 004000 values are from Table A-2).

000334	Use MFD>BOOT file from drive 1 on controller 27 ₈ .
010000	PRIMOS.SAVE file is on the same drive 1 as MFD>BOOT.
<u>004000</u>	Use the filename in MFD>BOOT_RUN_FILE_TREE_NAME.
014334	Resulting boot option word; the command will be BOOT 14334.

As another example, assume you want to boot from tape drive 1 at tape controller address 14₈ and be prompted for both the location of the runfile to be booted (MT1 in this example) and the pathname of that runfile. Use the BOOT command and specify only a boot device switch:

```
CP1> BOOT 205
```

These octal values, then, contain addresses you specify to the CPBOOT bootstrap program so that the program knows where to find the file you want to boot, and contain options that specify further information to the bootstrap program.

Many of the sections later in this chapter also contain examples of boot option words.

Data Switch Options

The data switch option (zzzzz) is used primarily to control the built-in diagnostic capabilities of the CPBOOT program. Typically, this option is used by a PrimeService representative or by someone debugging an operating system.

An example of a BOOT command with the data switch option might be as follows:

```
CP1> BOOT 100114 002000
```

The values for the zzzzz data switch option are as follows:

<i>Value</i>	<i>Meaning</i>
040000	Forces the system to halt after an error has been displayed with the Force Error Display switch (004000)
020000	Inhibits PIO timeouts
010000	Bypasses the CPBOOT diagnostic routines
004000	Forces error display
002000	Displays informative messages while executing CPBOOT
000002	Boots from a pre-Rev. 20 tape

Booting PRIMOS From Disk

Chapter 4 describes how to autoboot PRIMOS from disk by using the BOOTP command or the ON/INITIATE SHUTDOWN button. This section describes how to use the BOOT command to perform standard boots of PRIMOS from other disk drives and controllers, including a boot that does not use the system configuration and PRIMOS.COMI files.

Standard Boots of PRIMOS

A typical standard boot of PRIMOS uses one of three principal boot option words:

- Boot after prompting for the pdev of the boot device and the pathname of the boot runfile (Scenario A below)
- Boot prompting for only the pathname of the boot runfile (Scenario B)
- Boot automatically (autoboot) without prompting for any information (Scenario C)

Each of the three scenarios described below assumes that the boot device switch is octal 114, which means that disk drive 0 on disk controller 26g contains the MFD>BOOT runfile. The MFD>BOOT file then boots another runfile (such as PRIRUN>PRIMOS.SAVE) on either the same or another disk partition. The fourth section gives some details on the pathname of the PRIMOS boot runfile.

Note Each use of the BOOT command is preceded by the SYSCLR command.

Scenario A — Prompt for pdev and Runfile Pathname: The most basic standard boot is to supply only a boot device switch from Table A-1 (114 in this example). Keep in mind that you are supplying the 114 boot device switch

7. The PRIMOS.SAVE runfile loads PRIMOS (that is, the PRxxx files in the PRIRUN directory) into memory. The preloader part of PRIMOS displays this message to inform you that PRIMOS will begin to configure itself:

Coldstarting PRIMOS, Please wait...

8. PRIMOS begins to process the system configuration file (displaying the CONFIG command from the PRIMOS.COMI file) and displays its copyright notice:

```
CONFIG -DATA CONFIG      /* Specify CONFIG file after -DATA
[PRIMOS Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
```

9. The system configuration phase ends when PRIMOS displays its first OK, prompt.

The example below illustrates Scenario A. The example uses 2060 as the pdev of the disk partition that contains the PRIRUN>PRIMOS.SAVE runfile:

```
CP1> SYSCLR
DPM006: Central Processor system initialization completed.
        16 Aug 90 08:34:43 Thursday
CP1> BOOT 114
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
PHYSICAL DEVICE=2060
RUN FILE TREENAME=PRIRUN>PRIMOS.SAVE
BOOTING FROM 002060 PRIRUN>PRIMOS.SAVE
Coldstarting PRIMOS, Please wait...
CONFIG -DATA CONFIG      /* Specify CONFIG file after -DATA
[PRIMOS Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
.      .      .
.      .      .
.      .      .
OK,
```

Scenario B — Prompt for the Pathname of Boot Runfile: Scenario B differs from Scenario A in that you add the 10000 boot option switch to the boot device switch. The 10000 switch (bit 4, Table A-2) tells the BOOT program not to query you with the PHYSICAL DEVICE= prompt for the pdev of the device with the file to be booted, but to assume that the file resides on the same partition as the MFD>BOOT file:

```
000114      Use MFD>BOOT file from disk drive 0 on controller 26g.
010000      File to be booted is on same partition as MFD>BOOT file.
010114      Resulting boot option word; the command will be BOOT 10114.
```

As in Scenario A, the BOOT program uses the RUN FILE TREENAME= prompt to query you for the pathname of the file to be loaded and executed because you did not use the 004000 switch option. The boot procedure with the 10000 boot switch appears as follows:

```
CP1> SYSCLR
DPM006: Central Processor system initialization completed.
      16 Aug 90 06:43:24 Thursday
CP1> BOOT 10114
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
RUN FILE TREENAME=PRIRUN>PRIMOS.SAVE
BOOTING FROM 002060 PRIRUN>PRIMOS.SAVE
Coldstarting PRIMOS, Please wait...
CONFIG -DATA CONFIG /* Specify CONFIG file after -DATA
[PRIMOS Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
. . .
. . .
. . .
```

Scenario C — Autoboot: Scenario C is called an autoboot because you supply an octal value (such as 14114) that tells both the CPBOOT and BOOT programs to boot PRIMOS automatically without prompting you for any information.

The 14114 boot option word produces a boot that is similar to giving the BOOTP command or pressing the ON/INITIATE SHUTDOWN button. The 14114 boot option word is derived by adding bits 4 and 5 (see Table A-2) to the boot device switch:

000114	Use MFD>BOOT file is from disk drive 0 on controller 26g.
010000	File to be booted is on same partition as MFD>BOOT file.
<u>004000</u>	Use the filename in MFD>BOOT_RUN_FILE_TREENAME.
014114	Resulting boot option word; the command will be BOOT 14114.

The 4000 switch tells the BOOT program to suppress the RUN FILE TREENAME= prompt, and instead use the pathname stored in the MFD>BOOT_RUN_FILE_TREENAME file as the pathname of the PRIMOS runfile, or use PRIRUN>PRIMOS.SAVE as the pathname if the BOOT_RUN_FILE_TREENAME file does not exist.

The autoboot procedure with the 10000 and 4000 boot switches appears as follows:

```
CP1> SYSCLR
DPM006: Central Processor system initialization completed.
      16 Aug 90 14:55:34 Thursday
```

```
CP1> BOOT 14114
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
BOOTING FROM 002060 PRIRUN>PRIMOS.SAVE
Coldstarting PRIMOS, Please wait...
CONFIG -DATA CONFIG /* Specify CONFIG file after -DATA
[PRIMOS Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
. . .
. . .
. . .
```

The Boot Runfile Pathname: When PRIMOS is successfully booted, the file named `BOOT_RUN_FILE_TREENAME` is written or updated in the MFD to contain the pathname of the last successful boot from this partition. Typically, `PRIRUN>PRIMOS.SAVE` is the pathname. If PRIMOS is not successfully booted, the file is not updated.

Caution Do not attempt to edit the `MFD>BOOT_RUN_FILE_TREENAME` file.

When an autoboot is performed (as in Scenario C), the boot program looks for the `MFD>BOOT_RUN_FILE_TREENAME` file and reads the pathname in it. If the file or the pathname in it is not found, the boot defaults to a pathname of `PRIRUN>PRIMOS.SAVE`. If this pathname is not found, you are queried for the pathname of the runfile with the `RUN FILE TREENAME=` prompt.

When an autoboot is not performed (that is, when you do not use the 4000 option), you are queried for the runfile pathname (Scenarios A and B above). If you enter a null line (only a carriage return) or newline in reply, the default PRIMOS boot runfile pathname is used. The default PRIMOS boot runfile pathname is computed by exactly the same process as when an autoboot is performed.

Note You can change the default boot switch and whether or not an autoboot takes place by using the VCP command `STAT`. See Chapter 8 for details.

Booting Without the CONFIG and PRIMOS.COMI Files

At times, you may need to boot PRIMOS without using both the system configuration file (usually named `CONFIG`) and the `PRIMOS.COMI` system startup file.

Two reasons for doing so are

- If one or both of these files are damaged
- If the configuration has to be changed before booting (for example, because the disk containing the COMDEV and PRIMOS has been moved to another disk drive or disk controller, which means that the COMDEV and PAGING pdevs probably change)

Prior to Rev. 20, if either file could not be modified under PRIMOS, you used NSED (the nonshared editor) under PRIMOS II to edit the appropriate file. You can still do this with a later revision system if the files are on a pre-Rev. 20 partition.

If, however, the files are stored on a Rev. 20 or later partition, you must use the procedure described below, which includes adding the 100000 option switch to the boot option word. Adding the 100000 option switch (bit 1, Table A-2) tells PRIMOS to do the following:

- Do not read the system configuration file.
- Prompt for the COMDEV, PAGING, NTUSR, and SYSNAM values and use default values for the other configuration directives.
- Do not initialize the communications controllers.
- Do not execute the PRIMOS.COMI (or C_PRMO) startup file. After PRIMOS is running, however, you can execute this file with the COMINPUT command; in this case, the CONFIG command in the startup file is ignored.

Procedure for Booting Without the CONFIG and PRIMOS.COMI

Files: Use the following procedure to boot PRIMOS without the CONFIG and PRIMOS.COMI files:

1. At the CP1> prompt, use the SYSCLR command.
2. At the CP1> prompt, use the BOOT command with the 100000 switch specified in the boot option word (for example, BOOT 114114 or BOOT 100134).
3. Depending on what other options you specified in the BOOT command, you may have to enter the pdev of the boot device or the pathname of the PRIMOS runfile.
4. At the Enter COMMAND DEVICE: prompt, enter the pdev of the command partition to set a value for the COMDEV directive.
5. At the Enter PAGING device: prompt, enter the pdev of one of the paging devices to set a value for the PAGING directive.

6. At the Enter Number Terminal USErs: prompt, enter an octal number (5 is a recommended value) to set a value for the NTUSR directive. Note that you receive a warning message about the NTUSR directive exceeding the number (0) of async lines present on the system. Ignore this warning because it is intended for normal cold starts.
7. At the Enter system name: prompt, enter the name of the system. If the system is on a network, use the network node name. (At this step, you are actually setting a value for the SYSNAM directive.)
8. After PRIMOS is running, use NSED to edit or create the appropriate CONFIG or PRIMOS.COMI file so that it contains the correct values.
9. Shut down the system (with the SHUTDN ALL command) and reboot PRIMOS with the correct CONFIG and PRIMOS.COMI files.

Example of Booting Without the CONFIG and PRIMOS.COMI

Files: The three-part example that follows illustrates how to change the system configuration file using this procedure. Following the example is a brief explanation of it.

1. Boot PRIMOS with the 100000 switch option:

```
CP1> SYSCLR
DPM006: Central Processor system initialization completed.
      15 Aug 90 09:39:29 Wednesday
CP1> BOOT 114114
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
BOOTING FROM 001060 PRIRUN>PRIMOS.SAVE
Coldstarting PRIMOS, Please wait...
Enter COMmand DEvIce: 2060
Enter PAGING device: 71061
Enter Number Terminal USErs: 2
[PRIMOS Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
32768K BYTES MEMORY IN USE
Starting up revision 22.1 partition "SYSCMD".
Enter system name: SYSA
Warning: The 5 directly-connected login lines requested by the
         NTUSR directive exceed the 0 async lines present on
         this system. No login lines will be available.
System clock has been initialized.
TIMER_PROCESS (user 10) logged in Wednesday, 15 Aug 90 09:42:04.
LOGOUT_SERVER (user 11) logged in Wednesday, 15 Aug 90 09:42:04.
LOGIN_SERVER (user 12) logged in Wednesday, 15 Aug 90 09:42:04.
OK,
```

2. Edit the configuration file and make the necessary corrections:

```
OK, NSED CONFIG
EDIT
T;L COMDEV
COMDEV 1060
C /1060/2060/
COMDEV 2060
FILE
CONFIG
OK,
```

3. Shut down the system and reboot:

```
OK, SHUTDN ALL
REALLY? YES
WAIT,
PRIMOS NOT IN OPERATION
```

```
DPM400: Primary CPU halted at 000006/037515: 013404
        15 Aug 90 10:09:39 Wednesday
```

```
CP1> SYSCLR
DPM006: Central Processor system initialization completed.
        15 Aug 90 10:12:14 Wednesday
CP1> BOOT 14114
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
BOOTING FROM 002060 PRIRUN>PRIMOS.SAVE
Coldstarting PRIMOS, Please wait...
CONFIG -DATA CONFIG      /* Specify CONFIG file after -DATA
.      .      .
.      .      .
.      .      .
```

In the above example, the pdev of the command partition is changed because it had been specified incorrectly. After PRIMOS starts, NSED, the nonshared editor, must be used because PRIMOS.COMI was not started and no other editor has been shared. The operator changes the COMDEV parameter in the CONFIG file and then shuts down PRIMOS and reboots with the correct CONFIG parameters, and a normal startup continues.

Booting MAKE Standalone

The MAKE utility runs under PRIMOS, or you may boot it to run by itself without PRIMOS. The latter mode of operation is referred to as running standalone. It is useful for creating new systems or for recovering from disk crashes. When running MAKE standalone, you can boot it from disk or from a MAGSAV-format tape.

MAKE operates identically under PRIMOS and in standalone mode, except for these differences:

- When you run MAKE under PRIMOS, you enter the MAKE options immediately after the MAKE command and on the same line. After MAKE finishes, you are returned to PRIMOS command level.
- When you run MAKE standalone, you enter the MAKE pathname at the RUN FILE TREENAME= prompt. You then enter the MAKE options at the Enter command line options: prompt because the boot program does not accept such options following the pathname. (Note also the restrictions listed below.) After standalone MAKE finishes, the CPU halts and you are returned to CP mode.

When you run MAKE standalone, keep these restrictions in mind:

- When booting from disk, at the RUN FILE TREENAME= prompt, enter the pathname CMDNC0>MAKE.SAVE. When booting from tape, the pathname of MAKE must be entered exactly as it was saved by MAGSAV. For example, enter only MAKE.SAVE at the prompt if you saved MAKE while you were attached to the CMDNC0 directory; however, enter CMDNC0>MAKE.SAVE if you saved MAKE while attached to the MFD.
- You cannot use the -INTELLIGENT_CONTROLLER (-IC) option because the intelligent disk controller (IDC1 — Model 6580) is not downline loaded. Use the -ALL_CONTROLLER (-AC) option. Later, you can run FIX_DISK to switch the controller mode from -AC to -IC, if necessary.
- Use the -RESTORE_DEFAULT_INTERLEAVE (-RDI) option to select reverse allocation if the disk drive is connected to an intelligent disk controller.
- Make the partitions on a disk drive in order of top to bottom. That is, first make the partition beginning with surface 0.
- Rev. 20 and later versions of MAKE cannot run under PRIMOS II. Attempting to use these versions of MAKE under PRIMOS II results in the error message TOO BIG.

Note If your system has a pre-Rev. 20 version of MAKE in CMDNC0, delete it to avoid the possibility of booting that version by mistake. Pre-Rev. 20 versions of MAKE use CMDNC0>MAKE as the pathname; Rev. 20 and later versions use the .SAVE suffix in the filename (MAKE.SAVE).

Procedure for Booting MAKE Standalone

To boot MAKE standalone, use this procedure, which is shown in a following example:

1. At the CP1> prompt, use the SYSCLR command.
2. At the CP1> prompt, use the BOOT command with a boot option word that causes the boot program to prompt you for a runfile pathname. The boot option word will also specify if you are booting from disk (for example, BOOT 10114) or tape (for example, BOOT 10005). See Table A-1 and Table A-2 for the correct boot option word.
3. At the RUN FILE TREENAME= prompt, enter CMDNC0>MAKE.SAVE as the runfile pathname. (When booting from tape, the pathname of MAKE must be entered exactly as it was saved by MAGSAV; therefore, you may have to enter only MAKE.SAVE at this prompt.)
4. At the Enter command line options: prompt, enter the MAKE options you desire. You must use the -DISK option. Keep in mind that you cannot use the -INTELLIGENT_CONTROLLER (-IC) option when you run MAKE standalone or the program will abort.
5. Answer any other MAKE prompts (such as Partition name?) that result if you did not specify all the necessary options at Step 4.
6. After MAKE finishes, the CPU halts and you are returned to CP mode.

For details on how to use MAKE, see the *Operator's Guide to File System Maintenance*.

Example of Booting MAKE Standalone

The following example shows how to boot MAKE standalone from tape to format the first 16 surfaces of a 19-head 300MB SMD disk pack:

```
CP1> SYSCLR
DPM006: Central Processor system initialization completed.
      15 Aug 90 09:25:15 Wednesday
CP1> BOOT 10005
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
```

[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]

RUN FILE TREENAME=MAKE.SAVE

BOOTING FROM MT0 MAKE.SAVE

**** MAKE <Rev. 23.0> **** Copyright (c) 1990, Prime Computer, Inc.
Enter command line options: -DISK 4060 -DT SMD -FMT -RDI -PART MART1
Making 16 head partition MART1
Sectors per track: 9
Partition is using Reverse Sectoring
Partition is in -All_Controller Mode
Partition size in decimal records: 118479

Beginning format.
Format completed.

Checking for bad spots.
Done checking for bad spots.
4 Total badspots mapped out of PDEV 004060
Partition MART1 created successfully.

DPM400: Primary CPU halted at 000006/037515: 013404
15 Aug 90 09:42:36 Wednesday
CP1>

In the example, the 10005 switch is used because MAKE is booted from tape drive 0. Because the 4000 switch is not set, the RUN FILE TREENAME= prompt appears and the operator enters the pathname of MAKE.

After MAKE starts, it prompts for command-line options. Note that the operator must use the -DISK argument with the pdev of the partition that is being created. If the -PARTITION option is not used, MAKE prompts for the name of the partition. When MAKE finishes, the CPU halts.

Booting COPY_DISK Standalone

COPY_DISK runs under PRIMOS, or you may boot it to run standalone without PRIMOS. The standalone mode of operation is especially useful in performing backups, creating new systems, or recovering from disk crashes.

Note At Rev. 23.0, COPY_DISK is no longer on the master disk. The DBR utility, PSR, replaces COPY_DISK functionality except that PSR does not copy to or from the command device and you cannot boot PSR standalone. See the *Operator's Guide to Data Backup and Recovery* for details.

You can use COPY_DISK to copy the command partition (COMDEV) in one of two ways:

- While PRIMOS is running, shut down the command partition and use the PRIMOS command MTRESUME to run COPY_DISK from tape to perform the copy.
- While PRIMOS is not running, run COPY_DISK standalone.

COPY_DISK operates the same under PRIMOS and in standalone mode, except for these differences:

- When you run COPY_DISK under PRIMOS, you must first assign the disks involved in the copy operation. Then you enter any options after the command name and on the same line. After COPY_DISK finishes, you are returned to PRIMOS command level.
- When you run COPY_DISK standalone, you enter the pathname CMDNC0>COPY_DISK.SAVE at the RUN FILE TREENAME= prompt. You then enter the options at the Enter command line options: prompt because the boot program does not accept such options following the pathname. After standalone COPY_DISK finishes, the CPU halts and you are returned to CP mode.

COPY_DISK Restrictions: When using COPY_DISK to copy one partition to another, the main restriction is that the source and target partitions must be of the same size.

You can use COPY_DISK to copy a maximum of five partitions. If you copy more than one pair of partitions, keep these restrictions in mind:

- All the source partitions must reside on the same physical disk (that is, they must have the same controller address and drive number).
- All the target partitions must reside on the same physical disk (that is, they must have the same controller address and drive number).
- The source and target partitions in each partition pair must be of the same size (that is, the same number of surfaces).

Procedure for Booting COPY_DISK Standalone

To boot COPY_DISK standalone, use this procedure, which is shown in a following example:

1. At the CP1> prompt, use the SYSCLR command.
2. At the CP1> prompt, use the BOOT command with a boot option word that causes the boot program to prompt you for a runfile pathname (for

example, BOOT 10114). The boot option word also specifies if you are booting from disk or tape.

3. At the RUN FILE TREENAME= prompt, enter CMDNC0>COPY_DISK.SAVE as the runfile pathname.
4. At the Enter command line options: prompt, either enter one or more COPY_DISK options, or only a carriage return for no options.
5. At the Source PDEV: prompt, enter the physical device number of the source partition.
6. At the Target PDEV: prompt, enter the physical device number of the target partition.
7. The cycle of Source PDEV: and Target PDEV: prompts continues, to allow you to enter up to five pairs. To terminate the cycle, press only the Return key in response to the Source PDEV: prompt. COPY_DISK then lists the specified partitions, their size, and details of the tracks in use.
8. At the Parameters OK (yes/no)? prompt, answer YES to proceed with the copy, or answer NO to cancel the list of source/target partitions and return to the start of the dialogue (you can then select new source and target partitions).
9. After COPY_DISK finishes, the CPU halts and you are returned to CP mode.

For details on how to use COPY_DISK, see the *Data Backup and Recovery Guide*.

Example of Booting COPY_DISK Standalone

The example below illustrates booting COPY_DISK standalone. The partition named MRKSPT with a pdev of 61062 is copied to partition 61260.

```

CP1> SYSCLR
DPM006: Central Processor system initialization completed.
      15 Aug 90 07:08:45 Wednesday
CP1> BOOT 10114
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
RUN FILE TREENAME=CMDNC0>COPY_DISK.SAVE
BOOTING FROM 002060 CMDNC0>COPY_DISK.SAVE
[COPY_DISK Rev 22.0 Copyright (c) 1988, Prime Computer, Inc.]
Enter command line options: Return
Source PDEV: 61062
Target PDEV: 61260
Source PDEV: Return

```

```

    From      To      Name      Records   Tracks   Tracks in use (%)
    061062    061260    MRKSPT    29628     3292     1778 (54%)
Parameters OK (yes/no)? YES
  
```

```

Begin copy.
0      50%      100%
I-----I-----I
*****
Done copy.
DPM400: Primary CPU halted at 024147: 103775
      15 Aug 90 07:22:39 Wednesday

CP1>
  
```

Note that during the procedure, COPY_DISK lists, for the source partition, the total number of records (29628 in the example) and tracks (3292) on the partition, as well as the number of tracks in use (1778) and the percentage of the partition in use (54%). As the copy proceeds, COPY_DISK also displays a bar graph to indicate its progress.

Booting T&M Programs

T&M (Test and Maintenance) programs usually are used only by a PrimeService representative for problem solution. If, however, you run these programs, keep a list of their pathnames. Although T&M programs can be run under PRIMOS II, you should run them in standalone mode to prevent the possibility of corrupting your disks.

Use the following procedure to boot T&M programs standalone:

1. At the CP1> prompt, use the SYSCLR command.
2. At the CP1> prompt, use the BOOT command with a boot option word that causes the boot program to prompt you for a runfile pathname (for example, BOOT 10114).
3. At the RUN FILE TREENAME= prompt, enter the pathname of the runfile (for example, T&MRUN>HSMT7). After the program finishes, the CPU halts and you are returned to CP mode.

Alternatively at Step 2, you can add 2000 to the boot option word (for example, BOOT 12114). The 2000 switch loads the T&M program into memory without executing it and then halts the CPU. A RUN command at this point starts execution of the T&M according to its RVEC parameters. Alternatively, you may start the program at a different location by clearing the system (SYSCLR) and supplying an address with the RUN command.

Creating a Boot Tape

You should create a MAGSAV-format boot tape that you can use to boot the system in case of an emergency (for example, if your disks are damaged and you cannot boot from them). The boot tape should contain enough utilities (such as MAKE and MAGRST) to allow you to restore a system from backup tapes in your tape archive. MAGSAV automatically installs a copy of the BOOT program at the beginning of the tape.

Caution

The processes of using MAGSAV and MAGRST to create a boot tape and to boot the system from tape vary slightly depending on the PRIMOS revision. The procedures are different at PRIMOS Rev. 21.0 and 22.0 than they are at PRIMOS Rev. 23.0.

You cannot boot a Rev. 21.0 or Rev. 22.0 system using a boot tape that was created using Rev. 23.0 MAGSAV. See the *Operator's Guide to Data Backup and Recovery* for details.

This section describes how to create a boot tape and is followed by an example.

A subsequent section titled *Booting From Tape* describes the procedures for booting from tape, recovering from a crash, and recreating a system.

Procedure for Creating a Boot Tape

To create a boot tape, use the following procedure:

1. Use a text editor (such as ED or EMACS) to create a boot list file. The boot list file contains the pathnames of the files and directories that will be stored on the boot tape. Put each pathname on a separate line. You can give the file any name and store it in any directory. The files and directories listed below should be on the boot tape because they are necessary for booting and repair procedures.

```

CMDNC0>MAKE.SAVE
CMDNC0>MAGRST.RUN (for use with Rev 23)
CMDNC0>BOOT_RESTORE.SAVE (for use with Rev. 22)
CMDNC0>NSED
CMDNC0>FIX_DISK.SAVE
PRIRUN
  
```

You can include other useful files and directories, such as share files in the SYSTEM directory, the SEARCH_RULES* directory, and the system configuration and startup files.

2. Mount a tape on a tape drive. Make sure that the tape is at the load point, the tape drive is on line, and the write-ring is present so that you can write

on the tape. You do not have to assign the tape drive; BOOT_CREATE does that.

3. Issue the BOOT_CREATE command, using the pathname of the boot list file (from Step 1) and the -MT option with the number of the tape drive (from Step 2). Answer any BOOT_CREATE prompts.

Here is a sample command:

```
BOOT_CREATE SYSTEM>BOOT_LIST -MT 0 -NO_QUERY
```

The BOOT_CREATE program

- Automatically assigns the tape drive
- Calls the MAGSAV utility
- Creates the boot tape (with the name BOOT1) by saving the files and directories listed in the boot list file
- Rewinds the tape
- Unassigns the tape drive

After the boot tape is created, you should test it to make sure that it boots PRIMOS, especially if you received the following message from BOOT_CREATE:

```
Warning : This tape may not boot the system (Boot_create)
```

The boot tape generated by this procedure should be sufficient for most installations. For details on BOOT_CREATE, see the *Data Backup and Recovery Guide (Rev. 22)* or the *Operator's Guide to Data Backup and Recovery (Rev. 23)*.

Example of Creating a Boot Tape

The following example illustrates the procedure for creating a boot tape. In this example, the tape on which the files are to be written is mounted on drive unit 0 (MT0), and the boot list file will be stored under the name BOOT_LIST in the SYSTEM directory:

```
OK, ATTACH SYSTEM  
OK, ED  
INPUT  
CMDNCO>MAKE.SAVE  
CMDNCO>NSED  
CMDNCO>MAGRST.RUN  
CMDNCO>FIX_DISK.SAVE  
PRIRUN
```

```

EDIT
FILE BOOT_LIST
OK, ATTACH_CMDNCO
OK, BOOT_CREATE_SYSTEM>BOOT_LIST -MT 0 -NO_QUERY
[BOOT_CREATE Rev. 23.0 Copyright (c) 1990 Prime Computer, Inc.]

```

```

No Warnings
Assigning Tape drive 0 to your job .....
Device MT0 assigned.
Tape unit:0
Calling MAGSAV .....
WARNING: Only one reel can be loaded during system boot
***** because MTBOOT does not handle continuation reels.
[MAGSAV Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Tape unit (9 Trk): 0
Enter logical tape number: 1
Tape name: BOOT1
Date (MM DD YY): Return
Rev no: Return
Name or Command: $TTY
Name or Command: $A CMDNCO
Name or Command: MAKE.SAVE
Name or Command: $A CMDNCO
Name or Command: NSED
Name or Command: $A CMDNCO
Name or Command: MAGRST.RUN
Name or Command: $A CMDNCO
Name or Command: FIX_DISK.SAVE
Name or Command: $A MFD
Name or Command: PRIRUN
Name or Command: $R
Device released.
OK,

```

Booting From Tape

The BOOT program placed on disks (by MAKE) is also written on tapes created with Rev. 20 or later MAGSAV. The BOOT program may either boot from disk or from tape, and the options available in either case are the same. Thus, PRIMOS may be booted directly from tape.

After familiarizing yourself with booting from disk, you need to know only the following additional information to boot from tape:

- The Rev. 22 or Rev. 23 BOOT is present only on tapes written with Rev. 22 or Rev. 23 MAGSAV. The -REV19 option cannot have been used when

MAGSAV created the tape. The BOOT is not present on PHYSAV-format tapes or on BRMS-format tapes.

- Boot option words used with Rev. 19 or earlier MAGSAV tapes can no longer be used. Use only the boot switch options listed in Table A-1 and Table A-2 at the beginning of this appendix.
- The 000040 switch is still available for use in the boot option word to cause the boot to halt before doing anything. This switch allows you to modify the supervisor terminal baud rate if your system runs the supervisor terminal at a baud rate other than the default 300 baud.
- The boot device switch for booting from tape is 005. This value indicates that the boot is from tape drive 0, at tape controller address 14₈. Do not use a boot device switch of 505 with Rev. 20 and later tapes. (The 505 switch was sometimes used when operators booted from pre-Rev. 20 tapes.)
- You can boot only from the first reel of a multireel MAGSAV tape.
- Files being booted must be on the first reel; they cannot be on later reels or span reels.
- Only files on the first logical tape can be booted.
- Booting from master disk tapes is not recommended. You cannot be sure if the software to be booted is present on the first reel. Use `BOOT_CREATE` to create a tape specifically for booting.
- The way in which a tape was saved affects the pathname of the program to be booted. For example, when booting `MAKE` from tape, its pathname depends on how it was saved to tape:
 - If `MAKE` was saved to tape by first attaching to `CMDNC0` and telling MAGSAV to save `MAKE.SAVE` or `*`, then the boot runfile pathname is `MAKE.SAVE`.
 - If `MAKE` was saved to tape by first attaching to the `MFD` and telling MAGSAV to save `CMDNC0` or `*`, then the boot runfile pathname is `CMDNC0>MAKE.SAVE`.
 - If `MAKE` was saved to tape by attaching to the `MFD` and telling MAGSAV to save `MFD`, then the boot runfile pathname is `MFD>CMDNC0>MAKE.SAVE`.
- If the 10000 switch is not present in the boot option word, the boot program prompts for the boot device with the `PHYSICAL DEVICE=` prompt. Regardless of whether you get to this prompt by booting from disk or from tape, you may enter a disk partition physical device number (`pdev`) at this point to boot from disk, or you may enter a tape unit number, in the form `MT0` through `MT7`, to boot from tape.

Save PRIMOS to tape with MAGSAV by attaching to the MFD and saving the PRIRUN directory. This procedure makes PRIRUN>PRIMOS.SAVE the PRIMOS boot runfile pathname, thus ensuring that an autoboot will work. If you create the tape by saving the MFD, then the PRIMOS boot runfile pathname will be MFD>PRIRUN>PRIMOS.SAVE and you should not attempt an autoboot. In this case, do not add the 4000 switch; instead enter the correct pathname at the RUN FILE TREENAME= prompt.

When booting PRIMOS from tape, PRIMOS asks for a command device (COMDEV) in order to find the CMDNC0>PRIMOS.COMI file and the CONFIG file. Note that when you boot from tape, the pathname of the boot runfile is not written to the file MFD>BOOT_RUN_FILE_TREENAME on the COMDEV, because that file contains a pathname for booting PRIMOS from disk, not from tape.

The next sections explain how to boot PRIMOS and other programs from tape, either to recover a system after a crash or to create a system.

Recovering From a System Crash

This section explains the procedures for recovering from a system crash that damaged the disks or the file system. A system may crash for any number of reasons, including uncorrectable memory errors, machine checks, power outages, disk media failures, or other hardware failures.

Whatever the reason for the crash, sometimes you cannot reboot the system because of disk errors. The disk errors may be actual disk media failures, or they may be file system errors due to an improper system shutdown, which left file system structures on the disk in an incorrect state.

To help you recover quickly from a system crash, develop a contingency plan that includes at least the following steps:

- Perform backups on a regular basis. Remember that if your disks are damaged so badly that the data on them cannot be recovered, the only data that you have left is the data on your backup media.
- Create a boot tape so that you can boot PRIMOS from tape if you cannot boot it from disk. Create the tape with MAGSAV or with the procedure described in the section above, *Creating a Boot Tape*.
- Make a list of the physical device numbers (pdevs) of all the disks on your system.

Recovery Procedure: If your system cannot boot because of disk errors, use the following procedure to recover:

1. Determine whether the disk errors are on the command device (COMDEV) or on a paging device by checking the device number in the disk read-error

message to determine the pdev of the partition where the error occurred. (See the example below for a typical disk read-error message.)

2. Determine a course of action based on which disk is damaged:
 - o If the damaged partition is the command device, boot PRIMOS from tape and run `FIX_DISK` from tape. Use the procedure discussed in the next section, `Running FIX_DISK on a Damaged Command Device`. If this does not work, you must recreate your system, as explained in the section `Recreating a System`, later in this appendix.
 - o If the damaged partition is a nonsplit paging partition, you will probably not be able to use `FIX_DISK` on it, because `FIX_DISK` is intended for use on file system partitions. If the partition is a split partition, `FIX_DISK` fixes only the file system portion of the partition. Boot `MAKE` standalone from disk or from tape and remake the paging partition, reformatting the partition, if necessary. This procedure is shown in the example of recreating a system, later in this appendix. If this fails, check for hardware failures or perhaps replace the media.
 - o If the problem is related to a file system partition that is not the `COMDEV`, boot PRIMOS from the `COMDEV` and run `FIX_DISK` on the partition before adding it with the `ADDISK` command. If necessary, use the 100000 boot switch so that the `PRIMOS.COMI` file is not executed.

Running `FIX_DISK` on a Damaged Command Device: If you cannot boot PRIMOS because the command device is damaged, use the following procedure to run `FIX_DISK` from tape, repair the command device, and reboot PRIMOS normally:

1. At the `CP1>` prompt, use the `SYSCLR` command.
2. At the `CP1>` prompt, use the `BOOT` command with 005 specified in the `BOOT` command option word (for example, `BOOT 114005`). The 005 boot device switch boots PRIMOS from tape on tape drive 0 of the tape controller associated with address 14_g.

Note If the system contains ICS communications controllers, you must set the 100000 switch in the boot option word. This switch prevents the system from halting due to an initialization error involving the ICS controllers because the `DOWN_LINE_LOAD*` directory and its files were not found. Thus, in booting from tape with a null `COMDEV`, use the `BOOT 1xxx5` command.

3. When PRIMOS prompts for the `COMDEV`, enter 100000 for a null `COMDEV`.
4. Enter values at the `PAGING`, `NTUSR`, and `SYSNAM` prompts.

5. After PRIMOS is running, use the ASSIGN command to assign the tape drive to your terminal.
6. Use the DISKS command to place the disk to be repaired in the Assignable Disks Table.
7. Use the ASSIGN DISK command to assign the disk.
8. To repair the command device, use the MTRESUME command to resume FIX_DISK.SAVE from tape. Use the MTRESUME option -CMDOPT after the pathname of FIX_DISK to specify the FIX_DISK options.

Note You may want to run FIX_DISK in two passes. First, run FIX_DISK without the -FIX option to determine what would be lost by actually fixing the disk. If the disk can still be added to the system (with the ADDISK command), add it and use the MAGSAV or BACKUP utilities to save as much information as possible that has not already been backed up. Second, run FIX_DISK with the -FIX option to actually fix the disk. If for some reason you cannot run FIX_DISK on the disk, you must recreate the system as discussed in the next section, Recreating a System.

9. Shut down PRIMOS and reboot it with the BOOT or BOOTP command.

Example of Recovering From a Crash: The recovery procedure is illustrated in the following two-part example. In the example, the operator repairs a COMDEV that cannot boot because of errors in the MFD (which prevent access to PRIRUN and to CMDNC0). Disk drive 0 contains one 300MB disk pack. The first 14 heads of the disk pack (pdev 3460) are used for the command partition (named SYSCMD) and the last three heads (pdev 100461) are used for the paging partition.

In the first part of the example, the operator boots PRIMOS from tape and enters 100000 (for a null COMDEV) at the appropriate prompt. Note that error messages appear because no disks are added and PRIMOS cannot find files and directories.

```

CP1> SYSCLR
DPM006: Central Processor system initialization completed.
      15 Aug 90 10:20:41 Wednesday
CP1> BOOT 114005
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
BOOTING FROM MT0      PRIRUN>PRIMOS.SAVE
Coldstarting PRIMOS, Please wait...
Enter COMMANd DEvice: 100000
Enter PAGING device: 100461
Enter Number Terminal USErs: 5
[PRIMOS Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
32768K BYTES MEMORY IN USE
Enter system name: SYSA

```

Can't attach to the SAD: Not found. (get_prof)
Please contact System Administrator.
Profile data cannot be initialized from the SAD for the supervisor.
System defaults are being used.
Warning: The 5 directly-connected login lines requested by the
NTUSR directive exceed the 0 async lines present on
this system. No login lines will be available.
System clock has been initialized.
Not found. "SAD" (strtlis)
TIMER_PROCESS (user 10) logged in Wednesday, 15 Aug 90 10:22:04.
LOGOUT_SERVER (user 11) logged in Wednesday, 15 Aug 90 10:22:04.
Error initializing search rules. Please check template files in SEARCH_RULES*.
Unable to attach to initial attach point of the supervisor.
OK,

Next, now that PRIMOS is running, the operator assigns the tape drive and the command partition, making certain that the tape drive is online and at the load point. The operator resumes FIX_DISK from tape using the -ALL_CONTROLLER (-AC) option because the disk controller is not downloaded and is thus not operating as an intelligent disk controller.

```
OK, ASSIGN MTO
Device MTO assigned.
OK, DISKS 3460
OK, ASSIGN DISK 3460
OK, MTRESUME MTO FIX_DISK.SAVE -CMDOPT -DISK 3460 -FIX -AC -DUFE -CMPR
This a revision 22 MAGSAV tape.
Date:      10-01-89
Revision:  0
Reel:      1
Name:      BOOT1
[FIX_DISK Rev. 23.0 Copyright (c) Prime Computer, Inc. 1990]
Date: 8/15/90. Time: 10:27
Partition name is SYSCMD
This is a revision 22.1 partition.
Disk is in -All_Controller mode with Reverse Allocation
Disk not properly shutdown. Full fix disk will be run.
The quota system may be incorrect.
Moving DBS file system records
BEGIN MFD
  Entry at word '5742 not in hash table.
  Index entry 12 is bad, should be '5, is '37.
  BEGIN CMDNCO
DISK RD ER 002060 000000 034365 000000 000000 110000 000001
UNCORRECTABLE.
DISK RD ER 002060 000000 006307 000000 000000 110000 000001
UNCORRECTABLE.
DISK RD ER 002060 000000 006307 000000 006307 110000 000012
```

```

WORDNO ERROR ERROR
001037 000300 000000
END CMDNC0 13649
BEGIN DOS
END DOS 21
BEGIN PRIRUN
END PRIRUN 1312
BEGIN LIB
. . .
. . .
. . .
END DOWN_LINE_LOAD* 1015
Handling soft disk error recovery for '6307
Added to BADSPT file!
Handling soft disk error recovery for '34365
Added to BADSPT file!
END MFD 2557429628 records in partition
25574 records used
2 records lost
4052 records left
0 records compressed
DSKRAT UPDATED!
FIX_DISK finished
OK,

```

At this point, the operator shuts the system down and reboots PRIMOS from disk.

Recreating a System

If your system cannot boot because the command device is damaged and cannot be repaired with FIX_DISK, you must recreate the system. Before you can recreate a system, you must have the following items:

- A disk to serve as the command partition.
- A MAGSAV-format boot tape (created with BOOT_CREATE, for example) and containing the necessary files, especially MAKE, NSED, MAGRST, and the PRIRUN directory. (See the section above, Creating a Boot Tape.)
- A MAGSAV-format tape containing the files that make up a total system.

Use the following procedure to recreate a system.

Note This procedure is written assuming only one tape drive. If you have two tape drives, you can use both and will not have to switch tapes.

1. Boot MAKE from tape to format the command partition.
2. Boot MAKE from tape again to format the paging partition. (Omit this step if you used the -SPLIT option of MAKE in Step 1 to include the paging partition with the command device.)
3. Boot PRIMOS from tape with the 100000 switch set (for example, BOOT 110005). Make sure that you leave the tape on the tape drive for now.
4. At the Enter COMMAND DEVICE: prompt, enter the pdev of the command partition that you created at Step 1.
5. At the Enter PAGING device: prompt, enter the pdev of the paging partition that you created at Step 2.
6. Enter an octal number (say 2) at the Enter Number Terminal USers: prompt and the system name at the Enter system name: prompt.
7. Use the ASSIGN command to assign the tape drive that contains the boot tape.
8. Use the MTRESUME command to resume MAGRST from tape. Before you answer the MAGRST prompts, remove the boot tape from the tape drive and mount the backup tape that contains the system files.
9. Answer the MAGRST prompts.
10. If the backup tape did not contain a PRIMOS.COMI file and a configuration file, use NSED to create (or modify) them.
11. Shut down PRIMOS and reboot from disk.

Example of Recreating a System: The following four-part example shows how to recreate a system. In the example, the command partition (named SYSCMD) is the first sixteen heads of a 300MB disk pack and the paging partition is the last three heads of the same disk pack.

In the first part of the example, the operator boots MAKE.SAVE from tape drive 0 to format the command partition. (Keep in mind that the pathname of MAKE must be entered exactly as it was saved by MAGSAV.) The CPU halts when MAKE finishes.

```
CP1> SYSCLR
DPM006: Central Processor system initialization completed.
      15 Aug 90 09:30:15 Wednesday
CP1> BOOT 10005
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]

RUN FILE TREENAME=MAKE.SAVE
BOOTING FROM MTO MAKE.SAVE
**** MAKE <Rev. 23.0> **** Copyright (c) 1990, Prime Computer, Inc.
Enter command line options: -DISK 4060 -DT SMD -AC -FMT -RDI
```

```

Partition name? SYSCMD
Making      16 head partition SYSCMD
Tracks          823
Sectors per track:      9
Partition is using Reverse Sectoring
Partition is in -All_Controller Mode
Partition size in decimal records:      118479
Beginning format.
Format completed.
Checking for bad spots.
Done checking for bad spots.
4 Total badspots mapped out of PDEV 004060
Partition SYSCMD  created successfully.
DPM400: Primary CPU halted at 040236: 103775
          15 Aug 90 09:47:39 Wednesday

CP1>
  
```

In the second part of this example, the operator boots MAKE.SAVE again to create the paging partition. The `-SPLIT` option (which should always be used when creating a paging partition) specifies the number of records to be used for paging. The example also shows how MAKE prompts for the partition name if you forget to use the `-PARTITION` option.

```

CP1> SYSCLR
DPM006: Central Processor system initialization completed.
          15 Aug 90 09:53:10 Wednesday
CP1> BOOT 10005
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
RUN FILE TREENAME=MAKE.SAVE
BOOTING FROM MTO  MAKE.SAVE
**** MAKE <Rev. 23.0> **** Copyright (c) 1990, Prime Computer, Inc.
Enter command line options: -DISK 100461 -DT SMD -FMT -RDI
-SPLIT 22192
Partition name? PAGE1
Making      3 head partition PAGE1
Tracks          823
Sectors per track:      9
Partition is using Reverse Sectoring
Sectors per track:      9
Partition is using Reverse Sectoring
Partition is in -All_Controller Mode
File system records:      29
Paging records:      22192
Beginning format.
Format completed.
Checking for bad spots.
Done checking for bad spots.
4 Total badspots mapped out of PDEV 100461
  
```

Partition PAGE1 created successfully.

DPM400: Primary CPU halted at 040236: 103775
15 Aug 90 10:04:25 Wednesday

CP1>

In the third part of this example, the operator boots PRIMOS from tape drive 0 with the 100000 switch. The operator enters PRIRUN>PRIMOS.SAVE at the RUN FILE TREENAME= prompt and pdevs of the command partition (4060) and paging partition (100461) at the appropriate prompts. Error messages from the cold start are ignored. The OK, prompt indicates that PRIMOS is running.

CP1> SYSCLR

DPM006: Central Processor system initialization completed.
15 Aug 90 10:05:35 Wednesday

CP1> BOOT 110005

DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
RUN FILE TREENAME=PRIRUN>PRIMOS.SAVE

BOOTING FROM MTO PRIRUN>PRIMOS.SAVE
Coldstarting PRIMOS, Please wait...
Enter COMMAND DEVICE: 4060
Enter PAGING DEVICE: 100461
Enter Number Terminal USErs: 4
[PRIMOS Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]

32768K BYTES MEMORY IN USE
Starting up revision 22.1 partition "SYSCMD".
Enter system name: SYSA
Can't attach to the SAD: Not found. (get_prof)
Please contact System Administrator.
Profile data cannot be initialized from the SAD for the supervisor.
System defaults are being used.
Warning: The 4 directly-connected login lines requested by the
NTUSR directive exceed the 0 async lines present on
this system. No login lines will be available.
System clock has been initialized.
Not found. "SAD" (strtlis)
TIMER_PROCESS (user 9) logged in Wednesday, 15 Aug 90 10:07:45.

LOGOUT_SERVER (user 10) logged in Wednesday, 15 Aug 90 10:07:45.
Error initializing search rules. Please check template files in
SEARCH_RULES*.
Unable to attach to initial attach point of the supervisor.
OK,

In the fourth part of this example, the operator assigns the tape drive, attaches to the MFD, and uses the MTRESUME command to run MAGRST from the tape on MT0. When MAGRST begins running, the operator switches tapes so that the tape with the system software is on the tape drive and then answers the MAGRST prompts. At the Ready to Restore: prompt, the operator answers YES to restore the entire tape to the MFD.

```
OK, ASSIGN MT0
Device MT0 assigned.
OK, ATTACH MFD
OK, MTRESUME MT0 MAGRST.SAVE
This is a revision 23 MAGSAV tape.
Date:      10-29-89
Revision:  0
Reel:      1
Name:      BOOT1
[MAGRST Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Tape unit (9 Trk):
```

At this point, the operator switches tapes and then continues with the restore.

```
Tape unit (9 Trk): 0
Enter logical tape number: 1
Date(MM DD YY): 05-09-89
Rev no:      0
Reel no:     1
Name: BK.JN9
Ready to Restore: YES
*** Starting Restore ***
*** End Logical tape ***
*** Restore Complete ***
OK,
```

Converting Nonsplit Paging Partitions

At cold start, the PRIMOS boot code (for Rev. 20 and later) helps prevent an incorrect PAGING configuration directive from causing PRIMOS to accidentally page over a file system partition, thereby destroying valuable data. PRIMOS does so by preserving the file system header at the beginning of a paging partition, even if the partition is a nonsplit partition. In contrast, pre-Rev. 20 versions of PRIMOS destroyed the file system header on a paging partition the first time that the partition was used for paging.

When the PAGING directive is processed at boot time, PRIMOS verifies that a valid file system header exists on the specified paging partition. If a header does not exist, PRIMOS does not know whether the disk is a valid paging partition or

whether you specified an incorrect pdev (perhaps one that points to the middle of a file system partition). PRIMOS, therefore, displays a warning message and queries you:

```
PAGING pdev does not point to the beginning of a valid file system partition.  
Are you SURE you want to page on PAGING pdev?
```

This warning message means that one of these situations has occurred:

- The *pdev* in the PAGING directive is incorrect and specifies an actual file system partition instead of a paging partition. In this case, answer NO and you are prompted for another pdev for the paging partition.
- The PAGING directive is correct, but partition is a nonsplit paging partition. In this case, answer YES and the partition will be used for paging. (Systems that use split paging partitions do not receive this warning, regardless of which version of PRIMOS was used to create the partition.)

The warning message is displayed at every cold start if the partition configuration directive is correct. The reason, as mentioned above, is that file system headers on nonsplit paging partitions, which are carefully preserved by Rev. 20 or later PRIMOS, are destroyed by pre-Rev. 20 PRIMOS.

If your paging partition has a pre-Rev. 20 format, convert the partition by using one of these methods:

- Use MAKE with the -SPLIT option to recreate the old nonsplit paging partition as a split paging partition. This is the recommended method. The section above, *Recreating a System*, describes how to run make MAKE standalone.
- Use MAKE without the -SPLIT option to create a nonsplit paging partition, and then let PRIMOS convert it to a split paging partition at the next cold start. This method is discussed in the next section.

Either method prevents the warning message from being displayed at future cold starts.

Letting PRIMOS Convert a Nonsplit Paging Partition

To let PRIMOS help convert an old nonsplit paging partition, first use MAKE without the -SPLIT option to create a regular file system partition. Then, at the next cold start, answer YES to this prompt:

```
PAGING pdev, partition name, has not previously been used for paging.  
Are you SURE you want to page on PAGING pdev?
```

When you answer YES, PRIMOS automatically converts the partition to a split paging partition, setting aside the correct number of records for the file system part of the partition. You will not receive either of the above warning messages about this paging partition at subsequent boots.

Example of Letting PRIMOS Convert a Nonsplit Paging Partition: The following example shows the recreation of a one-head paging partition on an 80MB disk pack. The first four heads are the COMDEV partition and the remaining head is the PAGING partition.

The first part of the example shows the warning message and query that are displayed at each cold start because of the presence of the old nonsplit paging partition.

```
CP1> BOOT 14114
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]
BOOTING FROM 002060 PRIRUN>PRIMOS.SAVE
Coldstarting PRIMOS, Please wait...
CONFIG -DATA CONFIG      /* Specify CONFIG file after -DATA
PAGING 20061 does not point to the beginning of a valid file system partition.
Are you SURE you want to page on PAGING 020061? YES
. . .
. . .
. . .
```

In the second part of the example, the operator has shut down PRIMOS, and now runs standalone MAKE to create a new nonsplit paging partition. (The example assumes that the COMDEV has already been converted to a Rev. 23.0 format.) After MAKE finishes, PRIMOS is autobooted and it checks, for the last time, to be sure that you intend to use this partition as the paging partition.

```
CP1> SYSCLR
DPM006: Central Processor system initialization completed.
      15 Aug 90 06:15:45 Wednesday
CP1> BOOT 10005
DPM007: System booting, please wait.
[CPBOOT Rev. 18.0 Copyright (c) 1990, Prime Computer, Inc.]
[BOOT Rev. 23.0 Copyright (c) 1989, Prime Computer, Inc.]

RUN FILE TREENAME=MAKE.SAVE
BOOTING FROM MT0 MAKE.SAVE
**** MAKE <Rev. 23.0> **** Copyright (c) 1990, Prime Computer, Inc.
Enter command line options: -DISK 20061 -DT SMD -FMT -RDI -PART PAGER
Making      1 head partition PAGER
Tracks                823
Sectors per track:      9
Partition is using Reverse Sectoring
Partition is in -All_Controller Mode
```


If you start the system by pressing the ON/INITIATE SHUTDOWN button or using the BOOTP command, the booting process (including the preboot) is executed automatically.

If, however, you boot the system by using the BOOT command with a boot option word, you are telling the preboot to use the appropriate octal values for the boot procedure. For example, the standard disk boot (from disk drive 0 on controller address 26_g) uses the BOOT 14114 command.

The boot option word used as an argument to the BOOT command is described in the section titled Boot Option Words, at the beginning of this appendix. The following section explains in detail the meanings of the boot device switch values. For a complete list of the possible boot device switches and their meanings, see Table A-1. For a list of the boot option switches that you can use with a boot device switch, see Table A-2.

Meanings of the Boot Device Switch Values

The octal number that you supply during a preboot has the same meaning on any 50 Series computer. The octal number (given as an argument to the BOOT command) consists of a maximum of six digits. (Numbers containing less than six digits are supplied automatically with leading zeros. Therefore, BOOT *nnn* is interpreted as BOOT 000*nnn*.)

The leftmost digit of the octal number can be 0 or 1; the other digits can range from 0 through 7, inclusive. The six octal digits represent sixteen bits.

The first five digits of the octal number (bits 1-13) have special meanings that are discussed in the section titled Boot Option Words, at the beginning of this appendix. A bit without an assigned meaning is reset to 0.

The rightmost octal digit (bits 14-16) indicates what type of physical device contains the BOOT program. (Therefore, this digit also determines which bootstrap program is loaded into main memory.) This octal digit should be 0, 4, or 5, which means the following:

- A value of 0 reads in the auto-start bootstrap.
- A value of 4 reads in the disk bootstrap.
- A value of 5 reads in the tape bootstrap.

These three operational values are discussed further in the next sections. The meanings of the eight possible values of the rightmost octal digit are listed in Table A-3.

Table A-3. Meaning of Bits 14-16 of the Boot Option Word

Bit 14	Bit 15	Bit 16	Octal	Meaning
0	0	0	0	Auto-start
0	0	1	1	Obsolete - do not use
0	1	0	2	Obsolete - do not use
0	1	1	3	Obsolete - do not use
1	0	0	4	Disk
1	0	1	5	Magnetic tape
1	1	0	6	Obsolete - do not use
1	1	1	7	Reserved

Auto-start (0): Reads in the auto-start bootstrap. This bootstrap differs from the others in that it starts execution of a program that is already loaded into memory. Execution begins (in 64R mode) at the location specified in bits 1-10 (digits 1 through 4, representing locations 10000₈ through 177700₈). These bits become bits 1-10 of the starting address; bits 11-16 (digits 5 and 6) of the starting address are set to zero. If bits 1-10 are 0, a default starting location of 1000₈ is used.

Disk (4): Disks come in two varieties:

- Storage Module Disks (SMDs)
- Fixed-Media Disks (FMDs), also referred to as Winchester disks

These disks all use 2080-byte records. The same BOOT values are used for both types.

The functions of bits 1-7 are described in Table A-2 earlier in this appendix. The functions of bits 8-16 are as follows:

- Bits 8, 9, and 10 indicate which disk unit to address. Bit 10 is always set (=1).
- Bits 11, 12, and 13 indicate with which controller the disk is associated. Bit 11 differentiates between device addresses 26₈ and 27₈ and device addresses 22₈ and 23₈.
- Bits 13 and 14 are always set (=1).
- Bits 15 and 16 are reset (=0), indicating that disks are involved rather than tape.

A detailed explanation of bits 8-16 in a disk boot is listed in Table A-4.

Table A-4. Meaning of Bits 8-16 in a Disk Boot Option Word

Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15	Bit 16	Device Address	Disk Unit	Disk Cntrlr	Octal Value
0	0	1	0	0	1	1	0	0	26 ₈	0	0	114
0	1	1	0	0	1	1	0	0	26 ₈	1	0	314
1	0	1	0	0	1	1	0	0	26 ₈	2	0	514
1	1	1	0	0	1	1	0	0	26 ₈	3	0	714
0	0	1	0	1	1	1	0	0	27 ₈	0	1	134
0	1	1	0	1	1	1	0	0	27 ₈	1	1	334
1	0	1	0	1	1	1	0	0	27 ₈	2	1	534
1	1	1	0	1	1	1	0	0	27 ₈	3	1	734
0	0	1	1	0	1	1	0	0	22 ₈	0	2	154
0	1	1	1	0	1	1	0	0	22 ₈	1	2	354
1	0	1	1	0	1	1	0	0	22 ₈	2	2	554
1	1	1	1	0	1	1	0	0	22 ₈	3	2	774
0	0	1	1	1	1	1	0	0	23 ₈	0	3	174
0	1	1	1	1	1	1	0	0	23 ₈	1	3	374
1	0	1	1	1	1	1	0	0	23 ₈	2	3	574
1	1	1	1	1	1	1	0	0	23 ₈	3	3	774

Record 0 (of the first partition of the disk drive specified by bits 8-10 on the controller specified by bits 11-13) is read into memory starting at location 760₈ to allow for the 16-word record header. Execution begins at 1000₈ with a JST 777 instruction.

Thus, in a standard, automatic disk boot from drive unit 0 on controller address 26₈, the octal value is 014114.

Magnetic Tape (5): When you are booting from magnetic tape, the bit patterns and the octal values appear as shown in the table below.

The functions of bits 1-7 are described in Table A-2, earlier in this appendix. The functions of bits 8-16 are as follows:

- Bits 8, 9, and 10 indicate which tape unit (MT0 through MT7) is involved. Tape drives MT0 through MT3 must be associated with tape controller 0; tape drives MT4 through MT7 must be associated with tape controller 1.
- Bits 11, 12, and 13 indicate with which controller the tape drive is associated. Bits 11 and 13 are always reset (=0); bit 12 actually indicates the controller.
- Bits 14 and 16 are always set (=1).
- Bit 15 is reset (=0), indicating that tape is involved rather than disk.

A detailed explanation of bits 8-16 in a tape boot is listed in Table A-5.

Table A-5. Meaning of Bits 8-16 in a Tape Boot Option Word

Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15	Bit 16	Device Address	Tape Unit	Tape Cntrlr	Octal Value
0	0	0	0	0	0	1	0	1	14 ₈	0	0	005
0	1	0	0	0	0	1	0	1	14 ₈	1	0	205
1	0	0	0	0	0	1	0	1	14 ₈	2	0	405
1	1	0	0	0	0	1	0	1	14 ₈	3	0	605
0	0	0	0	1	0	1	0	1	13 ₈	4	1	025
0	1	0	0	1	0	1	0	1	13 ₈	5	1	225
1	0	0	0	1	0	1	0	1	13 ₈	6	1	425
1	1	0	0	1	0	1	0	1	13 ₈	7	1	625

When you are booting from tape, the bootstrap reads record 0 into memory from the first logical tape. That logical tape was written by MAGSAV on the physical tape that is now mounted on the tape drive specified by bits 8 through 10. That tape drive is associated with the controller specified by bit 12. The bootstrap starts up the tape drive, ensures that the tape is set at the loadpoint, and reads one tape record into memory locations 200₈ through 7775₈ (3894 halfwords). Execution begins at 1000₈ with a JST 777 instruction. The record read in by the bootstrap contains the BOOT program.

BOOT Program on Disks and Tapes

The BOOT program is placed on all disks by the MAKE utility and on tapes by the MAGSAV utility in each logical tape header-record. The runfile resides in the MFD and is called BOOT (MFD>BOOT).

The BOOT file on disk occupies several records, the first of which must be physical record 0. The preboot reads in the first record, which is itself a disk input routine that loads in the other records. When read in from disk, the BOOT program performs these steps:

1. Initializes the supervisor terminal.
2. Cleans up memory parity, nondestructively, throughout the first 512 Kbytes of memory.
3. Tests the first 512 Kbytes of memory.
4. Prompts you for the physical device from which to read in the file to be booted. (If you used the 10000 switch in the boot option word, this step is omitted, and the program to be executed is read in from the device from which BOOT was loaded.)
5. Prompts you for the valid treename of the runfile to be loaded. (If the 4000 switch is used in the boot option word, this step is omitted and the default PRIMOS runfile pathname is loaded.)
6. Reads the specified file into memory and starts it.

A boot operation has three possible outcomes:

- A successful boot, in which case PRIMOS (or another bootable program, such as standalone MAKE) takes control.
- A detected error, in which case the boot prompts you for the device from which to boot.
- An undetected error (such as a nonexistent device), in which case the boot hangs. (Error messages are listed in Appendix B.)

After the boot has been successfully brought into memory by the preboot, you can reexecute it by entering SYSCLR and starting at 1000_g. If a status error is detected on the device, BOOT restarts automatically, waiting until the device is ready.

PRIMOS Cold-start Messages

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This appendix lists the messages generated by a cold start of PRIMOS and describes some reasons for halts during the boot procedure and the numbers displayed during such halts.

For detailed information on network initialization error messages, see the *Operator's Guide to Prime Networks*. For detailed information on ICS2 and ICS3 initialization error messages, see the *ICS User's Guide*.

Disk and Tape Boot Errors

Some errors may cause the disk boot program or the tape boot program to halt. The error may be due to one of the following reasons:

- The boot is not set up to handle that error.
- The boot cannot proceed further after the error.
- Not enough of the boot has been read in to properly handle the error.

Halts in the range 0/000060 through 0/000077, inclusive, and without error messages correspond to faults not handled by the boot at the time. The address at which the halt occurs is one greater than the fault vector defined in the *System Architecture Reference Guide*. The boot generally encounters one of the following three fault vectors:

- 000067 Memory Data Parity Error
- 000070 Machine Check
- 000071 Missing Memory Module

The boot also halts at addresses greater than 0/000100 for other reasons. In such cases, one of the following numbers is displayed at the supervisor terminal after the halt location.

<i>Number</i>	<i>Meaning</i>
103	Bad Device Type. A missing boot device type or one that is no longer supported was specified in the physical device number. Reboot using valid parameters.
104	Bad Status. An I/O error occurred when booting from disk; location 40 ₈ contains the disk status word. Tape boots do not take this halt. When all of the boot is read in, errors of this type cause an error message to be displayed.
105	Bad Record ID. As each record is read, the requested record address is checked against the actual record address. If these addresses do not match, a halt occurs with this error. The record address contained within the record being read does not match the record address the boot attempted to read. The medium is corrupted. Reboot from another device or use another disk pack or reel of tape. When all of the boot is read in, errors of this type cause an error message to be displayed.
106	Incompatible BOOT Records. The first and last records are checked to see if they come from the same version of the BOOT program. The second and subsequent records may come from a different version of BOOT; boot records are not internally consistent. If such an incompatibility is recognized, BOOT halts with this error. Reboot using another disk pack or tape. Update the boot on the medium where the boot failed.

The above halt errors do not produce error messages. If the boot does halt, in most cases you can step past the error by issuing a RUN command (for example, if the halt is caused by a recoverable memory parity error or machine check, or if you want to boot a T&M program to diagnose hardware problems).

PRIMOS Messages

This section contains the informational, warning, and error messages generated by the PRIMOS preloader and the PRIMOS initialization sequence. The name of the module generating the error is often printed in parentheses at the end of the error message.

In general, these messages are alphabetized. Where a variable precedes the message, the message is alphabetized by the first word in the message; for example, see the first few messages.

When cold starting, PRIMOS can recover from many configuration errors, particularly those specifying nonexistent devices and incorrect physical device numbers for the command and paging partitions. If a configuration error aborts the cold start, boot PRIMOS with the 100000 switch set in the boot option word

(for example, BOOT 114114) and use the nonshared editor (NSED) to correct the erroneous (or missing) directive. See Appendix A in this book for details on booting PRIMOS without the system configuration and startup files. For details on configuration directives, see the *System Administrator's Guide, Volume I: System Configuration*.

primos-error config-filename (CINIT)

Cold start halts because PRIMOS is unable to open the configuration file (*config-file*) for reading to complete processing the configuration directives. Boot with the 100000 switch and check that the filename specified in the CONFIG -DATA command (in PRIMOS.COMI or C_PRMO) identifies the proper system configuration file and that the configuration file exists in CMDNC0. If the file exists, run FIX_DISK because the disk media may be corrupt.

primos-error Allocating user 1 unit tables. (BINIT)

A file system unit table could not be allocated for User 1. Cold start halts. Reboot. If this error recurs, call your PrimeService representative.

Attempt to down-line load tape controller FAILED. (MTINIT)
 Controller address = xxxxxx (OCT)
 Error Code = File in use.

If this message appears without one of the first two messages, then this is an indication that the downline-load file is corrupt or the Model 7210 controller is not working properly. Otherwise, the error code will be a file system error or an octal error code. An octal error code xxxxxx indicates a problem with the Model 7210 controller or a bad file.

BAD AMLCLK PARAMETER (CINIT)

The AMLCLK directive specifies a *baudrate* value less than 35₈ (29 decimal) or greater than 45400₈ (19200 decimal).

BAD AMLIBL PARAMETER (CINIT)

The DMC input buffer size is too small. Specify either a value of 0 or a value greater than 20₈.

BAD AMLTIM PARAMETER (CINIT)

The AMLTIM directive specifies a value for *disctime* or *gracetime* that is less than the value of *ticks*.

Bad ASYNC directive: JUMPER (CINIT)

Cold start halts because the ASYNC JUMPER directive specifies an invalid speed or fewer than three speeds. Boot with the 100000 switch and use NSED to correct the directive.

BAD CONFIG DIRECTIVE - IGNORED. *directive* (CINIT)

The indicated directive is not recognized and is ignored. Check the spelling and be sure that this is a valid directive.

Bad *disctime* *m* specified for AMLTIM; *n* will be used.
(CINIT)

The value *m* (decimal) specified for the AMLTIM *disctime* argument is not 0 and is less than the *ticks* argument. The value *n* (decimal) has been substituted for the one that you specified. Be sure to correct the directive.

BAD DMQ AMLC CONFIGURATION (CINIT)

A DMQ buffer size in an AMLBUF directive is not equal to a power of 2, such as 16 (20₈), 32 (40₈), 64 (100₈), 128 (200₈), or 256 (400₈).

BAD FILUNT PARAMETER (CINIT)

The FILUNT directive specifies an invalid value for the first parameter (which must be 0) or for *max-unit*.

Bad *gracetime* *m* specified for AMLTIM; *n* will be used.
(CINIT)

The value *m* (decimal) specified for the AMLTIM *gracetime* argument is not 0 and is less than the *ticks* argument. The value *n* (decimal) has been substituted for the one that you specified. Be sure to correct the directive.

Bad ICS directive: CARDS (CINIT)

Cold start halts because the ICS CARDS directive does not specify both the device address and configuration, or specifies an invalid device address. Boot with the 100000 switch and use NSED to correct the directive.

Bad ICS directive: INPQSZ (CINIT)

Cold start halts because the ICS INPQSZ directive specifies an invalid value for the queue size. The value must be between 17₈ and 1777₈ (inclusive) and must be equal to one less than a power of two (for example, 17₈, 37₈, 77₈, 177₈, 377₈, 777₈, and 1777₈). Boot with the 100000 switch and use NSED to correct the directive

BAD ICS DIRECTIVE: INTRPT (CINIT)

Cold start halts because the ICS JUMPER directive specifies an invalid speed or fewer than three speeds. Boot with the 100000 switch and use NSED to correct the directive.

Bad ICS directive: JUMPER (CINIT)

Cold start halts because the ICS JUMPER directive specifies an invalid speed or fewer than three speeds. Boot with the 100000 switch and use NSED to correct the directive.

BAD LHC DIRECTIVE, LHC NUMBER MUST BE BETWEEN 0-7.

The first argument to the LHC directive specifies a number that is not within the range of 0 through 7, inclusive. The directive is ignored (which means that the LAN Host Controller is not configured) and cold start continues.

Bad line # *n* in ASRBUF command; directive ignored. (CINIT)

The ASRBUF directive specifies a line number (*n*, octal) other than the correct value of 0. The directive is ignored and the default sizes (200₈ for the input buffer and 300₈ for the output buffer) are used. Remove or correct the directive.

Bad line number *n* in DISLOG directive. (CINIT)

The line number argument (*n*) to a DISLOG directive is less than 1₈ or greater than 1000₈ (512 decimal). The directive is ignored and cold start continues.

BAD LOTLIM PARAMETER (CINIT)

The LOTLIM directive specifies fewer than 2 or more than the time allowed by LOUTQM.

BAD LOUTQM PARAMETER (CINIT)

The LOUTQM directive specifies 0 minutes of inactivity before logging out a user. Increase this amount.

BAD NVMFS PARAMETER (CINIT)

The NVMFS directive specifies a value larger than 400₈ (256 decimal) segments.

Bad parameters in DISLOG directive. (CINIT)

The YES/NO form of the DISLOG directive was used, but the argument specifies something other than YES or NO. The directive is ignored, and cold start continues.

BAD PREPAG PARAMETER (CINIT)

The PREPAG directive specifies a value representing more than the number of pages of memory available for paging.

BAD PROTOCOL SPECIFICATION IN SMLC CNTRLR DIRECTIVE: *p* (CINIT)

The protocol argument to the SYNC (or SMLC) CNTRLR directive specifies *p*, which is an invalid protocol. The controller is disabled. For valid protocols, see the *System Administrator's Guide, Volume II: Communication Lines and Controllers*.

BAD RECORD ID, ASKED: *m* FOUND: *n*

Cold start halts when booting from tape because, while the BOOT program was reading a record from tape, the expected record address does not match

the record address of the record read. Check that you entered a correct physical device number. If you have, the tape drive may be broken or the tape itself may be corrupted. Boot from another device or use another reel of tape. This error corresponds to the halt with 105 displayed, as described in the section titled Disk and Tape Boot Errors, earlier in this appendix.

BAD SMLC CONTROLLER MAPPING COMMAND (CINIT)

Cold start halts because an SMLC (or SYNC) controller mapping directive specifies an invalid or missing controller number. The valid numbers are 0, 1, and 7. Boot with the 100000 switch and use NSED to correct the directive.

BAD SMLC DATASET PROCEDURE: *n* (CINIT)

Cold start halts because a SYNC DSC (or SMLC DSC) directive specifies an invalid or missing data set procedure of *n*. Correct values are 1, 2, and 3. Boot with the 100000 switch and use NSED to correct the directive.

BAD SMLC DATASET STRAPPING ORDER: *n* (CINIT)

Cold start halts because a SYNC DSC (or SMLC DSC) directive specifies an invalid or missing data set strapping order of *n*. The data set strapping order must be a value consisting of any combination of the octal values 10₈, 2₈, and 1₈. Boot with the 100000 switch and use NSED to correct the directive.

BAD SMLC LINE MAPPING COMMAND (CINIT)

Cold start halts because an SMLC SMLC (or SYNC SYNC) line mapping directive specifies an invalid or missing physical line number. The physical line number must be 0, 1, 2, or 3. Boot with the 100000 switch and use NSED to correct the directive.

BAD SMLC PARAMETER (CINIT)

The SMLC directive is invalid or does not have the required parameters.

BAD SMLC RECEIVER ON/OFF CONTROL: *n* (CINIT)

Cold start halts because a SYNC DSC (or SMLC DSC) directive specifies an invalid or missing receiver on/off control value of *n*. Correct values are 0 and 1. Boot with the 100000 switch and use NSED to correct the directive.

Bad token, ignore it.

An invalid character parameter exists in the system configuration file or the system startup file (PRIMOS.COMI or C_PRMO). The error is ignored and cold start continues.

**Bad value *n* specified for AMLCLK; directive ignored.
(CINIT)**

The value *n* (octal) specified for the AMLCLK directive was less than 35₈ (29 decimal) or greater than 45400₈ (19200 decimal). The default value of 22600₈ (9600 decimal) will be used. Remove or correct the directive.

Cannot add boot device *pdev*.

Cold start halts because the boot disk device could not be accessed. Some possible causes are that the disk drive is offline, the partition has an unsupported format, or the partition is corrupt (a good file system header was not found). Boot from another disk or from tape.

Cannot allocate Async DMQ buffers. (COMINI)

Cold start halts because PRIMOS could not allocate the segments required for asynchronous DMQ input and output buffers. The failure occurred because the number of segments needed for DMQ buffers is greater than the number of consecutive segments available on the system. If your system has more controllers than the memory can support, you may be able to cold start by removing a controller (for example, an ICS3 controller). In any case, call your PrimeService representative.

Cannot allocate CWAITQ storage. *primos-error* (lsrbuf)

Cold start halts because the LSRBUF routine of PRIMOS could not allocate the required CWAITQ storage area in memory. The CWAITQ storage, which is used to pass characters to the LOGIN_SERVER during a login request, is necessary for users to log in. Retry the boot. If the error persists, call your PrimeService representative because this error may indicate faulty hardware (such as failing memory).

Cannot allocate enable_flags storage. *primos-error* (trmini)

While attempting to initialize the terminal I/O enable flags, PRIMOS could not allocate the required storage area in memory. Cold start halts. Retry the boot. If the error persists, call your PrimeService representative.

Cannot allocate LGOSEM storage. *primos-error* (pcbini)

While attempting to initialize the Process Control Blocks for all user processes, PRIMOS could not allocate a block of wired storage large enough for all configured users. Cold start halts. Retry the boot. If the error persists, call your PrimeService representative.

Cannot allocate termparents storage. *primos-error* (trmini)

While attempting to initialize the data storage for all processes' terminal parent ID attributes, PRIMOS could not allocate the required storage area in memory. Cold start halts. Retry the boot. If the error persists, call your PrimeService representative.

Cannot copy existing input data to new user1 input buffer (as_init_bufrec)

Because the ASRBUF directive specifies an input buffer size other than the default input size that is already allocated, PRIMOS attempted to copy any data in the old input buffer (for User 1) to the new buffer and update the input fields in the associated buffer record entry. The copy attempt, however, has

Cannot lock database for remote line *n*, status *code*
(lsrbuf)

Cold start halts because the LSRBUF routine of PRIMOS could not lock the buffer database set up for remote line *n* (decimal). *code* is the status code returned by the routine that locks an asynchronous line. Retry the boot. If the error persists, call your PrimeService representative because this error may indicate faulty hardware (such as failing memory).

Cannot mirror COMDEV pdev pdev - incorrect Rev. or mode.

Disk mirroring will not be performed on the indicated partition either because it is not a Rev. 21 or later disk or is not in Dynamic Badspot Handling (-IC) mode. If the disks are of the same type (for example, both are Model 4845 770MB disks), run MAKE with the -INTELLIGENT_CONTROLLER option.

Cannot mirror on COMDEV pdev pdev - incorrect Rev., mode, or model.

Disk mirroring will not be performed on the indicated partition either because it is not a Rev. 21 or later disk, is not in Dynamic Badspot Handling (-IC) mode, or is not the same disk model as the other mirrored disk. If the disks are of the same type (for example, both are Model 4845 770MB disks), run MAKE with the -INTELLIGENT_CONTROLLER option.

Cannot mirror on PAGINM pdev pdev - incorrect Rev., mode, or model.

Disk mirroring will not be performed on the indicated partition either because it is not a Rev. 21 or later disk, is not in Dynamic Badspot Handling (-IC) mode, or is not the same disk model as the other mirrored disk. If the disks are of the same type (for example, both are Model 4845 770MB disks), run MAKE with the -INTELLIGENT_CONTROLLER option.

Cannot mirror on PAGINM pdev pdev - mirror table full.

Disk mirroring will not be performed on the indicated partition because there are no free mirror records in the Disk Mirror Table.

Cannot mirror PAGING pdev pdev - incorrect Rev. or mode.

Disk mirroring will not be performed on the indicated partition either because it is not a Rev. 21 or later disk, is not in Dynamic Badspot Handling (-IC) mode, or is not the same disk model as the other mirrored disk. If the disks are of the same type (for example, both are Model 4845 770MB disks), run MAKE with the -INTELLIGENT_CONTROLLER option.

Cannot obtain logged-out buffers for local line *n*, status *code* (lsrbuf)

The LSRBUF routine of PRIMOS could not allocate the logged-out buffers for the directly-connected loginable line *n* (decimal). The buffers (input,

*** Cannot read DSKRAT of disk *pdev*.

Cold start halts because PRIMOS could not read the DSKRAT file of the command partition (*pdev*). Boot from tape or from another disk and run **FIX_DISK** on the bad disk. Retry the boot and if the problem persists, call your PrimeService representative.

Cannot read DSKRAT of PAGING *pdev*.

A disk read-error occurred while PRIMOS was trying to read the record that contains the DSKRAT on paging partition *pdev*. If *pdev* is the only valid *pdev* specified for a paging partition, cold start continues and you are prompted for a physical device number for the paging partition. Run **FIX_DISK** or **MAKE** on the paging partition indicated by *pdev*.

Cannot set ACL on SAD. *primos-error (strtlS)*

The LOGIN_SERVER process could not change the ACL on the SAD. The server was attempting to edit the ACL to give itself rights to the SAD. Without these rights, the LOGIN_SERVER will not be able to process login requests. Try using the **START_LSR** command. If the command does not work, call your PrimeService representative.

Cannot spawn Login Server. *primos-error (strtlS)*

PRIMOS could not start up the LOGIN_SERVER process that handles login requests. Use the **START_LSR** command because users cannot log in if this system server is not running. If the problem recurs, call your PrimeService representative.

Cannot spawn Logout Server Process. *primos-error (strtas)*

PRIMOS could not start up the LOGOUT_SERVER process that deallocates system resources after logouts. Retry the boot. If the problem recurs, call your PrimeService representative.

Cannot unlock database for local line *n*, status code (*lsrbuf*)

Cold start halts because PRIMOS could not unlock the buffer database set up for the directly-connected loginable line *n* (decimal). The LSRBUF routine was attempting to deallocate the database because it had previously failed to obtain logged-out buffers for the line. *code* is the status code returned by the Ring 0 routine (called by LSRBUF) that unlocks an asynchronous line. Retry the boot. If the error persists, call your PrimeService representative because this error may indicate faulty hardware (such as failing memory).

Cannot unlock database for remote line *n*, status code (*lsrbuf*)

Cold start halts because PRIMOS could not unlock the buffer database set up for remote line *n* (decimal). The LSRBUF routine was attempting to deallocate the database because it had previously failed to obtain buffers for

primos-error Can't set priority ACL. (BINIT)

Cold start halts because a priority ACL could not be set for User 1. Call your PrimeService representative.

primos-error Can't start slave. (NPXON)

Remote File Access (RFA) is not enabled for this system because slave processes cannot be started.

Coldstarting PRIMOS, Please wait...

PRIMOS is cold starting.

COMDEV *pdev* does not point to the beginning of a valid file system partition.

The physical device number of the partition does not point to an area with a valid file system header. You are queried for another physical device number for COMDEV.

COMDEV *pdev* is an old partition which is not supported.

The COMDEV directive specifies a type of partition (such as one with 440 words per disk record) that is not supported after Rev. 15. You are prompted for another physical device number for COMDEV. Convert your disk.

COMDEV *pdev* is not a valid *pdev*.

The physical device number (*pdev*) supplied for the command partition is not valid. This error often occurs because of an invalid device type. The device type must be 60₈ (*pdev* = *nnnn6n*), not 20₈ (floppy disk). You are prompted for another physical device number for COMDEV.

COMDVM must follow COMDEV directive.

COMDVM directive ignored.

The COMDVM directive does not follow the COMDEV directive in the configuration file. The COMDVM directive is ignored and the command partition is not mirrored. Correct the configuration file by placing the COMDVM directive on the line following the COMDEV directive.

Controller codes: *n*, *n*

Error while loading device *o* (PCCBS)

Controller returned *p* words of (hex) status: *q q q q*

ICS device *o*: boot failed (BTPCC)

ICS cold start initialization failure.

The ICS failed to pass its self-verify test because of a hardware problem, which was probably caused either by the controller itself or by the LACs. *n* is the error code generated by the controller, *o* is the octal device address, *p* is the number of words returned (a maximum of four words may be returned), and *q* is the word status. Call your PrimeService representative.

DISK ERROR, STATUS: *n*

A disk I/O error occurred. The status words are displayed. Make sure that the device exists, that it is started, and that it is online. If booting from disk, check that you have used the correct drive and controller addresses.

*** Disk *pdev* is not a PRIMOS partition.

PRIMOS could not start up the command partition (*pdev*) because it was formatted with a version of MAKE that is more recent than the version of PRIMOS that you are booting. Cold start halts. Either boot a later version of PRIMOS or convert your disk by running standalone MAKE.

*** Disk *pdev*: Not ready.

Cold start halts because PRIMOS could not start up the command partition (*pdev*). Check that the COMDEV directive specifies the correct *pdev*, that the cables are connected correctly, and that the disk drive is online and functioning. Retry the boot and if the problem persists, call your PrimeService representative.

*** Disk *pdev*: Old partitions not supported.

PRIMOS could not start up the command partition (*pdev*) because it is a type of partition (such as one with 440 words per disk record) that is not supported after Rev. 15. Cold start halts. Convert your disk by running standalone MAKE.

DLL and init ICOP complete (*address*) - (*disk_init*)

The indicated disk controller successfully entered ICOP (Intelligent Channel Order Protocol) mode.

DLL of 7210 controller complete. (*device_number*) - (*disk_init*)

The Model 7210 controller is successfully downline loaded and initialized as an intelligent disk controller with enhanced error correction.

DLL file SDTC_XXXX_Y.DL not found. (MTINIT)

XXXX is the model number of the tape drive attached to the Model 7210 controller. Y is the number of the port on the Model 7210 controller to which the tape drive is attached. Check the DOWN_LINE_LOAD* directory for the existence of the downline load file.

DMQ BUFFERS TOO LARGE (AMINIT)

The DMQ buffer size is too large. Reconfigure it within the permissible range using the AMLIBL directive.

Enter system name:

Either the configuration file does not contain the SYSNAM directive, the directive does not specify a valid system name, or you booted PRIMOS with the 100000 boot switch option. Enter a system name that begins with a letter and contains a maximum of six characters.

Error accessing CONFIG file *filename*.

An error was encountered while the preloader was trying to read the configuration file. Cold start continues and you are prompted for the COMDEV, PAGING, NTUSR, and SYSNAM parameters.

Error accessing *filename primos-error (get_prof)*

PRIMOS could not open or read the specified file in the SAD, which contains the entry used to initialize the profile of User 1 (SYSTEM). System defaults will be used to initialize the profile of User 1. After system startup, run FIX_DISK to make sure the SAD directory is not corrupt.

Error: async line *xx (Jyy)* on line card in slot *zz* is inoperable (BTPCC)

The specified asynchronous line in the ICS communications controller is inoperable, probably because of a defective LAC. Call your PrimeService representative.

Error attempting microcode load on device address *nn*.

PRIMOS could not load the microcode file into an MPC4 controller. Call your PrimeService representative.

Error: bad ccpat index *n* (BTPCC)

While attempting to boot a programmable communications controller, PRIMOS encountered a bad index (*n*) in the CCPAT (Communications Controller Physical Attribute Table). The controller will not be started. Retry the boot. If the problem recurs, call your PrimeService representative.

Error: Bad SMLC directive, invalid device address *nn* (COMINI)

While performing a consistency check on the communications controllers, PRIMOS verified that the device address *nn* (octal) is not valid. The controller will not be configured. Check the SYNC (or SMLC) directives in the configuration file.

ERROR: BADSPX

The BADSPT file on a paging partition could not be opened. Use FIX_DISK to repair the partition. If the condition recurs, use MAKE to recreate the partition with a new BADSPT file.

Error: boot failed on ICS device address *nn* (BTPCC)

The ICS communications controller on device address *nn* could not be started because there is not enough segment 0 buffer storage space for the device or there is not a phantom interrupt code segment to handle the device. Retry the boot. If the problem persists, call your PrimeService representative.

Error: broken async lines for ICS on device address *nn* (BTPCC)

The ICS1 communications controller on device address *nn* contains faulty asynchronous lines. Call your PrimeService representative.

Error: condition "*condition-name*" raised at *segment(ring)/offset*.

Error detected during coldstart system shutting down

Cold start has halted at the specified location because of an error raised by condition *condition-name*. If the cause is a write error, first check that the boot and paging disks are not write-protected. If they are not, then the error may have been caused by PRIMOS attempting to write on a corrupt disk (for example, when the MFD>BOOT_RUN_FILE_TREE_NAME file is being updated). In this case, boot from tape and run FIX_DISK.

Error: Controller *nn* does not support sync protocols (COMINI)

While performing a consistency check on the communications controllers, PRIMOS verified that the controller at device address *nn* (octal) is not an ICS2/ICS3 and cannot support synchronous communications. The controller will not be configured. The probable cause is an incorrect protocol argument to the SYNC CNTRLR directive.

Error: controller has returned *m* words of (hex) status: *nn*

The ICS communications controller could not be started, probably because the controller has a fault. The error status (*nn*) represents the last data returned from the controller. Call your PrimeService representative.

Error: ICS cold start initialization failure (COMINI)

An ICS controller could not be started. Call your PrimeService representative.

Error: ICS cold start initialization failure: could not boot controller (COMINI)

The ICS communications controller could not be initialized. Cold start continues but the ICS controller will not be functioning. Possible causes for this failure are a nonexistent or corrupt DOWN_LINE_LOAD* directory and missing downline load files in the DOWN_LINE_LOAD* directory. You may be able to correct the problem by running FIX_DISK on the partition and/or restoring the ICS downline load files from a backup tape. If the problem persists, call your PrimeService representative.

Error in badspot file format.

The BADSPT file on a paging partition could not be read. Use FIX_DISK to repair the partition. If the condition recurs, use MAKE to recreate the partition with a new BADSPT file.

Error in extending static seg 0 space (CINIT)

The SMLC directive specifies the SDLC protocol, but there is not enough memory space in segment 0 for the IPQNM (Inter-Process Queuing and Notification Mechanism) communication software. Cold start halts. Call your PrimeService representative.

Error initializing search rules. Please check template files in SEARCH_RULES*.

The search rules for User 1 (SYSTEM) could not be initialized. This message should appear if you specify a null COMDEV (100000) at the Enter COMMAND DEVICE prompt. If the message appears in another situation, check that the SEARCH_RULES* directory exists and that it contains the appropriate files for the system search rules.

Error: line card in slot zz is inoperable (BTPCC)

The specified LAC in the ICS communications controller is defective. All of the lines on the card are inoperable. Call your PrimeService representative.

Error: line card in slot zz is unrecognizable (BTPCC)

The specified LAC in the ICS communications controller returned an ID that is unknown or unrecognizable to the module that boots the controller. Check that the correct LAC type (ASYNCR, RS232, V35) is installed in slot zz of the card cage. If the LAC type is correct, then the LAC is probably defective and you should call your PrimeService representative.

Error: No controller at address nn (COMINI).

While performing a consistency check on the communications controllers, PRIMOS could not verify the existence of a controller at device address nn (octal). Possible causes are an incorrectly installed controller, defective or loose cables, and an incorrect directive (LHC, SYNC, or SMLC) in the configuration file.

Error: NO phantom interrupt handler for ICS on device address nn (BTPCC)

The ICS communications controller on device address nn could not be started because there is not a phantom interrupt code segment to handle the device. Retry the boot. If the problem persists, call your PrimeService representative.

Error: v35 sync line xx (Jyy) on line card in slot zz is inoperable (BTPCC)

The specified synchronous line in the ICS communications controller is inoperable, probably because of a defective LAC. Call your PrimeService representative.

Error while loading device o (PCCBS)
ICS_n controller has not responded to self test.
Controller returned p words of (hex) status: q q q q
ICS device o: boot failed (BTPCC).
ICS cold start initialization failure.

The ICS controller failed its self-verify test. Someone has probably renamed or tampered with the downline load files. o is the device address of the controller, p is the number of words returned, and q is the word status. Restore the DOWN_LINE_LOAD* directory from backup tapes and try again. If this procedure fails or if you have no backup tapes, call your PrimeService representative.

Error while starting AMINIT: Cannot allocate mutex locks.
(COMINI)

Cold start halts because PRIMOS could not initialize the mutex locks for all lines present on the system. (AMINIT is the PRIMOS module that initializes the AMLC controllers.) During the initialization, PRIMOS must allocate enough space in system memory for a lock for each line, but could not do so. Retry the boot. If the error persists, call your PrimeService representative because this error may indicate faulty hardware (such as failing memory).

Error: whilst opening dll-file for ICS on device address nn
(BTPCC)

The ICS communications controller could not be started because a downline load file could not be read. Cold start continues but the ICS controller will not be functioning. The probable cause is that the ICS DOWN_LINE_LOAD* directory or a file in it is corrupt. You may be able to correct the problem by running FIX_DISK on the partition and/or restoring the ICS downline load files from a backup tape. If the problem persists, call your PrimeService representative.

Error writing DSKRAT on COMDEV pdev.

A write error occurred while the preloader was attempting to update the DSKRAT. Check that the disk drive is not write-protected. You are prompted for another physical device number for COMDEV.

Error writing DSKRAT on PAGING pdev.

A write error occurred while the preloader was attempting to update the DSKRAT on a paging partition. If pdev is the only valid pdev specified for a paging partition, cold start continues and you are prompted for a physical

device number for the paging partition. Check that the disk drive is not write-protected.

Excessive value *m* specified for PREPAG; maximum *n* will be used. (CINIT)

The value *m* specified for the PREPAG directive is greater than the system's limit of *n* (octal), which will be used. The number of memory pages cannot exceed the number of memory pages available for paging. Remove or correct the directive.

EXPECTED FILE MARK NOT FOUND.

The tape file mark was not found when you attempted to boot PRIMOS from magnetic tape. Cold start halts. Try another tape.

Failure to enter 7210 DLL mode. (*device_number*) - (*disk_init*)

The Model 7210 disk controller failed to be initialized as an intelligent disk controller. This message indicates a hardware problem and is subsequently entered in the system event log and the controller functions as a nonintelligent controller. Check the DLL file. If the problem persists, call your PrimeService representative.

Failure to enter ICOP mode (*address*) - (*disk_init*)

PRIMOS could not make the disk controller (with the controller address of *address*) enter ICOP (Intelligent Channel Order Protocol) mode. The controller will operate in non-ICOP mode. If the error persists, call your PrimeService representative.

FATAL ERROR: ATCH\$X

A file system error occurred while the preloader was attempting to attach to a password directory or MFD. Run FIX_DISK to repair the partition. If the error recurs, use MAKE to recreate the partition.

FILE NOT FOUND

The boot runfile was not found. Check that you included the .SAVE suffix. If you are booting from tape and the tape was made by saving the MFD, you must include MFD> in the pathname (for example, MFD>DOS>DOS.SAVE). The complete pathname of the file to be booted must be entered exactly as it was saved on the tape.

FILUNT specified is too large, defaults to maximum value of *n*. (CINIT)

The value specified for the FILUNT *max-unit* argument is too large. The maximum value *n* (octal) has been substituted for the one that you specified. Be sure to correct the directive.

ILLEGAL TREENAME

The pathname of the boot runfile contains an invalid character or begins with a partition name. Possible errors include using a left angle-bracket (<) in the pathname (partition names are not allowed), beginning or ending the pathname with one or more right angle-brackets (>), and beginning a filename or a directory name with a number. The invalid character is pointed out.

Illegible CONFIG directive *directive* ignored. (CINIT)

The indicated configuration directive could not be parsed, probably because it is an invalid directive. The incorrect directive is ignored and cold start continues. Remove or correct the directive.

Inconsistent cold start configuration for ICSx device *nn*

This message is followed by one or both of the following lines:

an async line card has been found where not expected in slot *zz*

slot zz is empty where an async line card was expected.

At cold start, the ICS controller found that the actual Line Adapter Card (LAC) configuration on the ICS controller (address *nn*) differs from the configuration specified in the ICS CARDS directive. Cold start continues as if the discrepancy does not exist. Call your PrimeService representative.

Inconsistent configuration for ICSx device *nn*

This message is followed by one or more of the following lines:

an async line card has been inserted into slot *zz*

the async line card in slot *zz* has been removed or is now inoperable

the async line card in slot *zz* is now inoperable

At warm start, the ICS controller found that the actual Line Adapter Card (LAC) configuration on the ICS controller (address *nn*) differs from the configuration specified in the ICS CARDS directive. Warm start continues as if the discrepancy does not exist. Call your PrimeService representative.

INPUT BUFFERS TOO LARGE (AMINIT)

The DMC buffer size is too large. Reconfigure it within the permissible range using the AMLIBL directive.

Insufficient paging records available to page Primos on PAGDEV *pdev*.

The paging partition does not have enough records for paging purposes. You are prompted for another physical device number for a paging partition. Increase the size of the paging partition.

Insufficient seg 0 windows for MPC4.

PRIMOS could not allocate space in segment 0 for an MPC4 controller. The controller will not function. Call your PrimeService representative.

Intelligent disk controller successfully Down-line loaded.
Attempt to enter Intelligent mode *result*.
Controller address = xxxxxx (OCT)

The Model 7210 disk/tape controller was downline loaded with the *result* being either SUCCESSFUL or FAILED. If *result* was FAILED, either the DLL file is corrupt or the controller is failing. A system warmstart or cold start will downline load the controller. If this message persists, call your PrimeService representative.

Invalid COMDVM argument *pdev* is ignored by COMDVM directive.

The *pdev* argument to the COMDVM directive is invalid. Disk mirroring of the COMDEV partition is not performed. Correct *pdev* and reboot.

Invalid PAGING argument *pdev* is ignored by PAGING directive.

An error occurred while the preloader attempted to process the specified *pdev* argument. Disk mirroring on the partition is also canceled, if it had been specified. Two instances that could produce this error are an invalid *pdev* and a partition with an unreadable BADSPT file. Check that *pdev* is a valid *pdev*; if it is, run FIX_DISK on the partition to correct any file system errors.

Invalid PAGINM argument *pdev* is ignored by PAGINM directive.

The *pdev* argument to the PAGINM directive is invalid. Disk mirroring of the partition is not performed. Correct *pdev* and reboot.

INVALID R-VEC: SA: *m*, EA: *n*, PC: *o*

The file to be booted contains an invalid RVEC parameter. In a valid RVEC, the 16-bit, unsigned starting address (SA) must be lower than the ending address (EA) and the starting PC value must lie between the SA and the EA. This error may be caused by attempting to boot DOS>*DOS64 or an EPF (.RUN file) instead of a .SAVE file.

Invalid system name *sysnam*: contains illegal character *c*.

A system name with the invalid character *c* was specified either in the SYSNAM directive or at the Enter system name: prompt. The system name cannot contain the following seven invalid characters: & (ampersand), - (hyphen), \$ (dollar sign), _ (underscore), . (period), / (solidus or slash), and # (pound or number sign). (If *c* is blank, it may specify a control character.) You are prompted for a system name.

Invalid system name *sysnam*: first character may not be *c*.

A system name that began with the invalid character *c* was specified either in the SYSNAM directive or at the Enter system name: prompt. The system name must begin with a letter. You are prompted for a system name.

Invalid system name *sysnam*: longer than 6 characters.

A system name that contained more than six characters was specified either in the SYSNAM directive or at the Enter system name: prompt. You are prompted for a system name. Enter a name of six or fewer characters.

Invalid system name *sysnam*: unknown error (code *n*).

An invalid system name was specified either in the SYSNAM directive or at the Enter system name: prompt. Make sure that the name begins with a letter, has six or fewer characters, and does not contain an invalid character. You are prompted for a system name.

I/O Errors while processing a disk DLL file (*filename*) -
(*disk_init*)

PRIMOS could not initialize an intelligent disk controller because of I/O errors with the controller. The disk controller will operate in non-ICOP mode. Check that the disk drive is online and that controller cables are connected correctly. If the error recurs and the disk drive appears to be functioning correctly, restore the file from a backup tape. If the error persists, call your PrimeService representative.

ISC initialisation failed, CODE = *n* (BINIT)

The ISC (Inter-Server Communication) database could not be initialized because of a software error or insufficient heap-storage space. (ISC is a message-passing facility used for communication between servers.) Cold start halts. Reboot the system. If this error persists, call your PrimeService representative.

LHC directive ignored, device at address *nn* is not an LHC (COMINI).

While performing a consistency check on the communications controllers, PRIMOS verified that the controller at device address *nn* (octal) is not an LHC controller. Correct the LHC directive in the configuration file.

LHC directive ignored, *nn* is not a valid comms device addr (COMINI).

While performing a consistency check on the communications controllers, PRIMOS verified that the device address *nn* (octal) in the LHC directive is not valid. Correct the LHC directive in the configuration file.

LHC DIRECTIVE IGNORED, MISSING ARGUMENT. (CINIT).

The LHC directive is ignored because of a missing argument, which results in the LAN Host Controller not being configured. Cold start continues. Edit the configuration file and correct the error.

LHC0x overrides LHC0y with address z (CINIT)

Two LHC directives have the same physical device address of z. The LHC directive with logical number x will be used and the LHC directive y will be ignored. All values are displayed in octal.

MACHINE CHECK: DSWPB: m DSWRMA: n DSWSTAT: o

A machine check was generated. The diagnostic status words (DSW) give the location of the check, the instruction that caused the check, and the type of the check. Issue a RUN command to step past this error. If the RUN command does not solve the problem, reboot with the 1000 switch set in the boot option word so that the boot does not run in machine-check mode.

MEMORY TEST MISMATCH, LOCATION: n

The memory location displayed generated an error during memory test. Call your PrimeService representative.

MEXTSZ config directive obsolete

MAKE and FIX_DISK should be used to set extent size

The configuration file contains the MEXTSZ directive, which no longer works. The directive is ignored and cold start continues. Remove the directive from the configuration file and use the -MIN_EXTENT_SIZE and -MAX_EXTENT_SIZE options of MAKE and/or FIX_DISK to set the extent sizes.

Missing COMDEV.

The configuration file does not contain the COMDEV directive. You are prompted for the physical device number for COMDEV.

Missing "GO" command.

The configuration file does not include the required GO directive at the end. You are prompted for the COMDEV, PAGING, NTUSR, and SYSNAM parameters if they are not in the file.

Missing NTUSR.

The configuration file does not contain the NTUSR directive. You are prompted for the value of NTUSR.

Missing PAGING.

The configuration file does not contain the PAGING directive. You are prompted for the physical device number for a paging partition.

NUSEG HAS BEEN REPLACED BY EDIT PROFILE SUBCOMMANDS.
(CINIT)

The obsolete NUSEG directive is in the configuration file. NUSEG is ignored and cold start continues. Delete NUSEG from the file.

Only 256 MAPOUT directives allowed.
No more will be processed.

You included more than 256 MAPOUT directives in your configuration file and only 256 can be processed. If it is necessary to have this many directives, you should have the system memory checked by your PrimeService representative.

PAGING *pdev* does not point to the beginning of a valid file system partition. Are you SURE you want to page on PAGING *pdev*?

The PAGING directive specifies a physical device number (*pdev*) that does not point to an area of the partition with a valid file system header. If you know that *pdev* is correct, the partition is probably a nonsplit paging partition that has just been formatted, or is one that, if used previously with pre-Rev. 20 PRIMOS, has had the file system header paged over. If you answer YES to the prompt, the partition is converted to a split paging partition and used for paging. If you answer NO, the partition is left as is and you are prompted for another physical device number. If the partition has a pre-Rev. 20 format, use MAKE with the -SPLIT option on the partition.

WARNING

The query is a check to help prevent paging over a valuable file system partition. Before answering YES, make sure that the partition is definitely intended for paging.

PAGING *pdev* is an old partition which is not supported.

The PAGING directive specifies a type of partition (such as one with 440 words per disk record) that is not supported after Rev. 15. If *pdev* is the only valid *pdev* specified for a paging partition, cold start continues and you are prompted for a physical device number for the paging partition. Use MAKE with the -SPLIT option to convert the disk.

PAGING *pdev* is not a split disk and conflicts with COMDEV.

The command partition (COMDEV) and the paging partition specified by the PAGING directive cannot be the same unless both are on a split partition. If *pdev* is the only valid *pdev* specified for a paging partition, cold start continues and you are prompted for a physical device number for the paging partition.

PAGING *pdev* is not a valid *pdev*.

The PAGING directive specifies the invalid physical device number *pdev*. This error often occurs because of an invalid device type. The device type must be 60₈ (*pdev* = *nnnn6n*), not 20₈ (floppy disk). If *pdev* is the only valid

pdev specified for a paging partition, cold start continues and you are prompted for a physical device number for the paging partition.

PAGING *pdev*, partition name, has not previously been used for paging. Are you SURE you want to page on PAGING *pdev*?

The indicated partition is a nonsplit partition that has never been used for paging or has been newly formatted with MAKE. This warning prevents you from unintentionally paging over valuable data on file system partitions. If you answer YES, the partition is split and used for paging. If you answer NO, the partition is not used for paging. (This message is not repeated unless the partition is reformatted MAKE without the -SPLIT option.) If *pdev* is the only valid *pdev* specified for a paging partition, cold start continues and you are prompted for a physical device number for the paging partition.

PAGINM args must correspond 1-1 to PAGING args.
PAGINM directive ignored.

The PAGINM directive does not follow the PAGING directive. The PAGINM directive is ignored and the paging partitions are not mirrored. Correct the configuration file by placing the PAGINM directive on the line following the PAGING directive.

PARITY ERROR: DSWPB: *m* DSWRMA: *n* DSWSTAT: *o*

A memory parity check was generated. The diagnostic status words (DSW) give the location of the check, the instruction that caused the check, and the type of the check. Issue a RUN command to step past this error. If the RUN command does not solve the problem, reboot with the 1000 switch (bit 7) set in the BOOT command option word so that the boot does not run in machine-check mode.

Physical page *page_number* is already mapped out.

The MAPOUT directive includes a *page_number* that was previously mapped out.

Physical page *n* is in use by the PRIMOS kernel and cannot be mapped out. Please schedule a service call.

The physical page of memory that you attempted to map out is in use by PRIMOS and cannot be mapped out. If this is a bad page as denoted by an ECC memory error, you should call your PrimeService representative because the system has a bad memory chip.

Physical page *page_number* is not configured.

The memory page *page_number* that you specified with the MAPOUT directive to be mapped out is not configured as part of physical memory and thus cannot be mapped out.

Please enter date and time.

The date and time for PRIMOS is not set, either because your system does not have an internal battery-powered clock or the clock is malfunctioning. Use the SETIME command to set the date and time.

primos-error PRnnnn (PRIMOS)

A file system error was encountered while the preloader attempted to open or read the indicated PRIMOS PRnnnn file. Restore the file from a backup tape and run FIX_DISK. In the meantime, boot PRIMOS from tape.

PRnnnn cannot be loaded as MAPGEN specified.

Cold start halts because a file system error was encountered while the preloader attempted to load the indicated PRIRUN PRnnnn file. Restore the file from a backup tape and run FIX_DISK.

PRnnnn does NOT exist.

Cold start halts because a file system error was encountered while the preloader was attempting to open or read the indicated PRIRUN PRnnnn file. Restore the PRIRUN directory from a backup tape and run FIX_DISK, or boot from tape.

PRATIO config directive obsolete, use PRATIO operator command to set PRATIO values.

The configuration file contains the PRATIO directive, which no longer works. The directive is ignored and cold start continues. Remove the directive from the configuration file and use the PRATIO operator command to set the ratio of usage for the paging partitions.

PRIMOS.COMI not found.

The system startup file (PRIMOS.COMI or C_PRMO) does not exist in CMDNC0. Cold start continues and you are prompted for the COMDEV, PAGING, NTUSR, and SYSNAM parameters. Before the next cold start, install PRIMOS.COMI in CMDNC0 by restoring it from a backup tape or creating a new one with a text editor.

Problem in initializing Timers Databases.

Cold start halts because PRIMOS could not initialize the global variables for the TIMER_PROCESS server. Reboot the system. If this error persists, call your PrimeService representative.

Profile data cannot be initialized from the SAD for the supervisor. System defaults are being used.

Either the SAD cannot be read, the SAD does not exist, or there is no User 1 under the entry SYSTEM. The profile of User 1 is initialized with default attributes. If the SAD does not exist, either restore the SAD from a backup tape or recreate the SAD with the EDIT_PROFILE utility.

physical device number for the paging partition. Check that *pdev* is correct and that the disk pack containing the paging partition is online and was not moved to a different disk drive or a different controller. If the problem persists, call your PrimeService representative.

SMLC CTRLR # OUT OF RANGE (CINIT)

An SMLC directive specifies an invalid controller number.

SMLC LINE # OUT OF RANGE: *n* (CINIT)

Cold start halts because a SYNC DSC (or SMLC DSC) directive specifies an invalid logical line number of *n*. The logical line number must be between 0 and 7, inclusive (as specified in the SYNC SYNC directive). Boot with the 100000 switch and use NSED to correct the directive.

System NOT configured with maximum possible memory:
only using *mK* BYTES, when *nK* BYTES are available.

The value for the MAXPAG directive causes the system to use less than the total amount of available physical memory. This message is only a warning, and the MAXPAG directive is obeyed. Remove the MAXPAG directive from the configuration file because PRIMOS automatically uses all the available physical memory.

System Paging Allocation Below Recommended Amount
1000 Pages Per Configured User
System Configured With *xxxxxx* Paging Records
Recommended *yyyyyy* Records For *nnn* Users

This is an informational message on the recommended amount of paging space for the number of users configured for your system. The number of configured users is the sum of NTUSR, NPUSR, NRUSR, and NSLUSR.

TAPE ERROR, STATUS: *n*.

Cold start halts when booting from tape because an unexpected tape I/O error occurred. The status words are displayed. Check that the device is online and that the tape is mounted. If they are, the tape drive may be broken or the tape itself may be corrupted. Boot from another device or use another reel of tape. If the problem persists, call your PrimeService representative. This error corresponds to the halt with 104 displayed, as described in the section titled Disk and Tape Boot Errors, earlier in this appendix.

The COMDEV *pdev* of *pdev*
should point to a *x* head partition, but points to a *y* head
partition.

The number of heads specified by the physical device number (*pdev*) in the COMDEV directive does not agree with the number of heads in the partition according to the DSKRAT written in record 1 of the indicated partition. Check that *pdev* is correct. Cold start continues and you are prompted for another physical device number for COMDEV.

TREENAME NOT A SAM FILE

The file whose name was provided to the boot is not a SAM file but is a DAM or CAM file, a directory, or a segment directory. You are queried for another filename.

Unable to allocate or initialize the DMQ buffer-access semaphore. (COMINI)

When ICS lines are present on the system, mutex locks are needed for the DMQ (Direct Memory Queue) buffer allocation and deallocation routines. Cold start halts because PRIMOS could not allocate the memory needed for the locks or could not initialize the locks. Retry the boot. If the problem recurs, call your PrimeService representative because this error may indicate faulty hardware (such as failing memory).

Unable to attach to initial attach point of the supervisor.

PRIMOS could not attach User 1 to its Initial Attach Point (IAP). This message should appear if you specify a null COMDEV (100000) at the Enter COMmand DEvice prompt. If the message appears in another situation, check for the existence of the directory specified as the IAP of User 1 (SYSTEM) in the SAD.

Unable to initialize gate segment. (GATE_INIT)

The gate segment could not be initialized during the cold start. Cold start halts. Reboot; if the error persists, call your PrimeService representative.

Unable to wire asyncbuffer_record entries (COMINI)

Cold start halts because PRIMOS could not wire the asynchronous buffer record table during the cold start. Reboot; if the error persists, call your PrimeService representative.

Unknown ASYNC directive: *keyword* ignored.

The ASYNC directive specifies an unrecognized *keyword*. The only valid ASYNC keyword is JUMPER. The directive is ignored and cold start continues. Check that the word JUMPER is spelled correctly in the directive.

Unknown ICS directive: *keyword* ignored.

An ICS directive specifies an unrecognized *keyword*. Valid ICS keywords are CARDS, INPQSZ, INTRPT, and JUMPER. The directive is ignored and cold start continues.

Unstartable PDEV *pdev* is ignored by PAGINM directive.

The partition specified by *pdev* cannot be started. Check that *pdev* is a valid number and that the disk drive is powered on.

remote buffer sizes by adding an appropriate CAB command (with the -REMBUF option) to the PRIMOS.COMI file.

Warning: A REMBUF output buffer size less than the minimum allowable size of $n(\text{dec})$ was specified. The minimum size will be used. (CINIT)

The specified size of the output buffer for the REMBUF directive is less than the minimum size of n (decimal). The minimum size is used. Remove the REMBUF directive from the configuration file and then configure the remote buffer sizes by adding an appropriate CAB command (with the -REMBUF option) to the PRIMOS.COMI file.

Warning: A REMBUF output buffer size less than zero was specified. The default size of $n(\text{dec})$ will be used. (CINIT)

The specified size of the output buffer for the REMBUF directive is less than 0. The default value n (decimal) is used. Remove the REMBUF directive from the configuration file and then configure the remote buffer sizes by adding an appropriate CAB command (with the -REMBUF option) to the PRIMOS.COMI file.

Warning: BAD LINE # IN AMLBUF COMMAND. (CINIT)
Must be greater than or equal to 0 and less than or equal to $n(\text{dec})$. AMLBUF directive ignored.
Directive in error is: *string*

The specified line number is either less than 0 or greater than the maximum number of lines that PRIMOS currently supports, which is n (decimal). *string* is the entire AMLBUF directive as it appears in the configuration file. The directive is ignored and cold start continues.

Warning: BAD LINE # IN AMLBUF COMMAND. (CINIT)
Must be greater than or equal to 0 and less than or equal to $\text{NTUSR} + \text{NRUSR} + \text{NAMLC} - 2$ to set I/O buffers. AMLBUF directive to set I/O buffers ignored.
Directive in error is: *string*

The specified line number is either less than 0 or greater than the sum of the NTUSR, NRUSR, and NAMLC directives minus two. *string* is the entire directive as it appears in the configuration file. The directive is ignored and cold start continues.

Warning: ICS JUMPER directive will be phased out. Please use ASYNC JUMPER instead. (CINIT)

The configuration file contains the ICS JUMPER directive, which will be phased out at a future revision of PRIMOS. The value specified by ICS JUMPER is configured and cold start continues. To prevent this message, replace the ICS JUMPER directive with the ASYNC JUMPER directive.

Warning: Input buffer size greater than maximum of $n(\text{dec})$.
Maximum size will be used. (CINIT)
Directive in error is: *string*

The specified size of the input buffer for the AMLBUF, ASRBUF, NTSABF, or NTSBUF directive is greater than the maximum of n (decimal). The maximum value is used. *string* is the entire directive as it appears in the configuration file. (Only the first bad directive is displayed.)

Warning: Input buffer size less than minimum of $n(\text{dec})$.
Minimum size will be used. (CINIT)
Directive in error is: *string*

The specified size of the input buffer for the AMLBUF, ASRBUF, NTSABF, or NTSBUF directive is less than the minimum of n (decimal). The minimum size is used. *string* is the entire directive as it appears in the configuration file. (Only the first bad directive is displayed.)

Warning: Input buffer size less than 0(dec).
Current size of $n(\text{dec})$ will be used. (CINIT)

The specified size of the input buffer for the AMLBUF, ASRBUF, NTSABF, or NTSBUF directive is less than 0. The value n is used.

Warning: Invalid attempt to set input/output buffer size in REMBUF range.
Input/output buffer size ignored. (CINIT)
Directive in error is: *string*

The AMLBUF or ASRBUF directive attempted to set the size of a buffer for a line for a remote user. The directive is ignored. To change the size of these buffers, use the CAB command with the -REMBUF option. *string* is the entire directive as it appears in the configuration file. (Only the first bad directive is displayed.)

Warning: Invalid DMQ buffer size specified.
It must be one of the following: 16, 32, 64, 128, 256, 512, 1024(dec).
Default size will be used. (CINIT)
Directive in error is: *string*

The specified size of the DMQ buffer for an AMLBUF directive is not a valid value. The default value of 40_8 (32 decimal) is used. *string* is the entire directive as it appears in the configuration file. (Only the first bad AMLBUF directive is displayed.)

Warning: NTS line number must be zero at this release.
The line number is ignored. (CINIT)

The NTSABF or NTSBUF directive specifies a line number other than 0. At Rev. 22.0, the only valid line argument is 0. Remove the NTSABF and NTSBUF directives from the configuration file and add the CAB command to the PRIMOS.COMI file.

Warning: NTSABF directive issued with no NTS assigned lines configured.
This directive is ignored. (CINIT)

The NTSABF directive can be used only when the configuration file also contains the NTSASL directive with a value greater than 0. The directive is ignored and cold start continues. Remove the NTSABF directive from the configuration file and add the CAB -NTSABF command to the PRIMOS.COMI file.

Warning: NTSBUF directive issued with no NTS terminal users configured.
This directive is ignored. (CINIT)

The NTSBUF directive can be used only when the configuration file also contains the NTSUSR directive with a value greater than 0. The directive is ignored and cold start continues. Remove the NTSBUF directive from the configuration file and add the CAB -NTSBUF command to the PRIMOS.COMI file.

Warning: Output buffer size greater than maximum of $n(\text{dec})$.
Maximum size will be used. (CINIT)
Directive in error is: *string*

The specified size of the output buffer for the AMLBUF, ASRBUF, NTSABF, or NTSBUF directive is greater than the maximum of n (decimal). The maximum value is used. *string* is the entire directive as it appears in the configuration file. (Only the first bad directive is displayed.)

Warning: Output buffer size less than 0(dec).
Current size of $n(\text{dec})$ will be used. (CINIT)

The specified size of the output buffer for the AMLBUF, ASRBUF, NTSABF, or NTSBUF directive is less than 0. The value n is used.

Warning: Output buffer size less than minimum of $n(\text{dec})$.
Minimum size will be used. (CINIT)
Directive in error is: *string*

The specified size of the output buffer for the AMLBUF, ASRBUF, NTSABF, or NTSBUF directive is less than the minimum of n (decimal). The minimum size is used. *string* is the entire directive as it appears in the configuration file. (Only the first bad directive is displayed.)

WARNING - x SEGMENTS MAY NOT BE ENOUGH FOR y USERS. (CINIT)

The NSEG directive specifies fewer segments than the expected minimum of three per configured users. Both values are printed in octal. y is NTUSR + NRUSR + NSLUSR + NPUSR. Users probably will receive the error condition NO_AVAIL_SEGSS\$ as the system use becomes high. Increase the value specified by NSEG.

Warning: the number of async lines (x) present exceeds the allowable maximum of 512.

The system has x (decimal) locally connected asynchronous lines (AMLC + ICS), which is more than the maximum allowable number of 512 (decimal). The extra lines will not be functional.

Warning: The REMBUF directive is being phased out. Please use the CAB command with the -REMBUF option instead (CINIT)

The REMBUF directive is obeyed, but this message is displayed to remind you that the REMBUF directive is obsolete because it has been replaced by the CAB command. Remove the REMBUF directive from the configuration file and add the CAB -REMBUF command to the PRIMOS.COMI file.

Warning: The REMBUF directive was issued with no remote terminal users configured. The directive is ignored. (CINIT)

The REMBUF directive is ignored because the NRUSR directive is either not in the configuration file or set to 0.

Warning: The XOFF lag value to the NTSABF directive must be greater than 0 and less than $n(\text{dec})$. The default (60% of the input buffer) is used. (CINIT)

The XOFF lag-value argument to the NTSABF directive is either less than 0 or greater than n (decimal). The default value, which is 60% of the input buffer, is used. Remove the NTSABF directive from the configuration file and use the CAB -NTSABF command in the PRIMOS.COMI file.

Warning: The XOFF lag value to the NTSBUF directive must be greater than 0 and less than $n(\text{dec})$. The default (60% of the input buffer) is used. (CINIT)

The XOFF lag-value argument to the NTSBUF directive is either less than 0 or greater than n (decimal). The default value, which is 60% of the input buffer, is used. Remove the NTSBUF directive from the configuration file and use the CAB -NTSBUF command in the PRIMOS.COMI file.

Warning: The XON lag value to the NTSABF directive must be non-negative and less than the XOFF lag. The default (20% of the input buffer) is used. (CINIT)

The XON lag-value argument to the NTSABF directive is either less than 0 or greater than the XOFF value. The default value, which is 20% of the input buffer, is used. Remove the NTSABF directive from the configuration file and use the CAB -NTSABF command in the PRIMOS.COMI file.

C

Maintenance Processor Messages



This appendix lists all messages issued by the Maintenance Processor. These messages are divided into three categories:

- Informational messages, which have a DPM prefix (for example, DPM007)
- Warning messages, which have a WRN prefix (WRN401)
- Error messages, which have an ERR prefix (ERR071)

Report warning (WRN prefix) and error messages (ERR prefix) immediately to your System Administrator, who may also wish to report them to your PrimeService representative.

Some warning and error messages are followed by one or more of these messages:

Maintenance Processor halted.

Forcing Processor Check

Sysclring System

System shutdown in progress.

Please refer to CPU handbook.

The CPU handbook mentioned in the last message refers to the *5300 Family Handbook*.

Informational Messages

The following DPM messages, which the Maintenance Processor displays as part of normal system operation, provide you with information regarding the current status of the system. These messages cannot be inhibited by the MO BRIEF command. (An exception is message DPM010, which is inhibited by MO BRIEF.) Messages that are logged in the Maintenance Processor's History file are indicated by the symbol (H) after the message's explanation.

DPM000: Maintenance Processor beginning self verification
The Maintenance Processor has begun its self-testing verification procedure.
This procedure is initiated either at power-on or by the VIRY command.

DPM001: Maintenance Processor self verification completed.
The Maintenance Processor has successfully verified its functionality.

DPM002: Beginning Central Processor system verification, please wait.
As part of the autoboot procedure (initiated at power-on or by the BOOTP or BOOTT command), the Maintenance Processor is loading microcode from the load device into the CPU and performing verification tests on the CPU.

DPM003: Diagnostic *filename* successfully completed.
The Maintenance Processor successfully executed the verification microcode contained in the file named *filename*.

DPM004: Central Processor system verified.
The Maintenance Processor has successfully completed the verification of the CPU.

DPM005: Beginning Central Processor system initialization, please wait.
The Maintenance Processor has begun to initialize the CPU by loading into it functional microcode (such as the Instruction Set and Decode Net microcode).

DPM006: Central Processor system initialization completed.
The Maintenance Processor has successfully loaded and verified either functional microcode or the Decode Net for the CPU.

DPM007: System booting, please wait.
The Maintenance Processor has begun a bootstrap procedure (for example, a boot of PRIMOS) by loading the CPBOOT program from the floppy diskette load device into main memory. The CPBOOT program will in turn load the PRIMOS BOOT program from a system disk.

DPM008: Microcode file *filename* successfully loaded.
The Maintenance Processor has successfully loaded the microcode file named *filename* (for example, as specified by the LOADM command).

DPM009: Diagnostic *filename* beginning execution.
The Maintenance Processor has begun execution of the microdiagnostic file named *filename* (for example, as specified by the RUND command).

DPM206: No Help available.

You issued the HELP command, but the Maintenance Processor could not find a file of type H on the load device.

DPM207: Can't from Remote terminal.

The MO USER command was issued while the remote terminal was privileged. USER mode is not available when the remote terminal is privileged.

DPM300: Can't while CPU is running.

You issued a command that can be executed only if the CPU is halted. If PRIMOS is running, be sure to use the shutdown procedure described in Chapter 5.

DPM301: Can't while key switch is locked.

Because the supervisor terminal is locked in CP mode (that is, it was switched to CP mode and someone turned the key switch to the locked position), the only commands that the Maintenance Processor accepts are DATE, DIRECTORY, HELP and LISTREV. Any other command is ignored with this message. To unlock the system, turn the key switch to the unlocked position.

DPM302: Can't unless microcode is running.

You issued a command that can be executed only if the CPU has microcode loaded and running.

DPM303: Can't unless Instruction Set microcode is running.

You issued a command that can be executed only if the CPU has the Instruction Set microcode loaded and running.

DPM305: Can't SYSCLR unless Microcode loaded.

A SYSCLR operation could not be performed because the CPU does not have microcode loaded in its Control Store. You can load the microcode with the LOADM command.

DPM307: Can't unless CPU is running.

You issued a command that can be executed only if the CPU is running. (Normally, this means that PRIMOS must be running).

DPM308: Extended I/O box available.

The Maintenance Processor tests for the presence of the additional Logic module containing system controllers and finds it to be present. The Maintenance Processor will monitor the additional Logic module.

DPM309: Extended I/O box not configured.

The Maintenance Processor tests for the presence of the additional Logic module containing system controllers and finds it to be absent. The test consists of checking for four cables that are connected to the Logic module. If you have an additional Logic module and this messages displays, check the cable connections.

DPM310: RAM Verification ...

The Maintenance Processor tests its random access memory (RAM). If the test is successful, PASSED. appears after the ellipsis. If the test fails, an error message indicates the bad memory location.

DPM311: Floppy Disk System Verification ...

The Maintenance Processor tests the floppy disk system. If the test is successful, PASSED. appears after the ellipsis.

DPM312: Initializing File System ...

The Maintenance Processor tests and initializes the file system on the floppy diskette drive. If the test is successful, PASSED. appears after the ellipsis.

DPM313: Loading Message File ...

The Maintenance Processor loads the file containing these messages. If the load is successful, LOADED. appears after the ellipsis.

DPM314: Loading Maintenance Processor code...

The Maintenance Processor loads its own programs. If the load is successful, LOADED. appears after the ellipsis. If the load fails, an error message displays.

DPM400: Primary CPU halted at *address:data*

The CPU has halted. *address* is the address of the last instruction in main memory that was executed and *data* is the address contents displayed as a 16-bit halfword. This message is followed by the date (day, month, year, time, and day of the week) when the halt occurred. (H)

DPM401: CPU is halted.

The CPU has halted. This message is followed by the date (day, month, year, time, and day of the week) when the halt occurred. If this is an unexpected halt, see Chapter 6 for recovery procedures. (H)

DPM701: Machine check.

STAT = xxxxxxxx/xxxxxxx
PAR = xxxxxxxx/xxxxxxx
PAR2 = xxxxxxxx/xxxxxxx
RMA = xxxxxxxx/xxxxxxx
PB = xxxxxxxx/xxxxxxx

The system has halted because of an internal parity error. The contents of the six indicated CPU registers (DSWSTAT, DSWPAR, DSWPAR2, DSWRMA, and DSWPB) indicate the error causing the halt. See Chapter 6 for recovery procedures. (H)

DPM702: Missing Memory Module

The system halted because of an attempt to access nonexistent physical memory. The message also lists the contents of the L and X registers. See Chapter 6 for recovery procedures.

DPM703: Memory parity (ECCU).

L =xxxxxx
X =xxxxxx

The system halted because of a memory parity error. See Chapter 6 for recovery procedures.

DPM900: Port is already enabled.

The ENABLE command was issued for a terminal (Local 1, Local 2, or remote) that is already enabled. The command is ignored and the enabled terminal is unaffected.

DPM901: Local port is being enabled.

DPM901: Remote port is being enabled.

An active Local 1, Local 2, or remote terminal is being enabled with either the ENABLE command or, for a remote terminal only, the REMOTE ENABLE button.

DPM902: Local port is being disabled.

DPM902: Remote port is being disabled.

The Local 1, Local 2, or remote terminal is being disabled with either the DISABLE command or, for a remote terminal only, the REMOTE ENABLE button.

DPM903: Port is already disabled.

The DISABLE command was issued for a terminal (Local 1, Local 2, or remote) that is already disabled. The command is ignored and the disabled terminal is unaffected.

Although the errors that produce warning messages usually do not halt system operation, they should be reported to your System Administrator and your PrimeService representative. Otherwise, the error condition can worsen into a situation that prevents system operation.

Warning messages that are logged in the Maintenance Processor's History file are indicated by the symbol (H) after the message's explanation.

WRN002: n Recoverable verification error(s) occurred.

The Maintenance Processor detected a recoverable error while it was loading and verifying the control store of the CPU. The system integrity is questionable if this error persists. Contact your PrimeService representative for assistance. (H)

WRN003: UPS System active, main A.C. power interrupted.

The main AC power has been lost on a system connected to an Uninterruptible Power Supply (UPS), and the system is currently being powered by the batteries of the UPS. The amount of up time supplied by the UPS cannot be determined. (H)

WRN004: Mode specifier is not set to octal.

Certain commands (such as BOOT and LOADTM) are normally given with the Data mode set to octal. This message indicates that the current Data mode is in decimal, binary, or hexadecimal (:D, :B, or :H). The command continues using the specified setting. To change to octal Data mode, use CONTROL-P to abort the command and use the :O mode specifier command to set the Data mode to octal.

WRN005: Sysverify microcode file not found.

Autoboot sequence terminated, entering Control Panel Mode.

A copy of the system verification microcode was not found during the microcode loading sequence. This warning is displayed during an autoboot to PRIMOS when the Maintenance Processor cannot find either the correct number of verification files or any at all. The autoboot terminates and the Maintenance Processor enters CP mode. This warning is typically displayed if you attempt an autoboot when the diskette contains only microdiagnostic files (of type M) and is not a valid autoboot disk. If this is not the case, use the DIRECTORY command to make sure that a file of type S exists on the diskette. If the file does not exist use a valid autoboot diskette. If the file does exist, replace the diskette and enter the BOOTP command. Contact your PrimeService representative if the error persists. (H)

WRN043: Checksum error on file *filename*.

The Maintenance Processor detected a checksum error while reading file *filename* from the floppy diskette load device. The Maintenance Processor continues with its current operation. This warning, which can occur any time that the Maintenance Processor accesses the load device, usually indicates

some form of read error that was not detected by any of the other check mechanisms. Retry the operation that caused the warning to ensure that the data that was loaded is correct. If the problem persists, contact your PrimeService representative. (H)

WRN400: Maintenance Processor shutting down system power.
Refer to System Operator's Guide.

The Maintenance Processor shut down system power either because someone pressed the ON/INITIATE SHUTDOWN button, an environmental sensor detected an error, or some other fault condition occurred. If the shutdown was triggered by an environmental sensor or a power supply failure, an appropriate error (ERR) message may also be displayed.

WRN401: MP detects Soft Shut down request.

Someone pressed the ON/INITIATE SHUTDOWN button. The Maintenance Processor shuts down PRIMOS in an orderly manner with a five minute grace time and turns off power to the system.

Error Messages

The following messages indicate that the Maintenance Processor has detected an error that prevents normal operation of the system. For each error, a description of the failure is given along with a number of possible causes of the failure, in descending order of probability of occurrence. In addition, any appropriate actions that you should take prior to calling your PrimeService representative are outlined for each error category.

Unless otherwise indicated, all of these messages are displayed whether the Maintenance Processor is in Full or Brief Message mode. Error messages that are logged in the Maintenance Processor's History file are indicated by the symbol (H) after the message's explanation.

ERR000: MP Memory error at location xxxxxx.

An error occurred while the Maintenance Processor was verifying its RAM memory. The error was probably caused by a failing memory component at the location shown. Call your PrimeService representative.

ERR076: MP detects high board temperature.

The temperature of the CPU board is too high. The system shuts down. Check that the cabinet blower is functioning, that air ducts are not blocked, and that room temperature is within the specified limits. Contact your PrimeService representative.

ERR101: Failure detected in test *n*

OR_UNIT: *x* =>

[ECS is suspect]
[IS is suspect]
[MC is suspect]
[MC and IS are equally suspect]
[MC and ECS are equally suspect]
[MC most likely suspect, then ECS, then IS]
[IS most likely suspect, then ECS]
[ECS most likely suspect, then IS]
[TEST_TNUM . . . any chip could be suspect]
[ECS most likely suspect, then MC]
[IS most likely suspect, then ECS, then MC]
[Undefined OR unit]

Microdiagnostic test *n* has failed. If the microdiagnostic test can determine the failing chips (IS, MC, or ECS), it displays them in order of optimal replacement unit (OR_UNIT) with one of the above messages that is in brackets. The field replaceable unit (FRU) in this case is the CPU board. Contact your PrimeService representative. (H)

ERR112: File *filename* not found.

The PMA file *filename* was not found on the floppy diskette during a LOADTM or RUNTM command. Use the DIRECTORY command to make sure that the file exists and check to see that you used the correct spelling of *filename*, including the extension. Contact your PrimeService representative if the problem continues.

ERR114: Instruction set Microcode not found.

A copy of the Instruction Set microcode (of type B on the floppy diskette) was not found during the load Control Store sequence of an autoboot to PRIMOS. The system cannot boot without the Instruction Set microcode. Use the DIRECTORY command to check that a file of type B exists on the diskette. If the file does not exist, use a correct copy of the diskette. If the file does exist, replace the diskette and issue the BOOTP command. Contact your PrimeService representative if the problem continues. (H)

ERR116: PRIMOS Boot routine not found.

A copy of the PMA boot file was not found during the boot to PRIMOS. Use the DIRECTORY command to determine if the PMA file is present on the diskette. If the file is not present, use another diskette or call PrimeService.

ERR120: File *filename* is not a valid Microcode file.

The filename you gave in a LOADM, RUND, RUNDC, or VERIFYM command is not a valid microcode file of type M, B, Q, or S. Use the DIRECTORY command to make sure that the corresponding file is one of those types. If it is not, the command cannot be run with this file type. If the

command still fails, replace the floppy diskette or contact your PrimeService representative.

ERR121: File *filename* is not a valid PMA file.

The filename you gave in a LOADTM or RUNTM command is not a valid PMA file of type P or T. Use the DIRECTORY command to make sure the filename corresponds to one of those types. If it does not, the command cannot be used. If the command still fails, replace the floppy diskette or contact your PrimeService representative.

ERR130: Recoverable Verification error on file *filename*

RecoverableVerifyError The Maintenance Processor detected a Control Store verification error against *filename* and successfully corrected it when it retried the operation. This error may indicate a soft disk error or a hardware failure. If the condition persists, contact your PrimeService representative. (H)

ERR131: Verification error on file *filename*

The Maintenance Processor detected Control Store microcode discrepancies and could not load and verify the microcode file *filename*. If this error occurred while the system was autobooting, the autoboot sequence terminates. If the error occurs three consecutive times during loading of another microcode file and the verification file, it is considered a fatal error and the Maintenance Processor returns to CP mode. If the Maintenance Processor is in Full Message mode, message ERR375 is displayed. Contact your PrimeService representative. (H)

ERR140: Unable to open file *filename*.

The Maintenance Processor is unable to open the file CPBOOT in attempting to boot PRIMOS. Replace the floppy diskette with a backup copy. If the error persists, call your PrimeService representative.

ERR200: Read error on file *filename*

The information in the indicated file cannot be read, probably because the floppy diskette is defective. Replace the diskette. If the error persists, contact your PrimeService representative.

ERR202: Unknown Central Processor system type.

The Maintenance Processor is unable to determine what type of processor is in your system by reading the ID PROM. The most likely cause is a missing or defective ID PROM. Contact your PrimeService representative. (H)

ERR205: Incorrect password entered.

You entered an incorrect password at a password prompt (message DPM202, DPM203, or DPM204). You are prompted for a password either when you use the PASSWORD command, when a port is enabled, or when a terminal break occurs if Terminal Break mode is set. (See the BREAKON command in

Chapter 8.) The password can be set from the Local 1 terminal only (with the PASSWORD command). The password can be entered only from the terminal where the password prompt appears and the prompt cannot be exited by pressing CONTROL-P. You have three tries or 40 seconds (whichever comes first) to enter the correct password, after which the Maintenance Processor disconnects the port. If the System Administrator does not know the correct password, he or she can set a new one with the PASSWORD command from the Local 1 terminal.

ERR208: Invalid password format.

A password can contain only alphanumeric characters, it must begin with an alphabetic character, and the maximum length of the password can be eight characters. Reenter a password with those characteristics.

ERR301: CPU not responding.

PRIMOS is halted because the Maintenance Processor and the CPU are not communicating. Press the MASTER CLEAR button and attempt to boot the system again. If this does not solve the problem, contact your PrimeService representative. (H)

ERR305: CPU hung. Master Clear required.

The CPU hangs while the Maintenance Processor is running its own code and PRIMOS is not running. To clear the system, press the MASTER CLEAR button. If a hang occurs while PRIMOS is running, see Chapter 6, Handling Halts and Hangs.

ERR375: Verification error on file *filename*, Word *nnnn*
Data expected: *aaaa bbbb cccc dddd*
Data found : *eeee ffff gggg hhhh*

The Maintenance Processor detects Control Store microcode discrepancies when verifying microcode. The data are given in hexadecimal. Contact your PrimeService representative.

ERR401: MP detects insufficient air flow.

ERR401: MP detects insufficient air flow in CPU cabinet.

ERR401: MP detects insufficient air flow in I/O cabinet.

The blower assembly is not providing adequate airflow to cool the main cabinets. PRIMOS will attempt to shut down in an orderly fashion before the CPU reaches a critical temperature and overheats. Do not attempt to restart the system until it has been checked out by your PrimeService representative. (H)

ERR411: Maintenance Processor detects UPS Batteries are low.

The Maintenance Processor detected a low battery on the first UPS (Uninterruptible Power Supply) while the unit was active. The AC power to the UPS has been off for too long and the UPS can no longer supply power to the system. The Maintenance Processor has signaled PRIMOS to shut down.

ERR905: Invalid decimal number:

The data or address mode specifiers are set to decimal (:D) and you entered a number that is not a decimal number. Reset the mode specifiers or enter a decimal number.

ERR906: Invalid hexadecimal number:

The data or address mode specifiers are set to hexadecimal (:H) and you entered a number that is not a hexadecimal number. Reset the mode specifiers or enter a hexadecimal number.

ERR907: Invalid octal number:

The data or address mode specifiers are set to octal (:O) and you entered a number that is not an octal number. Reset the mode specifiers or enter an octal number.

ERR908: Extra Arguments on Command Line.

You entered an argument more than once or one that is not related to the present command. Reenter the command with appropriate arguments.

ERR909: Missing Argument(s) on Command Line.

You did not enter an argument that is required with this command. See the descriptions of the commands for appropriate arguments.

ERR910: Invalid address format. Valid formats are :B :O :D :H.

The address you specified was not in the base to which the address mode specifier is set. Reset the mode specifier or enter a number in the correct format.

ERR912: Undefined token: *token*.

The character you entered has no meaning to the VCP under the circumstances it is running under. Reenter a correct response.

ERR913: CPU received unexpected input from MP.

ERR914: CPU received unexpected input from MP.

The input from the Maintenance Processor to the CPU while the CPU is either running or halted is unexpected.

ERR915: CPU received undefined input from MP.

ERR916: CPU received undefined input from MP.

The input from the Maintenance Processor to the CPU while the CPU is either running or halted is not known to the CPU.

ERR917: The SENSE and DATA switches form an invalid reg. addr.

The values of the sense and data switches that you entered form an invalid register address. Check the values that you entered and reenter the command with valid switch values.

ERR918: Invalid Command - CPU is RUNNING.

You cannot use this command when PRIMOS is running.

ERR919: Invalid Command - CPU is HALTED.

You cannot use this command when the CPU is halted and PRIMOS is not running.

ERR923: Bad time and date values.

Two instances of when invalid dates and times occur are when the clock battery fails and when you use the SETIME command with incorrect values. (For example, you specified a date or time with the required number of digits, but some of the digits are out of range.)

ERR924: MP clock not valid. Reset to 01 Jan 01 01 :01:01 Su.

Two instances of when invalid dates and times occur are when the clock battery fails and when you use the SETIME command with incorrect values. (For example, you specified a date or time with the required number of digits, but some of the digits are out of range.) The time is set to January 01, 1901 01:01:01 Sunday.

ERR925: Invalid Date Format. Valid format is: -mmdyy.

Two instances of when invalid dates and times occur are when the clock battery fails and when you use the SETIME command with incorrect values. (For example, you specified a date or time with the required number of digits, but some of the digits are out of range.) The time is set to January 01, 1901 01:01:01 Sunday.

ERR926: Invalid Time Format. Valid format is: -hhmmw.

Two instances of when invalid dates and times occur are when the clock battery fails and when you use the SETIME command with incorrect values. (For example, you specified a date or time with the required number of digits, but some of the digits are out of range.)

ERR927: Invalid time and date. Reset to 01 Jan 01 01 :01:01 Su.

Two instances of when invalid dates and times occur are when the clock battery fails and when you use the SETIME command with incorrect values. (For example, you specified a date or time with the required number of digits, but some of the digits are out of range.) The time is set to January 01, 1901 01:01:01 Sunday.

ERR928: Invalid port selected, valid ports are 1 & 2.

In using the ENABLE, DISABLE, or PRIVILEGE command, you have specified an argument that is out of the range of this command. Arguments to the command specify the Local 1 (:1), Local 2 (:2), and Remote (:3) ports.

Remote Diagnostics

D



The 5300 systems allow you to permit a remote user to perform or monitor system test and maintenance operations. The remote user is normally a PrimeService representative.

This appendix discusses remote diagnostics from the points of view of both the local operator and the remote user. The local operator is concerned with enabling and disabling remote diagnostics. The remote user is concerned with establishing contact with the Maintenance Processor as a remote user.

Enabling Remote Diagnostics

Before enabling remote diagnostics, you must determine if your supervisor terminal will still control the system (in which case the remote user will only monitor what you type), or if the remote user's terminal will function as the supervisor terminal (in which case your local supervisor terminal only monitors what is typed at the Remote terminal).

The procedure that you use to enable remote diagnostics consists of the following three steps:

1. Use the `PASSWORD VCP` command to set a password for the remote user. This step is optional.
2. Use either the `REMOTE ENABLE` button or the `ENABLE :3 VCP` command to enable the remote port of the Maintenance Processor.
3. Use either the `REMOTE PRIVILEGED` button or the `PRIVILEGE :3 VCP` command to privilege the remote port, to turn control of the Maintenance Processor over to the remote user. Omit this step if the Remote terminal will not function as the system's supervisor terminal but will only monitor system activity.

Setting the Password

Use the PASSWORD command to set a password that must be entered by a person on an enabled terminal. For security reasons, you should change the password before and after the remote diagnostic operation.

The PASSWORD command can be issued only from the Local 1 supervisor terminal. The password, which can have a maximum of eight characters, will not be echoed on the supervisor terminal when set or entered.

Use the following procedure in CP mode to set the password:

1. Issue the PASSWORD command. The Maintenance Processor uses message DPM202 to prompt for the password that is currently in effect.
2. Enter the current (old) password at the DPM202 prompt. If you enter an incorrect password, the procedure is aborted, you are returned to CP mode, and the following message is displayed:

```
ERR205: Incorrect password entered.
```

3. If you entered the correct current password at step 2, you are prompted for the new password with the DPM203 prompt. Enter the new password.
4. You are then asked to verify the new password with prompt DPM204. Reenter the new password.
5. If you reentered the correct new password at step 4, the new password replaces the old one. If you entered a password at step 4 that was different from the one at step 3, the new password is rejected, the ERR205 message is displayed, and the old password remains in effect.

The following example illustrates how to change the old password TOWER to the new password BABEL. For the sake of clarity, the example shows the password being echoed, although the actual procedure does not. The example also assumes that you are changing to CP mode from either ST or USER mode.

```
OK, <ESC><ESC>  
CP1> PASSWORD
```

```
DPM202: Please enter old password: TOWER
```

```
DPM203: Please enter password: BABEL
```

```
DPM204: Verify new password: BABEL
```

To set a null password, enter a carriage return at the DPM203 prompt. In that case, the carriage return is the password. If you do not want the remote user to enter a password (even if one has been set), use the -NOPASS option with the ENABLE command.

The password is stored by the Maintenance Processor in nonvolatile memory, which means that it is preserved even across power failures.

Enabling the Remote Port

The remote user establishes contact with the Maintenance Processor by dialing in to a modem connected to the remote port of the Maintenance Processor. However, before the connection is accepted by the Maintenance Processor, the remote port must be enabled.

To enable the remote port, either press the REMOTE ENABLE button on the System Status Panel or issue the VCP command `ENABLE :3`. If you do not want the remote user to be prompted for a password, use the `-NOPASS` option:

```
CPI> ENABLE :3 -NOPASS
```

Note If you use the REMOTE ENABLE button, the remote user is prompted for a password.

The light on the REMOTE ENABLE button lights up when the remote port is enabled. See Chapter 2 for details on the REMOTE buttons and lights.

If you enable the remote port and no one has dialed in to the remote port modem, then the remote port is said to be inactive. Even though the port is inactive, it is still enabled and a remote user who dials in makes the port active as soon as the connection is made. When you enable an inactive remote port, the following messages are displayed by the Maintenance Processor:

```
DPM901: Remote port is being enabled.
```

```
DPM907: Terminal is not active.
```

Only the DPM901 message is displayed if a user has dialed in to the modem after the remote port is enabled. This process allows the Maintenance Processor to accept any call dialed in to the modem.

If you enabled the remote port so that the remote user is prompted for a password (either by using the REMOTE ENABLE button or by using the `ENABLE :3` VCP command without the `-NOPASS` option), be sure to notify the remote user of the password. The remote user can then dial up the Maintenance Processor.

When the remote user dials in, the action of the two REMOTE lights indicates the status of the Remote terminal:

- If the remote port is enabled, the REMOTE ENABLE light is lit and the REMOTE PRIVILEGED light blinks continually.
- If the remote port is not enabled, both REMOTE lights blink continually. The Maintenance Processor ignores the remote port until you enable the port.

At this point, you are still in full control of the system because the Remote terminal is not privileged, although it is active and enabled. The remote user sees everything that is typed on your supervisor terminal. Similarly, anything typed by the remote user is echoed on your supervisor terminal, but it is enclosed in angle brackets and does not otherwise affect the behavior of your system. (That is, the remote user's commands are not acted upon by the Maintenance Processor.) This difference in the display of supervisor output and remote output allows you and the remote user to communicate with each other.

Turning Control Over to the Remote User

After communication has been established and you have verified that the remote user is indeed the correct person, you can allow the remote user to have complete control of the Maintenance Processor and the CPU. This action is called privileging the Remote terminal.

To turn control over to the remote user, either press the REMOTE PRIVILEGED button or issue the VCP command PRIVILEGE :3. Either action causes the Remote terminal to become the supervisor terminal. The prompt issued by the Maintenance Processor is changed to CP*> to indicate that the remote user has control of the Maintenance Processor (that is, the Remote terminal is privileged). The CP*> prompt is also displayed at your Local 1 terminal (and at the Local 2 terminal, if that terminal is active and enabled.)

While the Remote terminal is privileged, you see (on your Local 1 terminal) the interaction between the remote user and the Maintenance Processor. You can type on the Local 1 terminal, and the remote user sees what you type. However, what you type is enclosed in angle brackets and does not affect the Maintenance Processor.

Returning Control to the Local User: During the remote diagnostics session, you (or the remote user) may want to return control of the system to the Local 1 supervisor terminal while the remote user continues to monitor.

To return control to the Local 1 terminal, the remote user issues the PRIVILEGE :1 command. This command reverts privilege to the Local 1 terminal and changes the prompt at all active and enabled terminals (both locals and the remote) to the CP1> prompt. The Remote terminal remains enabled and active (slaved) and the Maintenance Processor displays the following message:

```
DPM911: Terminal is being slaved.
```

Disabling Remote Diagnostics

When the remote user has completed the diagnostic session, use one of the following methods to disable remote diagnostics and regain control of the Maintenance Processor from the remote port:

- The remote user first issues the `PRIVILEGE :1` (or `PRIVILEGE :2`) command at the end of the session and hangs up. The Maintenance Processor automatically returns privilege to the appropriate local terminal. You then press the `REMOTE ENABLE` button to disable the remote port.
- If the Remote terminal is still privileged, press the `REMOTE PRIVILEGED` button. The Maintenance Processor reverts privilege to either, first, the Local 1 terminal or, second, the Local 2 terminal. Then press the `REMOTE ENABLE` button to disable the remote port.

Disabling the remote port displays the following message:

```
DPM902: Remote port is being disabled.
```

Both methods assume that a local terminal is enabled and active. If this is the case, using either method reverts privilege to the local terminal.

However, if the Remote terminal is privileged but neither local terminal is enabled, the Maintenance Processor ignores the attempt to privilege the local terminal, retains privilege to the Remote terminal, and displays the following message:

```
DPM910: Another terminal must be enabled to disable Remote terminal
```

In this case, to return privilege to the Local 1 (or Local 2) terminal, the remote user must first use the `ENABLE :1` (or `ENABLE :2`) command to enable the local terminal. Then, either the remote user can issue the `PRIVILEGE` command from the Remote terminal or you can press the `REMOTE PRIVILEGED` button. In the unlikely event that the remote user refuses to enable and privilege a local terminal, you can always regain control of the system by pressing the `ON/INITIATE SHUTDOWN` button to reset the Maintenance Processor.

Performing Remote Diagnostics

This section is intended for your PrimeService representative who is connecting to the Maintenance Processor as a remote user. After determining the phone number of the modem connected to the remote port of the Maintenance Processor and asking for the remote password, the PrimeService representative should dial in to the remote port.

UPS Support

E



An Uninterruptable Power Supply (UPS) facility allows the system to continue running even when main system power is unavailable. The Maintenance Processor can be notified by the UPS upon the loss of main power and the subsequent auxiliary backup by the UPS facility. The Maintenance Processor also recognizes when the UPS system can no longer maintain system power, and shuts down the system gracefully. The normal type of UPS configuration is a complete UPS facility that powers the entire system, including all of the peripherals.

The UPS system should have an lamp or meter that indicates the status of the battery charge. If this lamp or meter indicates that there is insufficient battery power for handling a main ac power outage, notify your System Administrator immediately. You should periodically check the UPS system to make certain that the batteries are charged.

UPS Operation

When the UPS facility detects that a power fail has occurred, it immediately begins to supply power to the system from its own batteries and then notifies the Maintenance Processor of this fact.

When the Maintenance Processor is first notified that the UPS is substituting for main power loss, it does not disturb PRIMOS or lock up the supervisor terminal. Instead, it returns to its normal operation and displays the following message on the supervisor terminal:

```
WRN003: UPS System active, main A.C. power interrupted.
```

At this point, the system is running on power furnished by the UPS. If the power fail is temporary and the main ac power returns before the UPS batteries go low, the UPS notifies the Maintenance Processor of this fact. The Maintenance Processor then continues with its normal operation and displays the following message on the supervisor terminal:

```
DPM100: Main A.C. power resumed, UPS no longer active.
```


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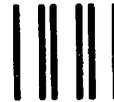
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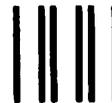
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