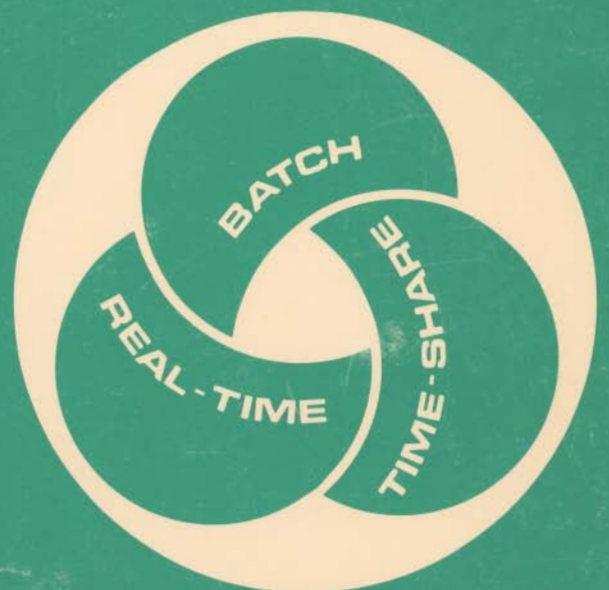


HP 3000

**MULTIPROGRAMMING
EXECUTIVE CONSOLE
OPERATOR'S GUIDE**



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HP 3000

MULTIPROGRAMMING

EXECUTIVE CONSOLE

OPERATOR'S GUIDE



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PREFACE

This manual explains how to initialize and maintain the Multiprogramming Executive Operating System (MPE/3000) for the HP 3000 Computers, and how to request various operations through the MPE/3000 Console.

The manual is intended for the MPE/3000 Console Operator, who is concerned primarily with starting and monitoring batch jobs, rescheduling programs, specifying peripheral devices for the system, transmitting messages to users and receiving, at the console, messages from users and the system. Because this individual does not generally require extensive knowledge of MPE/3000, the manual does not include detailed information about the system. Instead, it presents only information that is relevant to the operator's functions.


An MPE/3000 System Manager, System Operator (who may supervise one or more Console Operators), Standard Programmer, or Diagnostician, who is more familiar with MPE/3000 can use this manual to perform console operations. But such familiarity is not a prerequisite for using this book.

For more information about MPE/3000, the reader can consult the following manuals:

Title	Part No.
<i>HP 3000 Software General Information</i>	<i>03000-90001</i>
<i>HP 3000 Multiprogramming Executive Operating System</i>	<i>03000-90005</i>



CONTENTS

PREFACE			iii
SECTION I	INTRODUCTION TO MPE/3000		1-1
	Features		1-1
	Time-Sharing Processing		1-2
	Easy to Use		1-2
	System Messages		1-3
	Hardware Environment		1-4
	The Console Operator		1-8
	Entering Commands Through the Console		1-12
SECTION II	INITIALIZING AND SHUTTING DOWN MPE/3000		2-1
	Start-Up and Modification		2-1
	Shut-Down		2-6
	System Back-Up		2-6
SECTION III	BEGINNING AND HALTING JOB PROCESSING		3-1
	Starting a Job		3-1
	Terminating a Job		3-1
SECTION IV	DETERMINING JOB OR SESSION PROCESS INFORMATION		4-1
	WHATJOB Command		4-1
	DISPLAYJOB Command		4-2

SECTION V	CONTROLLING SYSTEM DEVICES	5-1
	Device On-Line	5-1
	Device Off-Line	5-1
SECTION VI	SENDING AND RECEIVING CONSOLE MESSAGES	6-1
	Sending Messages to Users	6-1
	Receiving and Replying to a User Message	6-2
SECTION VII	SCHEDULING JOBS AND SESSIONS	7-1
	SHOWQ Command	7-1
SECTION VIII	USING THE SYSTEM CONSOLE FOR TIME-SHARING SESSIONS	8-1
	SESSION Command	8-1
APPENDIX A	HP 3000 INPUT/OUTPUT DEVICES	A-1

FIGURES

Figure 1-1.	Small Batch System	1-5
Figure 1-2.	Small Time-Sharing System	1-5
Figure 1-3.	Combined Batch and Time-Sharing System	1-6
Figure 1-4.	Large Processing System	1-7
Figure 1-5.	HP 3000 Computer Control Panel	1-9
Figure 2-1.	Switch Register	2-7

SECTION I

Introduction to MPE/3000

The Multiprogramming Executive Operating System (MPE/3000) is a general-purpose disc-resident software system that supervises the processing of all user programs submitted to HP/3000 computers. MPE/3000 relieves programmers from many program control, input/output, and other house-keeping responsibilities by monitoring and controlling the input, compilation, run preparation, loading, execution, and output of user programs. MPE/3000 also relieves computer console operators from such tasks as controlling the order in which programs are executed and allocating the hardware and software resources they require.

FEATURES

MPE/3000 offers many important features, some of which are found elsewhere only in medium to large-scale computers. These features of special interest to the Console Operator are

- **MULTIPROGRAMMING**

Through *multiprogramming*, MPE/3000 can execute many different programs concurrently. The number of programs that can be processed concurrently depends on such factors as the hardware configuration, program operating modes (batch or time-sharing), and applications involved. Each programmer, however, uses the computer as if it were his own private machine—in other words, he need not depend on, nor even be aware of others using the machine. (The Console Operator, however, can always determine the number of programs in process and the identities of the programmers currently accessing the machine by entering the appropriate command.)

- **GENERAL-PURPOSE VERSATILITY**

MPE/3000 allows users to run batch and time-sharing programs concurrently.

- BATCH PROCESSING

Batch processing allows submission of one or more computer-language programs as a single unity called a *job*, to the computer. Jobs contain all instructions to MPE/3000 programs and data required for their execution; once they are running, no further input is needed from either the programmer or the operator. Jobs are input by the Console Operator or the programmer through on-site (local) devices, typically card readers. In fact, several jobs can be submitted from many devices concurrently. MPE/3000 schedules each job according to its priority. When a job enters execution, the programs within it are compiled sequentially and executed on a multiprogramming basis. MPE/3000 generates the job output locally, on a device such as a line printer, tape unit, or card punch. When one job temporarily halts, perhaps to await input of data, another immediately enters execution. Thus, when many jobs are active on the system, the operator can maintain uninterrupted processing and high throughput.

- TIME-SHARING PROCESSING

In time-sharing many programmers at remote or local terminals interact conversationally with the computer, each receiving immediate responses to his input. They simultaneously share the control processes through time-sharing (when each user receives an equal share of time, allocated in a round-robin fashion). This type of interaction, called a *session*, can be used for program development, information retrieval, computer assisted execution, and many more applications when the user at a remote terminal must access the system directly. The programmers can communicate with the console operator, and *vice-versa* by transmitting messages between the terminals and the console.

The basic difference between a time-sharing session and a batch job is that a session is interactive but a job is not. This, during a session, the programmer maintains a dialogue with the system to control input and monitor output; in a batch job, however, part of the command stream is entered into the system before its processing begins, and part is entered during or after processing.

- EASY TO USE

MPE/3000 is easy to initialize, operate, monitor, and shut down. Programmers interact with the system through a terminal or batch-input device. Operators interact with the system through the MPE/3000 Console. MPE/3000 automatically schedules all jobs and sessions according to their priorities.

When execution of a running program is interrupted for any reason (such as input/output, an internal interrupt, or expiration of a time-slice), MPE/3000 passes control to the program of next highest priority. Operator intervention is not necessary.

All HP 3000 Computers operate under one version of MPE/3000. This means that programs prepared on one HP 3000 can be run on any other (of comparable hardware configuration) without modification. It also means that programmers and operators moving from one installation to another need not undergo additional training or read additional documentation to prepare themselves for the new environment.

- **SYSTEM MESSAGES**

To aid in correctly establishing and executing programs. MPE/3000 provides programmers and operators with messages that describe errors encountered in using the operating system, show the status of jobs, or request certain actions (such as providing a specific magnetic tape).

MPE/3000 HARDWARE ENVIRONMENT

The minimum hardware configuration required by MPE/3000 is

- HP 3000 Computer, including central processor and 32,768-word main (core) memory
- Multiplexor Channel
- Moving-Head Disc or Fixed-Head Disc
- System Console (TTY-Compatible Terminal)
- Magnetic Tape Unit
- System Timer

The disc is used to contain portions of MPE/3000 and user programs. The console is used for operator input needed to initialize and maintain MPE/3000, and optionally for input/output of user programs. The magnetic tape unit also is used for storage and input/output of user programs. The system timer is used for sequencing various operations and for maintaining a usage account of system resources.

The following optional hardware can be added to the system:

- Main Memory (for a total of up to 65,536 words)
- Additional System Timer
- Discs (Fixed-Head or Moving-Head)
- Magnetic Tape Units
- Card Readers
- Line Printers
- Terminal Controllers
- Terminals

With this optional equipment, many hardware configurations are possible. For example, a small system used for batch processing might appear as shown in Figure 1-1. In this system, the card reader is used for input and the line printer for output, while the disc is used for storage of programs and data awaiting further processing.

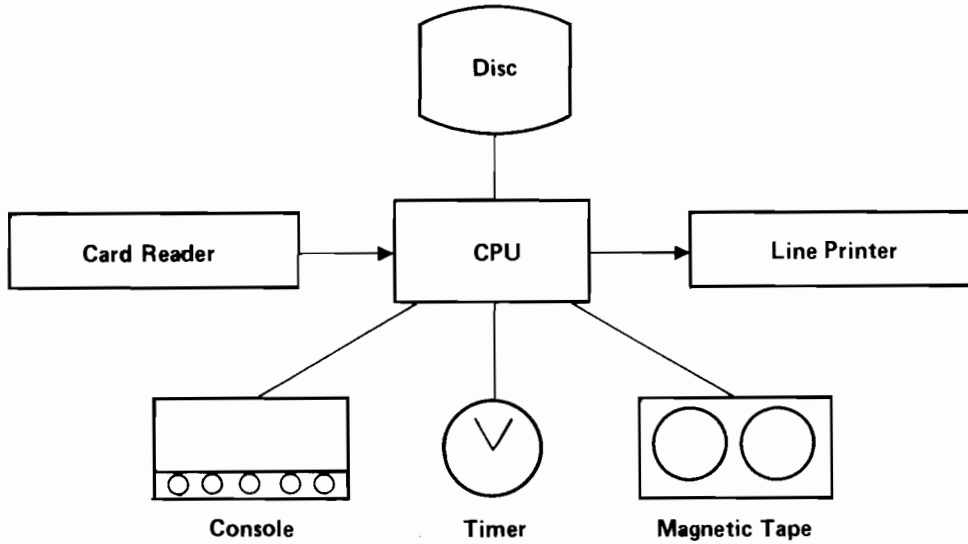


Figure 1-1. Small Batch System

A small time-sharing system might be configured as shown in Figure 1-2. In this system, up to 16 terminals connected to a terminal controller are used for input and output.

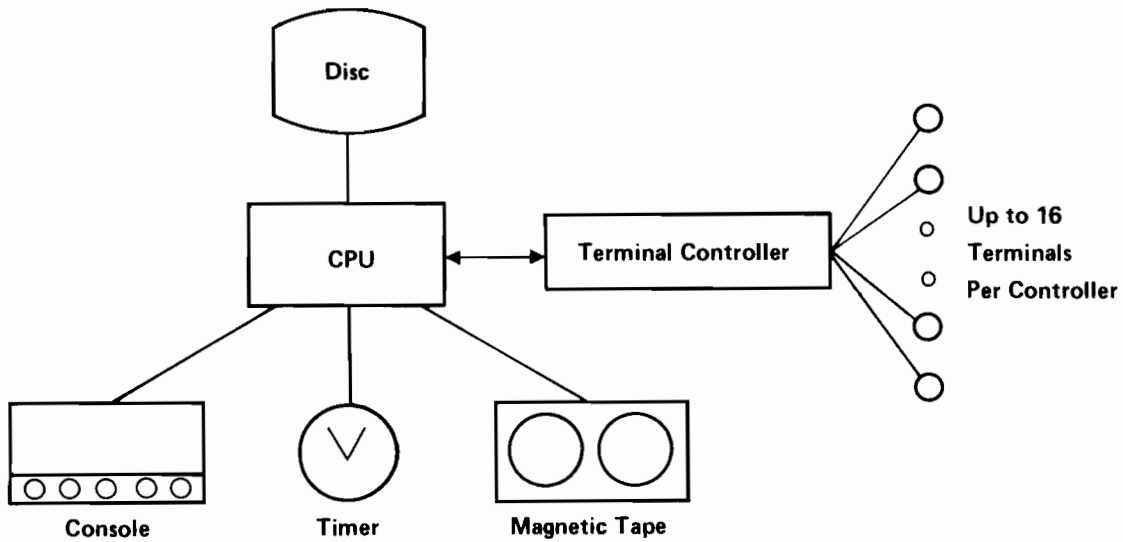


Figure 1-2. Small Time-Sharing System

A combined batch and time-sharing system is illustrated in Figure 1-3. Here, batch and time-sharing operations can occur separately or concurrently. When time-sharing terminals are active, batch jobs in process are spooled to disc.

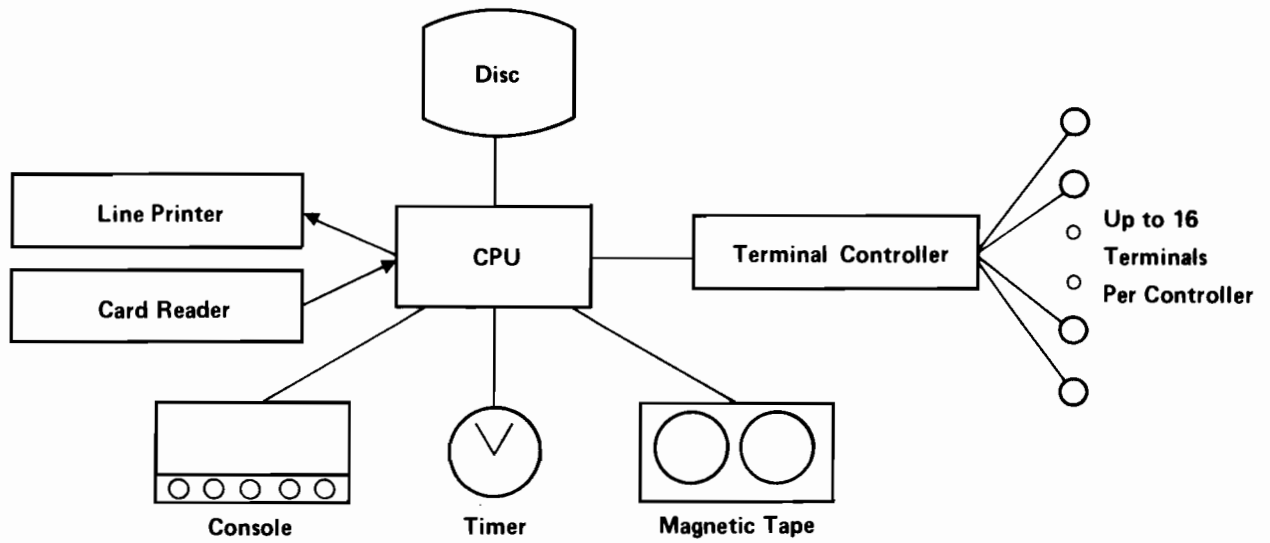


Figure 1-3. Combined Batch and Time-Sharing System

A large processing system is shown in Figure 1-4. This system incorporates a large central memory, fixed-head and moving-head discs, many input/output devices for multiple-job batching, and several controllers, each connected to up to 16 terminals for an extensive time-sharing network.

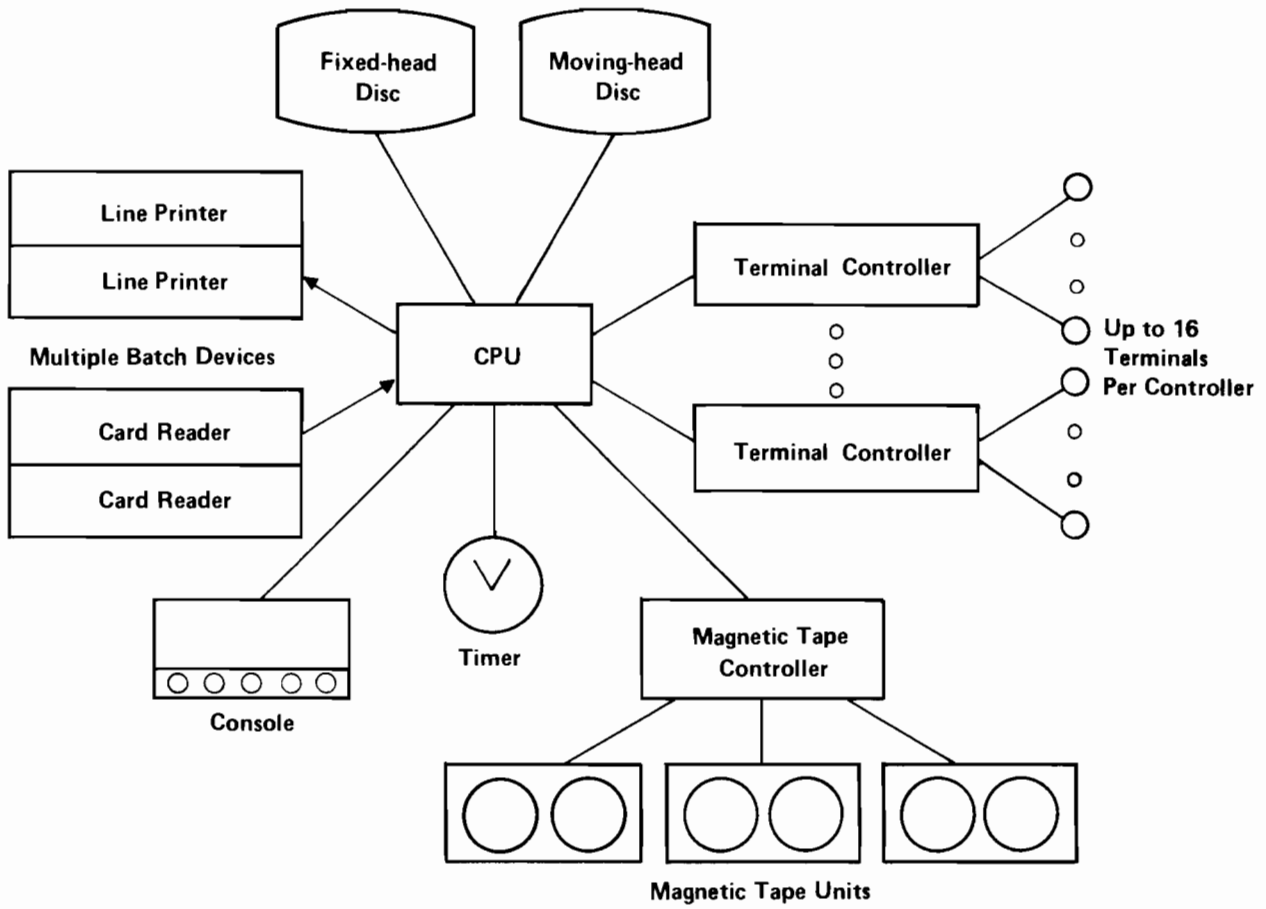


Figure 1-4. Large Processing System

THE CONSOLE OPERATOR

The console operator is responsible for the day-to-day operational control of the system. A Console Operator is not an MPE/3000 user in the same sense that System Manager, System Supervisor, or programmer is; the Console Operator does not log on to the system to perform his functions nor need he retain the same level of knowledge about MPE/3000 that an actual user does. The Console Operator performs the following tasks:

- Starts the system each day and shuts it down at night. During start-up, the operator can respecify elements such as main memory size, available peripheral devices, and job/session introduction messages.
- Submits batch jobs to the system
- Displays job status and job/session process family structure
- Reschedules running jobs within subqueues
- Displays and redefines scheduling for subqueue/input device mapping
- Interrupts, resumes, or aborts job
- Redefines the devices used for job/session input and listing
- Sets peripheral devices on-line or off-line
- Transmits messages to the users

The console operator interacts with MPE/3000 through the MPE/3000 console and the MPE/3000 Computer Control Panel.

MPE/3000 Console

The console operator sits at the MPE/3000 console, which is a TTY-compatible device located near the computer. Only one terminal is defined as the MPE/3000 console at any one time. The console can also function as a standard time-sharing terminal for initiating sessions. The operator uses the console to enter commands (explained later).

HP 3000 Computer Control Panel

The HP 3000 Computer Control Panel, shown in Figure 1-5, provides controls to initialize, stop, restart, and otherwise control the system. The panel consists of a group of switches whose functions are described below.

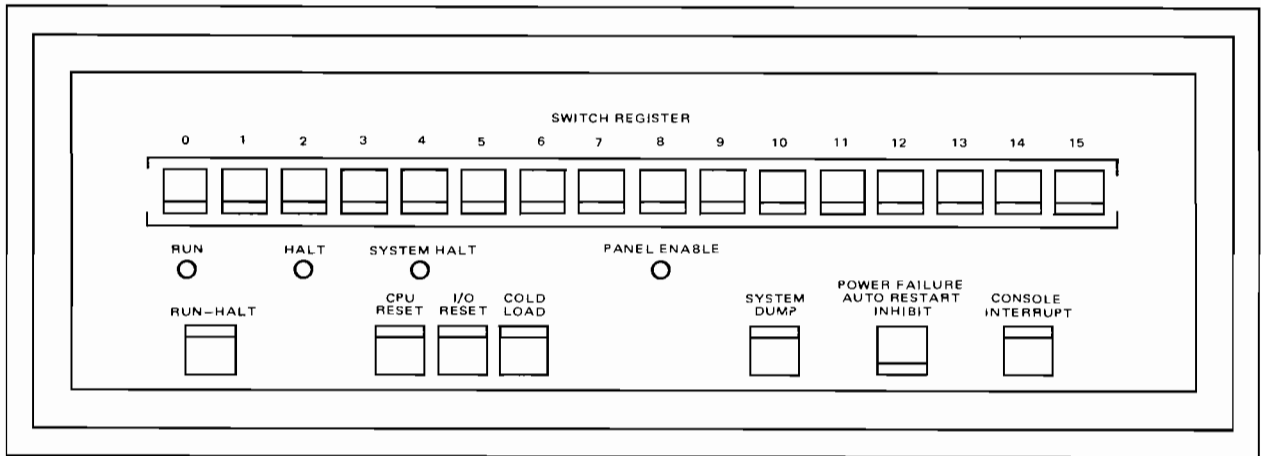


Figure 1-5. HP 3000 Computer Control Panel

PANEL ENABLE. The PANEL ENABLE switch is located behind the panel door and is used to enable or disable all of the panel switches (except the CONSOLE INTERRUPT switch). When the PANEL ENABLE switch is in the ENABLE position, all panel controls can be used. When in the inhibit position, no controls except the CONSOLE INTERRUPT respond when pressed.

SWITCH REGISTER. The SWITCH REGISTER is used to enter information into the computer (in binary form) and to specify options during cold-loading procedures (described later).

RUN AND HALT LIGHTS. The RUN and HALT lights indicate the operational state of the computer. Only one of the lights is illuminated at any one time. When the RUN light is on, the system is executing normally (a program is running) or is paused (awaiting an interrupt). When the HALT light is on, the system is halted; interrupts are disabled and the status of the computer can only be changed by pressing the RUN/HALT switch.

SYSTEM HALT LIGHT. The SYSTEM HALT light indicates an irrecoverable system error. To clear the error, press the CPU RESET switch, or perform a power-on sequence.

PANEL ENABLE LIGHT. The PANEL ENABLE light turns on whenever the PANEL ENABLE switch is set to the ENABLE position. When the PANEL ENABLE switch is set to the INHIBIT position, the PANEL ENABLE light turns off.

RUN-HALT SWITCH. The RUN-HALT switch changes the operational state of the computer. If the computer is running (RUN light is on), pressing the RUN-HALT switch halts the computer. If the computer is halted (HALT light is on), pressing the RUN-HALT switch starts the computer running.

CPU RESET SWITCH. Pressing the CPU RESET switch initializes the control processor and the module control unit bus.

I/O RESET SWITCH. Pressing the I/O RESET switch initializes the Input/Output Processor and Controllers.

COLD LOAD SWITCH. Pressing the COLD LOAD switch loads programs into computer memory from a device specified by the code set into the switch register.

SYSTEM DUMP SWITCH. Pressing the SYSTEM DUMP switch dumps the contents of main memory and the CPU registers to a device specified in the switch register as follows:

Bits 0-7	I/O control byte
Bits 8-15	I/O device number

POWER FAILURE/AUTO RESTART INHIBIT SWITCH. This switch specifies what response the system is to take following a power failure. This switch should be set upward (inhibit) and remain upwards.

CONSOLE INTERRUPT BUTTON. The **CONSOLE INTERRUPT** button, when pressed, manually interrupts the system (in **RUN** or **PAUSE** mode) so the operator can enter a system command from the console.



ENTERING COMMANDS THROUGH THE CONSOLE

The Console Operator initiates communication with MPE/3000 by pressing the Console Interrupt button on the computer control panel. MPE/3000 responds by prompting the operator for a command by printing an equal sign (=) on the MPE/3000 console. The operator then enters a command through the console keyboard followed by pressing the carriage return key. To send another command, the operator must press the CONSOLE INTERRUPT button to re-establish communication with MPE/3000.

To cancel the current line of a command prior to pressing carriage return, press Control X (hold down the Control key and press X). The terminal verifies the cancellation by printing three exclamation marks (!!!) followed by a carriage return and linefeed.

To backspace one character while entering a command, press Control H (hold down the Control key and press H). The terminal verifies the backspace by typing a backslash (\).

To place the MPE/3000 console in half-duplex mode so that commands entered on the console keyboard are not echoed on the printer, type:

ESC;

To place the MPE/3000 console from half-duplex mode to full duplex mode so that commands entered on the keyboard are echoed on the printer, type:

ESC;

SECTION II

Initializing and Shutting Down MPE/3000

The Console Operator can start up MPE/3000, optionally alter the current input/output device configuration, and shut down the system.

START-UP AND MODIFICATION

Start-up of MPE/3000, and re-configuration of the input/output devices on the system, is done through a program called the MPE/3000 Initiator. The Initiator provides an option of four types of start:

- **COOLSTART** cold-loads the MPE/3000 System from the system disc. (This is the standard operating procedure when a system is routinely shut-down at night and brought up again the next day.) All resident user files (including programs such as FORTRAN/3000, SPL/3000, and EDIT/3000 that run as MPE/3000 subsystems) are saved, but the operational environment present prior to the last shutdown is not retained. Thus, all jobs or sessions in progress at shutdown are lost.
- **COLDSTART** cold-loads the MPE/3000 System from magnetic tape, using the input/output device and system configuration on that tape plus the user files and directory information currently on disc. This allows modification of the system configuration while retaining the user's information.
- **UPDATE** cold-loads the MPE/3000 System from magnetic tape, using the input/output device and system configuration currently on the system disc and user-files on disc. This is the standard operating procedure used when starting the system with an updated MPE/3000 tape from HP, and should only be used in that situation.
- **RELOAD** cold-loads the entire MPE/3000 System, including all system files and directory and configuration information from magnetic tape. This is normally done when installing the system from the first MPE/3000 Tape received from HP, or when restoring the system following a disc crash (from a tape created by the :SYSDUMP command, discussed at the end of this section).

No start-up option permits resumption of user batch jobs or time-sharing sessions interrupted by a system shut-down; such jobs must be re-initiated from the beginning by the user.

All four start-up options allow the operator to alter the input/output device configuration currently in effect. This is done through an interactive dialogue between the user and the MPE/3000 Initiator. This dialogue is described later in this section.

When the system is started, the initialization of blank disc packs, the writing of labels for them, and the renaming of volumes, is accomplished by the MPE/3000 Initiator. (Formatting of blank disc packs, however, is done by a disc diagnostic program rather than by the Initiator.)

When using the Initiator to modify MPE/3000, the operator requires certain background information. This information is noted below.

Changing Main Memory Size

MPE/3000 runs on HP 3000 Computers with main-memory of the following sizes:

- 32 K (K = 1024 words)
- 40 K
- 48 K
- 56 K
- 64 K

The size specified by the operator during configuration should be the actual size of main-memory used with the machine on which this MPE/3000 configuration is to run. This entry is required so that other configuration parameters (such as table sizes) that depend on main-memory size can be set up correctly.

Changing Input/Output Device Configuration

Every physical input/output device in the system is identified by a unique logical device number, ranging from 1 to 255. Input/output configuration consists of specifying this number and various other characteristics for each such device. Some of these characteristics (such as DRT entry number, device unit number, and select code for SIO Multiplexor, described below) are determined by physical hardware connections made prior to system generation. Other characteristics (such as whether a device is interactive or duplicative, whether it can accept jobs and sessions, and the device class to which it belongs) are operator options. When the operator is deleting or re-specifying devices already on the system, he can determine the characteristics of these devices by requesting a Device Characteristics Listing during the re-configuration process. When he is adding a new device, he must know the hardware-dependent characteristics of the device and must also carefully determine those characteristics that are user options, as noted below. The characteristics that must be specified for each device are

1. Logical Device Number

The logical device number is the value by which the MPE/3000 File Management System recognizes a particular device. For each device, this is a unique, three-digit number ranging from 001 to 255, determined by the user.

2. Device Reference Table (DRT) Entry Number

Every device on the system is cabled to a device controller. (A particular controller may serve more than one device of the same type.) For every controller, there is an entry in the DRT in main memory that contains pointers to the driver and interrupt programs that serve the controller (and its devices). Because each DRT entry is four words long, the size of the DRT (in words) is

$$4 \times (\text{Total number of controllers})$$

The DRT is located in fixed-memory locations beginning at octal address 14. The maximum upper limit for the DRT is location 1777g, thus limiting the maximum number of four-word DRT entries to 253 (decimal).

Since each DRT entry is always four-words long, it is convenient for the hardware to map controllers to DRT addresses simply by multiplying by four. Since the DRT begins at location 14, the lowest controller (DRT entry) number is 3 ($14g/4g = 3g$). (DRT entry numbers 0, 1, and 2 do not exist.)

When re-configuring the system, the operator needs to know the highest DRT entry number that can be assigned to a device. He determines this by adding three to the total number of controllers planned. This value may not exceed 253.

The operator also needs to know the DRT entry number of any device that he is adding or deleting. This is a hardware-dependent value consisting of three digits, ranging from 003 to 253, and is determined by a set of jumpers on the device controller board.

3. Unit Numbers

When a controller services only one device, that device is generally assigned a unit number of 0 (recognized by the associated driver). When the controller serves more than one device, each device is assigned a unique unit number (with respect to that controller) to distinguish it from others cabled to the same controller. The unit number of any device is a hardware-dependent characteristic determined when the device is physically connected to its controller. The value ranges from 0 to a maximum number determined by the type of device controller.

4. Start Input/Output (SIO) Multiplexor DRT Entry Number

When a device is run under SIO, the DRT entry number of the SIO multiplexor connected to the device is specified. This number is determined by the user in the same manner as any other device's DRT entry number.

5. SIO Multiplexor Select Code

This number identifies the port on the SIO multiplexor to which the device is connected, as determined by the physical hardware cabling.

6. Device Type

This number determines the type of device, where

0 = Moving-Head Disc

1 = Fixed-Head Disc

8 = Card Reader

9 = Paper Tape Reader

16 = Terminal

24 = Magnetic Tape

32 = Line Printer

33 = Card Punch

34 = Paper Tape Punch

7. Device Sub-Type

This characteristic is specified for a device whose driver handles devices with different characteristics (such as 7-track versus 9-track tape). It is a number ranging from 0 to 15, depending on the actual device referenced (as specified in Appendix A).

8. Corresponding Output Device

If the device can be used as a job/session input device, the operator should specify (by logical device number *or* device class name) a device that will be recognized as the corresponding job/session list device. That is, all input read from the job/session input device is listed on that particular list device.

9. Option to Accept Job and Session Input Stream

The operator can optionally specify that this device can accept an input stream from a job or session; in other words, that it can accept the MPE/3000 :JOB or :HELLO commands, and thus serve as a job/session input device.

10. Option to Accept Data From Outside the Job/Session Input Stream

The operator can optionally specify that a device can read data from outside the job/session input stream; in other words, that it can accept the MPE/3000 :DATA command. (Typically, a device is designated to accept jobs/sessions, but not data external to a job/session.)

11. Interactive Option

The operator can optionally specify that this device is a member of an *interactive pair*. An input device and a list device are said to be interactive if a real-time dialogue can be established between a program and a person using the list device as a channel for programmatic requests, with appropriate responses from a person using the input device. For example, an input file and a list file opened to the same terminal would be an interactive pair.

12. Duplicative Option

The operator can also specify that the device is a member of a duplicative pair; in such a pair, input from an input device is automatically duplicated on a corresponding list device. For example, a terminal upon which the information input is also output is duplicative.

13. Driver Name

The name of the driver associated with the device/controller is specified. For standard devices supported by HP, appropriate driver names are found in Appendix A. For nonstandard drivers supplied by this user, this is the name of the program file containing the driver; the name must contain from one to eight alphanumeric characters, beginning with a letter. (If the driver name is preceded by an asterisk (*), the driver will always reside in main-memory.)

14. Device Class

The general class to which a device belongs must be specified. (This enables a user to request a device by class name, such as any disc or any tape unit.) These names are arbitrary, user-dependent names that are left to the discretion of the *user with System Supervisor Capability*. They consist of up to eight alphanumeric characters, beginning with a letter. A device can belong to more than one class, such as DISC and FHDISC. The only device class specifically referenced by MPE/3000 is DISC; it is the default device class for such operations as building files.

SHUTDOWN

The user can shut the system down by pressing the CONSOLE INTERRUPT BUTTON and entering the following command:

`=SHUTDOWN`

The =SHUTDOWN command shuts the system down in an orderly manner, terminating all jobs and sessions currently in progress. The system can be restarted at any time as directed in the preceding pages.

SYSTEM BACK-UP

If the Console Operator is also a user with *System Supervisor Capability*, he can copy the running system to magnetic tape, providing a back-up copy of the system on a daily basis. This user, of course, can log-on to MPE/3000 and enter the various commands described in *HP 3000 System Manager/Supervisor Capabilities (03000-90038)*.

The user copies the system by entering the :SYSDUMP command through his terminal (after logging-on and initiating a time-sharing session). This command can be entered at any time, but if other users are accessing MPE/3000, any files they have opened for output are not copied to the :SYSDUMP output tape.

When the :SYSDUMP command is entered, a program called the MPE/3000 Configurator begins an interactive dialogue with the user by asking if he wants to make any configuration changes. If he responds NO, the Configurator copies the running system to tape. (If he responds YES, the Configurator continues a lengthy dialogue with the user, enabling him to make many changes to the system, including those affecting table sizes, queue management, addition and deletion of software, and so forth. These changes are beyond the scope of this manual, but are described in *HP 3000 System Manager/Supervisor Capabilities*.)

The :SYSDUMP command format is

`:SYSDUMP dumpfile [auxlistfile]`

<i>dumpfile</i>	The actual file designator of the output file (device) on which the system is to be copied. (The format for writing actual file designators is explained in <i>Multiprogramming Executive Operating System (03000-90005)</i> . Typically, in this case, the designator is a file name comprised of up to eight alphanumeric characters, beginning with a letter). This must indicate a magnetic tape file. (Required parameter.)
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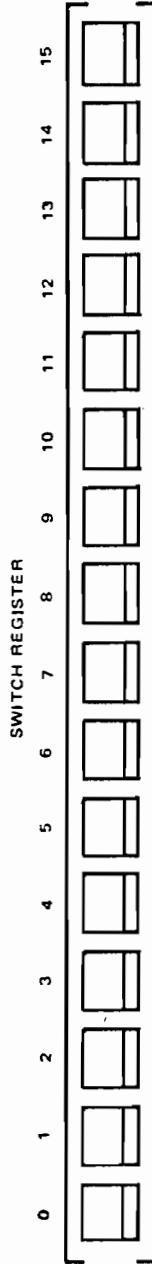


Figure 2-1. Switch Register

Initiator/Operator Dialogue

The Initiator's output consists of questions (ended by a question mark) and statements (ended by a period). The content of the questions generally indicates the type of answer required. To those questions requiring a simple positive or negative answer, the user responds with YES (or simply Y) or NO (or N, or simply a carriage return). Other questions contain values followed by a question mark; they normally quote an existing parameter value and ask whether the user wants to change it. To retain the quoted value, the user enters a carriage return. To change the value, he enters the new value desired. In any case, the user must always conclude an entry with a carriage return to transmit the entry to MPE/3000.

To begin the Initiator/User Dialogue, the user follows these steps:

1. Mount the magnetic tape or disc containing the system and any associated new files and configuration data on the appropriate device. If the system is loaded from the system disc, that disc should be mounted on the disc drive specified by Device Reference Table (DRT) Entry Number 5, Unit 0. (Other discs can be mounted on whatever drives desired.) If the system is loaded from magnetic tape, that tape should be mounted on the tape unit specified by DRT Entry Number 6, Unit 0. The operator's console must be the terminal specified by DRT Entry Number 3.
2. Set the SWITCH REGISTER on the Computer Control Panel with the control-byte setting and DRT entry number of the device on which the system disc or system tape is mounted. If the system is loaded from disc, set the switch register to octal 5. If the system is loaded from magnetic tape, set the switch register to octal 3006. (The control byte setting is 0 for disc and 6 for tape.)

The SWITCH REGISTER (Figure 5-1) consists of 16-bits; each bit is set *on* by placing the corresponding switch in the up position, or *off* by placing that switch in the down position. The control byte is represented by the leftmost byte (Bits 0-7); the logical device number, by the rightmost byte (Bits 8-15).

3. Press the following switches (on the Computer Control Panel) downward in the order shown:
 - a. I/O RESET
 - b. CPU RESET
 - c. COLD LOAD

This is the cold-load operation which reads into memory the MPE/3000 Initiator.

4. Press the RUN switch. The MPE/3000 Initiator enters execution, beginning its dialogue with the user by printing the following information on the console. (In the dialogue shown below, output from the Initiator is shown verbatim in upper-case letters, and input from the user is described in mixed-upper- and lowercase letters.)

If cold-loading is done from magnetic tape, the MPE/3000 Initiator begins its dialogue at Step 1. If cold-loading is done from disc, the COOLSTART option is assumed, and the dialogue begins with Step 2.

Step No.	Dialogue
1	<p>WHICH OPTION (COLDSTART/RELOAD/UPDATE)?</p> <p>Enter the option desired.</p>
2	<p>LOAD MAP ?</p> <p>To request a map showing the correspondence between MPE/3000 segments, programs, and code segment table (CST) entries, enter YES. (The format of the map is shown in Figure 2-2, following this dialogue.)</p> <p>To suppress this map, enter NO.</p>
3	<p>ANY CHANGES ?</p> <p>To proceed with changes to the current configuration, enter YES.</p> <p>To maintain the current configuration and skip to Step 28, enter NO.</p>
4	<p>CORE SIZE =XX?</p> <p>The value <i>xx</i> is the current size of main-memory for the system (in multiples of 1024 words). To change this value, enter one of the following values (specifying memory size in multiples of 1024 words): 32, 40, 48, 56, or 64.</p>
5	<p>LIST I/O DEVICES?</p> <p>To print a list of input/output devices currently assigned to the system, enter YES.</p> <p>To suppress this listing, enter NO.</p>

Step No.

Dialogue

If an input/output device listing is requested, it is displayed in tabular form, showing the following items for each device:

- Logical Device Number
- DRT Entry Number
- Unit Number
- SIO Multiplexor or DRT Entry Number. (If the device does not run under SIO, zero is output.)
- SIO Multiplexor Select Code.
- Device Type, where
 - 0 = Moving-Head Disc
 - 1 = Fixed-Head Disc
 - 8 = Card Reader
 - 9 = Paper Tape Reader
 - 16 = Terminal
 - 24 = Magnetic Tape
 - 32 = Line Printer
 - 33 = Card Punch
 - 34 = Paper Tape Punch
- Device Sub-Type
- Record Length. (The length of the physical records read or written by the device in words.)
- Output Device. (The logical device number or device class name of the job/session list device corresponding to jobs/sessions entered on *this* input device. (If this is not an *input* device, zero is output.)
- Mode, where
 - J = The device can accept jobs or sessions (:JOB or :HELLO commands).
 - A = The device can accept data external to job/session input stream (:DATA command).
 - I = The device is interactive.
 - D = The device is duplicative.

Step No.

Dialogue

- Driver Name. The name of the driver for this input/output device. (The driver resides permanently in main-memory if its name is preceded by an asterisk.)
- Device Classes. The classes to which this device belongs defined by a System Supervisor user.

6 **HIGHEST DRT NUMBER=XX?**

In the output, *xx* is a number denoting the present highest DRT entry number that can be assigned to a device.

To change *xx*, enter the new value desired. If the highest-numbered device in the configuration is a device that uses two DRT entries (such as a terminal controller with two data sets), be sure to enter the *highest* of the two entry numbers).

To maintain the current *xx*, enter a carriage return.

7 **LOGICAL DEVICE #?**

To specify a device to be added or removed, enter the logical device number of that device.

To skip to Step 21, enter zero.

8 **DRT #?**

To add a device, enter its DRT entry number.

To remove a device and return to Step 6, enter zero.

9 **UNIT #?**

Enter the physical hardware unit number of the device, if the device shares its controller with other devices.

Otherwise, enter zero to continue.

Step No.	Dialogue
10	<p>SIO MPX DRT #?</p> <p>If the device runs under SIO, enter the DRT entry number of the SIO multiplexor to which this device is connected.</p> <p>If the device does not run under SIO, enter zero to skip to Step 12.</p>
11	<p>SIO MPX SELECT CODE?</p> <p>Enter the port number on the SIO multiplexor to which this device is connected.</p>
12	<p>TYPE?</p> <p>Enter the device type (Appendix A).</p>
13	<p>SUB-TYPE?</p> <p>Enter the device sub-type (Appendix A).</p>
14	<p>OUTPUT DEVICE?</p> <p>If the device can be used as a job or session input device, enter the device class name or logical device number of the device to be used for the corresponding job/session listing device. (If a device class name is entered, any device of this class can be used as the listing device.)</p> <p>If this is not a job/session input device, enter zero.</p>
15	<p>ACCEPT JOBS OR SESSIONS?</p> <p>To specify that this device can accept a job or session input stream, enter YES.</p> <p>Otherwise, enter NO.</p>

Step No.

Dialogue

16 **ACCEPT DATA?**

To specify that this device can accept data external to a job or session input stream, enter YES.

Otherwise, enter NO.

17 **INTERACTIVE?**



To specify that this is an interactive device, enter YES.

Otherwise, enter NO or a carriage return.

18 **DUPLICATIVE?**

To specify that this is a duplicative device, enter YES.

Otherwise, enter NO.

19 **DRIVER NAME?**

Enter the name of the program file containing the driver for this device (Appendix A). For drivers written and supplied by the user, this name must contain from one to eight alphanumeric characters, beginning with a letter. (If the driver name is preceded by an asterisk, the driver will permanently reside in main-memory.)

20 **DEVICE CLASSES?**

Enter a list containing at least one device class name (up to eight alphanumeric characters, beginning with a letter). Class names are separated from each other by commas. These names are left to the discretion of the System Supervisor. They will be used in certain file commands when any member of a group of devices (such as any disc drive) can be referenced.

A device can belong to more than one device class, such as DISC and FHDISC. When the device class list is complete, enter a carriage return to return to Step 7.

Step No. Dialogue

21 LIST I/O DEVICES?

To print a listing of the new input/output device configuration, enter YES. This list appears in the format described in Step 5.

To suppress the list, enter NO.

22 LIST VOLUME TABLE?

To list the disc volumes and their currently assigned logical device numbers, enter YES. The listing is printed in the following format:

VOLUME	LOG DEV #
<i>volname</i>	<i>ldn</i>
.	
.	
.	

In this listing, *volname* is a name of up to eight alphanumeric characters, beginning with a letter, identifying the volume; *ldn* is the logical device number assigned to that volume.

To suppress this listing, enter NO.

Regardless of whether the user requested the listing (by entering YES) or suppressed the listing (by entering NO), at this point in the dialogue, control transfers to Step 23 (if this is a RELOAD) or skips to Step 25 (if this is a COLDSTART, COOLSTART, or UPDATE).

23 DELETE VOLUME?

To prepare to delete a volume, enter YES.

To bypass deletion and skip to Step 25, enter NO.

24 ENTER VOLUME NAME?

To delete a volume, enter the volume name. (When the name is entered, the question is repeated.)

Otherwise, enter a carriage return.

Step No.	Dialogue
25	<p>ADD VOLUME?</p> <p>To prepare to add a volume, enter YES.</p> <p>To bypass addition and skip to Step 27, enter NO.</p>
26	<p>ENTER VOLUME NAME?</p> <p>To add a volume, enter the volume name. (When the name is entered, the question is repeated.)</p> <p>Otherwise, enter a carriage return.</p> <p>If any volume was deleted (Steps 23-24) or added (Steps 25-26), the Initiator proceeds to Step 27. Otherwise, the Initiator skips to Step 28.</p>
27	<p>LIST VOLUME TABLES?</p> <p>To list the disc volumes and their currently assigned logical device numbers (as in Step 22), enter YES.</p> <p>To suppress this listing, enter NO.</p>
28	<p>At this point, the MPE/3000 Initiator ensures that all volumes defined in the volume table are mounted, that all discs have valid labels, and that the volume name of each disc is in the volume table. As a result of this verification, any of the following messages may appear:</p> <p>A. <i>DEVICE ldn VOLUME volname NOT DEFINED IN TABLE. ENTER VOLUME NAME?</i></p> <p>This means that the volume identified by <i>volname</i>, with the logical device number <i>ldn</i>, does not appear in the volume table. To add this volume, identified by this <i>volname</i> and <i>ldn</i>, enter a carriage return.</p> <p>To add this volume under a different volume name, enter the new name. The new name will be entered in the volume table, and the volume will be relabeled with that name.</p>

Step No.

Dialogue

- B. *INVALID LABEL FOR DEVICE ldn.
ENTER VOLUME NAME?*

This indicates that device *ldn* does not contain a valid MPE/3000 volume label. The user must enter a volume name. If the name entered corresponds to that of a volume in the volume table, the logical device number *ldn* is set for that volume. Otherwise, a new entry is made in the volume table. The disc label is then updated.

- C. *ALL VOLUMES MUST BE MOUNTED.*

This message occurs when an entry appears in the volume table but no corresponding disc is attached to the system.

If any of the above messages appears and the user responds properly, the Initiator proceeds to Step 29. If none of these messages is displayed, the Initiator skips to Step 30.

- 29 **LIST VOLUME TABLE?**

To list the disc volumes and their currently assigned logical device numbers (as in Steps 22 and 27), enter YES.

To suppress this listing and return to Step 5, enter NO.

- 30 **DATE?**

Enter the current date in the following format:

mm/dm/yr

where

mm = Two digits representing the month.

dm = Two digits representing the day of the month.

yr = The last two digits of the year.

Step No.

Dialogue

31

TIME?

Enter the current time-of-day in the following format:

hh:mm

where

hh = Two digits indicating the hour (on a 24-hour basis).

mm = Two digits indicating the minute of the hour.

The initiator program now terminates, transferring control to MPE/3000.
The system is ready for use.

Load Map

The load map requested in Step 2 of the Initiator/Operator Dialogue appears as shown in Figure 2-2. This map shows the correspondence between MPE/3000 code segments and programs, and code segment table (CST) entries. In the first column of this listing, the CST number (in octal) is shown. In the second column, the system segmented library (SL) segment name or program name is presented. (SL segment names are followed by a parenthesized value in the third column; program file names are not.) In the third column, the parenthesized number indicates the logical segment number of the segment within the system library (identified as SL.PUB.SYS).

20 DIRC (0)
 21 CROUTINE (1)
 22 MMDISK (2)
 23 IOUTILITY (4)
 24 MISC0 (5)
 25 CHECKER (6)
 26 PCREATE (7)
 27 MORGUE (12)
 30 MESSAGE (13)
 31 DATASEG (14)
 32 JOBTABLE (15)
 33 PROCMail (16)
 34 ABORTTRAP (17)
 35 SYSDEBUG (20)
 36 LOADER1 (21)
 37 SYSSTOPS (22)
 40 SYSDSPY (23)
 41 TTYINT (24)
 42 MMCORER (26)
 43 ALLOCATE (27)
 44 FILESYS7 (30)
 45 DISKSPC (31)
 46 FILESYS6 (32)
 47 FILESYS1 (51)
 50 UTILITY (107)
 51 FILESYS5 (110)
 52 FILESYS4 (111)
 53 FILESYS3 (112)
 54 RINS (114)
 55 PINT (11)
 56 DEBUG (25)
 57 CIINIT (37)
 60 CIMISC (40)
 61 CISUBS (41)
 62 CFILEB (42)
 63 CFILEM (43)
 64 CIPRUN (44)
 65 CILISTF (46)
 66 CIUTIL (47)
 67 SEGUTIL (106)
 70 FILESYS2 (113)
 71 ININ
 72 DISPATCH
 73 MAPP
 74 DATAIOPM
 75 IOFDISK0
 76 DISKIOPM
 77 IOCLTTY0
 100 TERMIOPM
 101 IOTAPE0
 102 SIODIOPM
 103 IOLPRT0
 104 IOCDRD0
 105 IOTERM0
 106 UCOP
 107 DEVREC
 110 LOAD
 111 PROGEN

Figure 2-2. Load Map

auxlistfile The actual file designator of the output file (device) to which listings requested during the Configurator/User dialogue are written. If the user is only copying the system, and not modifying it, these listings are not provided and the *auxlistfile* parameter is not required. (Optional parameter.)

In addition to the names of the files to be used for the *dumpfile* and optional *auxlistfile* output, the user must specify what type of devices these files are to reside on. He does this by preceding the :SYSDUMP command with MPE/3000 :FILE commands defining each of the two files. Then, in the :SYSDUMP command, he precedes each filename with an asterisk to indicate a back-reference to the definitions in the :FILE commands. (The rules for writing and back-referencing :FILE commands are discussed in *Multiprogramming Executive Operating System (03000-90005)*). An example is shown below, however, to illustrate the general way in which dialogue with the Configurator is initiated.

EXAMPLE

To begin dialogue with the MPE/3000 Configurator, a user enters the :SYSDUMP command shown below. At the end of the dialogue, the MPE/3000 configuration, together with any subsystem and user files specified, is copied to the file named DUMP. (The auxlistfile parameter is not used.) The :FILE command specified that DUMP is a magnetic tape file. (In this command, the TAPE parameter is a device class name arbitrarily defined during a previous configuration.)

```
:FILE DUMP; DEV=TAPE  
:SYSDUMP *DUMP
```

When the :SYSDUMP command is entered, the Configurator/User Dialogue proceeds as follows:

Step No.	Dialogue
1	ANY CHANGES?

To copy the running system, enter NO.

The system is now copied to tape, along with any user files specified in this Step. It may be loaded and initiated on this or any other HP 3000 Computer with comparable hardware configuration.

SECTION III

Beginning and Halting Job Processing



STARTING A JOB

To start a batch job processing, follow the steps outlined below:

1. Ensure that the job deck begins with a :JOB command and terminates with a :EOJ command.
2. Place the job deck in the card reader hopper.
3. Press the RESET button on the card reader hopper. Job processing begins.

TERMINATING A JOB

To terminate a job during its execution, press the CONSOLE INTERRUPT button and type

ABORTJOB Jxxx

Jxxx the job identification number assigned to the batch job and reported by the system when the job starts processing.

Following the ABORTJOB command, job execution halts and the job is flushed from the system.



SECTION IV

Determining Job or Session Process Information

To discover the relationship between user jobs or sessions and processes, the user can issue WHATJOB and DISPLAYJOB commands to MPE/3000.

WHATJOB COMMAND

The WHATJOB command informs the user which job (or session) owns the process specified in the command. The form of WHATJOB is

WHATJOB pin

pin a process identification number (PIN) unique to the process and assigned by the MPE/3000 system at process creation.

MPE/3000 returns the fully qualified job (or session) identification (including the job name, user name, and account name) of the job which owns the process identified by *pin*.

DISPLAYJOB COMMAND

The DISPLAYJOB command displays the process numbers (PINs) and the substates of all processes used by the job specified in the command. The form of DISPLAYJOB is

DISPLAYJOB jobid

jobid *Jxxx* for the job number, or *Sxxx* for the session number. (These numbers are assigned to the job or session when the *user* logs onto the system.)

MPE/3000 responds to the DISPLAYJOB command by typing the main process number followed by the son process numbers. In each case, the process substate is also listed:

Mxxx(yyyyyy) - xxx(yyyyyy)
 - xxx(yyyyyy) - xxx(yyyyyy)
 - xxx(yyyyyy)

where *M* stands for the main process number of the job/session. *xxx* is the PIN for the process. The number in parentheses is the process substate code, in the form of a six-digit octal number representing all sixteen bits of the fourth word of the PCB for the process. The fourth word of the PCB entry for each process and the meaning of the bits are shown below:

BIT	MEANING	BIT	MEANING
1	mourning wait	9	waiting for the system timer
2	waiting for global RIN	10	waiting for an interrupt
3	waiting for local RIN	11	waiting for a son process
4	waiting for mail	12	waiting for a father process
5	waiting for blocked I/O	13	process is active
6	waiting for unblocked I/O	14	process is impeded
7	waiting for the UCOP process	15	process is in a System internal resource
8	(reserved for MPE/3000)	16	process is in critical mode (cannot be deleted)

SECTION V

Controlling System Devices

To place peripheral devices on-line and off-line for use by the system, use the UP and DOWN commands.

DEVICE ON-LINE

To set a device on-line, type

UP device

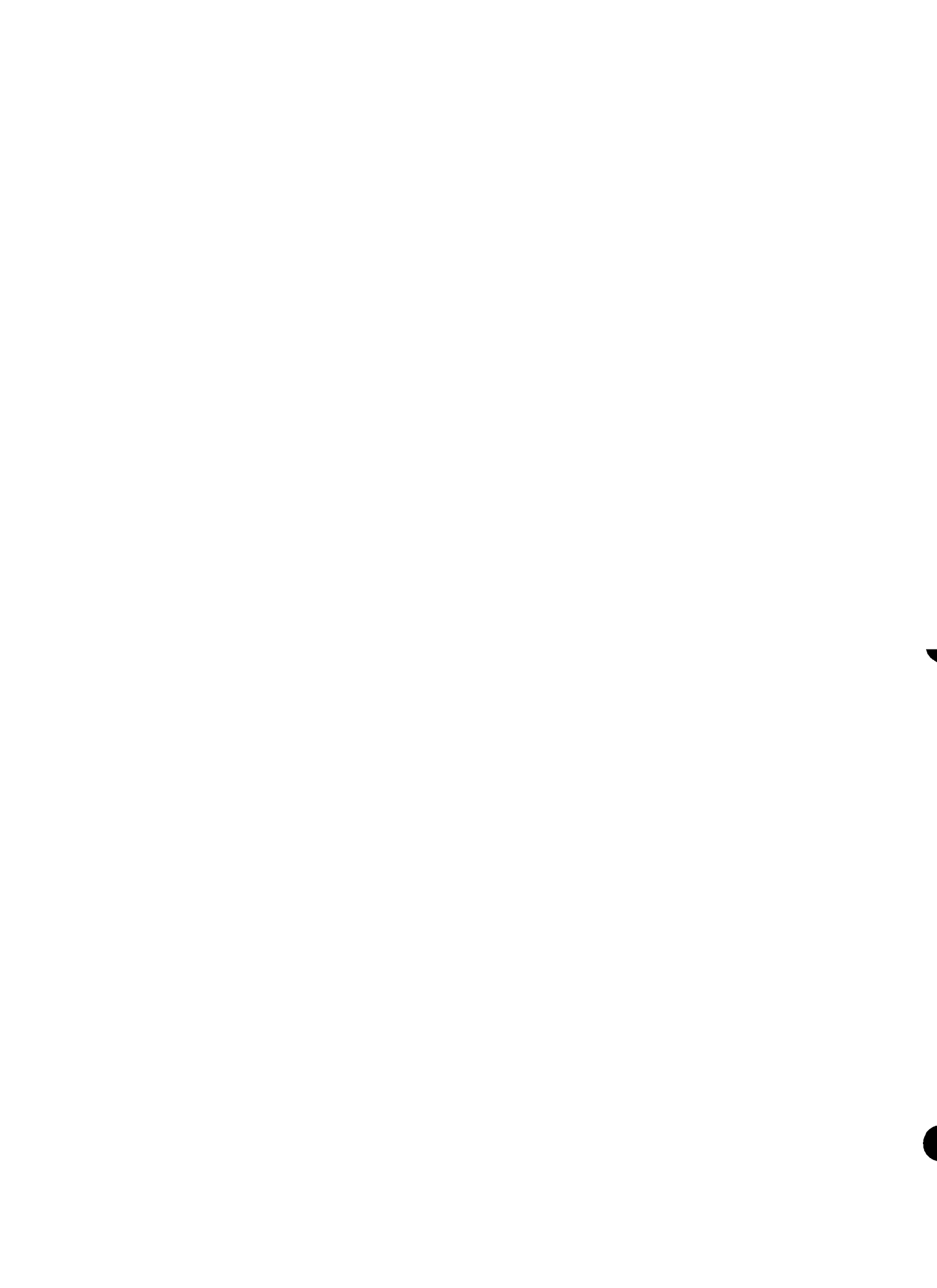
device the logical device number of the device.

DEVICE OFF-LINE

To set a device off-line (no longer available for general use, but still defined in the hardware configuration), type

DOWN device

device the logical device number of the device.



SECTION VI

Sending and Receiving User Messages

It is possible to send messages to user terminals from the system console through the TELL and WARN commands.



SENDING MESSAGES TO USERS

To send a message from the system console to the list device of a job or session, use the TELL command in the form:

TELL [jobname],username.acctname;message or *TELL #* $\left. \begin{matrix} J \\ S \end{matrix} \right\}$ *number;message*

jobname the name given to the job (or session) by the user when the job/session is initiated.

username the user's name.

acctname the user's account number which he used when he initiated the job or session.

message an ASCII string, the length of which is limited to the length of the current record in which the message appears. The message is terminated by a carriage return.

$\left. \begin{matrix} J \\ S \end{matrix} \right\}$ *number* is the job (or session) number assigned by the system at log-on.

The message is printed on the user job/session device as soon as possible, but not during a write, read in progress or unreceptive job (one that has been set by a :SETMSG command).

To send an urgent message to a user (one that will print immediately except for other warnings and system critical messages), the operator types

WARN [jobname],username.acctname;message or *WARN #* $\left. \begin{matrix} J \\ S \end{matrix} \right\}$ *number;message*

<i>jobname</i>	}	all have the same meaning shown in the TELL command.
<i>username</i>		
<i>acctname</i>		
<i>message</i>		
$\left. \begin{array}{l} \{ J \} \\ \{ S \} \end{array} \right\} \textit{number}$		

RECEIVING AND REPLYING TO A USER MESSAGE

If a user sends a message to the console device (through a :TELOP command) the message sent is printed on the console in the following form (which never requires a reply):

MS/time/jobnumb/message

time is the time the message was sent.

jobnumb is the job number assigned to the user who sent the message.

message an ASCII string.

MPE/3000 can send messages to the operator console which may require a reply. The operator responds to the messages by using a REPLY command. The message to the operator console takes the form

?prefix/time[/jobnumb]/processnumb/message(reply type)

prefix either ST (status) or IO (input/output).

time the time the message was sent.

jobnumb optional and is the job/session number of the user. Those messages omitting *jobnumb* do not pertain to an individual job.

processnumb the process identification number (PIN) of the process running the job.

reply type indicates what form the reply sent from the system console is to take. *reply type* takes one of four forms:

Form	Meaning
Y/N	Respond with YES or NO.
YN#	Respond with YES, NO, or a number.
NUM	Respond with a number (such as logical device number).
Sxx	Respond with a string whose length does not exceed <i>xx</i> characters.

Reply to the message using a **REPLY** command in the form

REPLY processnumb,reply

processnumb the number of the process (PIN) found in the message to the system console.

reply the reply as dictated by the *reply type* indicated in the message to the system console.

EXAMPLE: *REPLY 23,YES



SECTION VII

Scheduling Jobs and Sessions

SHOWQ COMMAND

To display the configuration of masterqueues and subqueues, type the **SHOWQ** command as follows:

SHOWQ [X]

X a single letter which is the name of a subqueue. No letter indicates the masterqueue.

If the user asks for a subqueue (e.g., **SHOWQ A**), MPE/3000 responds with the process identification numbers (PINs) of the processes running in the subqueue:

```
=SHOWQ A  
SQ-A 34.M53.77
```

If the subqueue is empty or not known to the system, then MPE/3000 reports this to the user:

```
SQ-A EMPTY  
SQ-A UNKNOWN
```

If the subqueue is a double subqueue (one I/O-bound and one CPU-bound) then MPE/3000 prints the I/O bound subqueue first, identified by a dollar sign (\$) after the subqueue name.

SQ-A-\$ 53.M44.133

SQ-A 41.M120.

If the parameter is omitted from the SHOWQ command, MPE/3000 responds with a diagram of the masterqueue. The diagram shows the priority number of all processes running in the masterqueue, along with all the subqueues in the masterqueue. Standard subqueues are denoted by an asterisk following the subqueue name. MPE/3000 also reports whether the subqueue is linear (L) or circular (C), and if circular, how much time each process in the circular queue is given for execution at one time. If the queue is empty, MPE/3000 types EMPTY in the last column opposite the subqueue name. For example:

#SHOWQ

PRIORITY	NAME	C/L	TQ(MS)	
5	P			
6	P			
15	P			
20	P			
21	P			
24	P			
25	P			
26	P			
27	P			
30	AS *	L		EMPTY
50	P			
60	P			
103	BS *	L		EMPTY
120	P			
150	CS *	C	500	EMPTY
151	CS *	C	500	
200	DS *	C	500	EMPTY
201	DS *	C	500	
250	ES *	L		EMPTY



SECTION VIII

Using the System Console for Time-sharing Messages

SESSION COMMAND

The system console can be used for a time-sharing session without losing the system console capabilities. To use the console for a session, type:

SESSION

MPE/3000 prompts the user by typing a colon (:) in anticipation of a legitimate HELLO sequence. The console can still be used for console commands if the CONSOLE INTERRUPT button is pressed. MPE/3000 prints an equal sign (=) to prompt for the command. Messages to the console still appear, with noncritical messages interspersed with lines printed by the session.



APPENDIX A

HP 3000 I/O Devices

Part #	Description	Sub-type	Driver Name	Type	Record Width
30031A	System clock/console interface		IOCLTTY0	16	36
30124A	– ASR 33, 35	0			
30114A	– DCT 500, 10 cps	1			
	– DCT 500, 15 cps	2			
	– DCT 500, 30 cps	3			
30123A	– HP 2600A, 10 cps	4			
	– HP 2600A, 15 cps	5			
	– HP 2600A, 30 cps	6			
	– HP 2600A, 60 cps	7			
	– HP 2600A, 120 cps	8			
	– HP 2600A, 240 cps	9			
30032A	Asynchronous terminal controller		IOTERM0	16	36
	– Hardwired terminal	0			
	– Interfaced over 103A modem	1			
30115A	9 Channel magnetic tape	0	IOTAPE0	24	128
-100					
30103A	Fixed head disk 1 megabyte	0	IOFDISK0	1	128
-001	2 megabyte	1			
-002	4 megabyte	2			
30110A	Cartridge disk	2	IOMDISK0	0	128
	– Lower platter only	1			
	– Upper platter only	0			
30102A	Disk file	3	IOMDISK0	0	128
30106A, 30107A	Card reader	0	IOCDRD0	8	40
-001					
30108A, 30109A	Line printer	0	IOLPRT0	32	66
-001					
30111A, 30112A	Card punch	0	IOCDPN0	33	40

