

# **Operator's Guide**

## **T-Class**

**HP 3000 99x Family Systems, HP 9000 Enterprise Servers**



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## Printing History

The manual printing date and part number indicate its current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The manual part number will change when extensive changes are made.

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## Safety and Regulatory Information

For your protection, this product has been tested to various national and international regulations and standards. The scope of this regulatory testing includes electrical/mechanical safety, radio frequency interference, ergonomic, acoustic, and hazardous materials. Where required, approvals obtained from third-party test agencies are shown on the product label. In addition, various regulatory bodies require some of the information under the following headings.

### USA Radio Frequency Interference

The United States Federal Communications Commission (in 47 CFR Subpart B, of Part 15) has specified that the following notice be brought to the attention of the users of this product:

---

<b>WARNING</b>	<b>This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.</b>
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## Japanese Radio Frequency Interference

The following notice is for users of this product in Japan:

### Japanese Radio Frequency Notice

この装置は、第一種情報装置（商工業地域において使用されるべき情報装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。

従って、住宅地域またはその隣接した地域で使用すると、ラジオ、テレビジョン受信機等に受信障害を与えることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

### EMI Statement (European Union Only)

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

### Digital Apparatus Statement (Canada)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus", ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur : "Appareils Numériques", NMB-003 édictée par le ministre des Communications.

### United Kingdom General Approval

The HP3000 99x and the HP9000 T-Class computers are approved under Approval No. NS/G/1234/J/100003 for indirect connection to public telecommunication systems within the United Kingdom.

### Acoustics (Germany)

Laermangabe (Schalldruckpegel  $L_pA$ ) gemessen am fiktiver Arbeitsplatz bei normalem Betrieb nach DIN 45635, Teil 19:  $L_pA = 61$  dB.

Acoustic Noise (A-weighted Sound Pressure Level  $L_pA$ ) measured at the bystander position, normal operation, to ISO 7779:  $L_pA = 61$  dB.

## Battery Notices

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**WARNING** This product may contain sealed, lead acid batteries. Replace only with the same type and part number. Recycle used batteries or send them to the following address for disposal:

**Hewlett Packard Co.  
Environmental Health and Safety Department  
8000 Foothills Boulevard  
Roseville, Ca. 95678  
ATTN: Battery Disposal Coordinator.**

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**WARNING** Fire, explosion, and severe burn hazard! Do not crush, disassemble, heat, incinerate, or expose the batteries to water.

---

## IT Power System

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**WARNING** This product has not been evaluated for connection to an IT power system (an AC distribution system having no direct connection to earth according to IEC 950).

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## High Leakage Current

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**WARNING** To reduce the risk of electric shock, never operate the product with the ground conductor disconnected. An earth connection is essential before connecting the supply. Reliable ground circuit continuity is vital for safe operation of this product.

---

## Installation Conditions (U.S.)

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**WARNING** Please note the following conditions of installation:

**An insulated earthing conductor that is identical in size, insulation material, and thickness to the earthed and unearthed branch-circuit supply conductors except that it is green with or without one or more yellow stripes is to be installed as part of the branch circuit that supplies the unit or system. The earthing conductor described is to be connected to earth at the service equipment or, if supplied by a separately derived system, at the supply transformer or motor-generator set.**

**The attachment-plug receptacles in the vicinity of the unit or system are all to be of an earthing type, and the earthing conductors serving these receptacles are to be connected to earth at the service equipment.**

---

## Safety Considerations

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. The following figure shows some of the safety symbols used on the product to indicate various safety considerations.

### Safety Symbols



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.



Indicates presence of electric shock hazard.



Indicates earth (ground) terminal (sometimes used in manual to indicate circuit common connected to grounded chassis)



Indicates wiring terminal intended for connection of the protective earthing conductor associated with the supply wiring.

---

**WARNING**     **The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not done correctly or adhered to, could result in injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.**

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---

**CAUTION**     The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not done correctly or adhered to, could damage or destroy part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

---

## DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

**Manufacturer's Name:** Hewlett-Packard

**Manufacturer's Address:** 8000 Foothills Boulevard  
Roseville, CA, 95747, U.S.A

**declares, that the product**

**Product Name:** PA-RISC Computer System

**Model Number(s):** HP 3000 Models 99x (may have prefix  
"Corporate Business System" or "CS" and  
suffix such as "DX/100, /200, ...")  
Note: 'x' can be any number 0-9;  
HP 9000 Models 890, T500, T520, and T600  
(may have prefix "Corporate Business Server")

**Product Options:** All

**conforms to the following Product Specifications:**

**Safety:** EN60950:1988+A1+A2 / IEC 950:1986+A1+A2  
EN60825-1:1993 / IEC 825-1:1993

**EMC:** EN55022:1994 / CISPR 22:1993 Class A<sup>1)</sup>  
EN 50082-1:1992  
IEC 801-2:1991 / prEN55024-2:1992 - 4 kV CD, 8kV AD  
IEC 801-3:1984 / prEN55024-3:1991 - 3V/m  
IEC 804-4:1988 / prEN55024-4:1992 - 0,5 kV Signal Lines  
1,0 kV Power Lines  
IEC 1000-3-2:1995 / EN 61000-3-2:1995 [no limits, par. 7]  
IEC 1000-3-3:1995 / EN 61000-3-3:1995 [no test, par. 6.1]

**Supplementary Information:**

The product herewith complies with the requirements of the EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC and carries the CE marking accordingly.

1) The above products were tested in a typical configuration using Hewlett-Packard Information Technology Equipment .

Roseville, CA March 31, 1997



Dan Blount

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE / Standards  
Europe, Herrenberger Strasse 130, D-71034 Böblingen (FAX:+49-7031-143143)

## Preface

This edition of the Installation Guide is intended for experienced system operators.

This guide contains technical information about HP 3000 Corporate Business Servers (99x Family) and HP 9000 Corporate Business Servers (T-Class System).

At the time of publication, HP 3000 Corporate Business Systems and HP 9000 Corporate Enterprise Servers included the following models:

### HP 3000 99x Family

990/992		991/995		996 <sup>1</sup>	997
990CX	990DX	991CX	991DX	996/80	997/100
992/100CX	992/100DX	995/100CX	995/100DX	996/100	997/200
992/200CX	992/200DX	995/200CX	995/200DX	996/200	997/300
992/300CX	992/300DX	995/300CX	995/300DX	996/300	997/400
992/400CX	992/400DX	995/400CX	995/400DX	996/400	997/500
		995/500CX	995/500DX	996/500	
		995/600CX	995/600DX	996/600	
		995/700CX	995/700DX	996/700	
		995/800CX	995/800DX	996/800	

1. A 996 System may be field upgraded to 9, 10, 11, or 12 processors. Factory integrated servers are sold with a maximum of 8 processors.

### HP 9000 T-Class Systems

890	T500	T520	T600
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# 1 Overview

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This chapter covers:

- Scope of this Manual.
- New Procedures for 99x/T-Class Systems.
- Manual Organization.
- Front Panel.
- System Startup.
- Operator Commands.

## **Scope of this Manual**

This manual tells how to operate and monitor 99x/T-Class Systems. Depending on the operating system, 99x/T-Class Systems are known as:

HP 3000 Corporate Business Systems 990, 991, 992, 995, 996, 997 (for MPE/iX).

HP 9000 Corporate Business Servers 890, T500, T520, T600 Servers (for HP-UX).

This manual is written for system administrators, system operators, or system managers. The manual assumes you have experience operating multi-user systems; it is not a manual for beginners.

This manual does not cover the operating system (HP-UX or MPE/iX). Refer to the operating system manuals for instructions on booting the OS and subsequent OS procedures.

For electrical and environmental specifications, refer to the data sheets for the product. For more detailed specifications, contact the HP Customer Response Center (Hardware Assistance).

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## New Procedures for 99x/T-Class Systems

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**NOTE When Executing a Transfer of Control (TC) or Reset (RS) Command:**

99x/T-Class Systems require one more step than other PA-RISC computers to execute a Transfer of Control (TC) or a hard reset (RS). (These commands are often used in recovering from system interruptions.) The new procedure is described in Table 1-2. Also see Chapter 3 (Recovering from Failures on the T-Class Systems) and Chapter 4 (Recovering from Failures on the 99x).

**Table 1-1. Executing transfer of control (TC) or Hard Reset (RS)**

	<b>99x/T-Class Systems</b>	<b>Other PA-RISC Systems</b>
Step ONE: At the system console.	Enter <Control>-B.	Enter <Control>-B.
Step TWO: At the AP Control Mode (CM) prompt.	Enter SP mode: CM > SP (NEW STEP)	Enter the desired command: CM > TC (or RS)
Step THREE: At the Service Processor (SP) prompt.	Enter the desired command: SP > TC (or RS)	

---

## Manual Organization

Table 1-2 shows what each chapter in this manual covers. Most of the time, the information in Chapter 2 (Procedures) and Chapter 5 (Indicators, Switches, and Console) provide enough information to operate the computer. For more complex tasks such as changing parameters, consult the reference information in the remaining chapters:

**Table 1-2 Organization of this Manual**

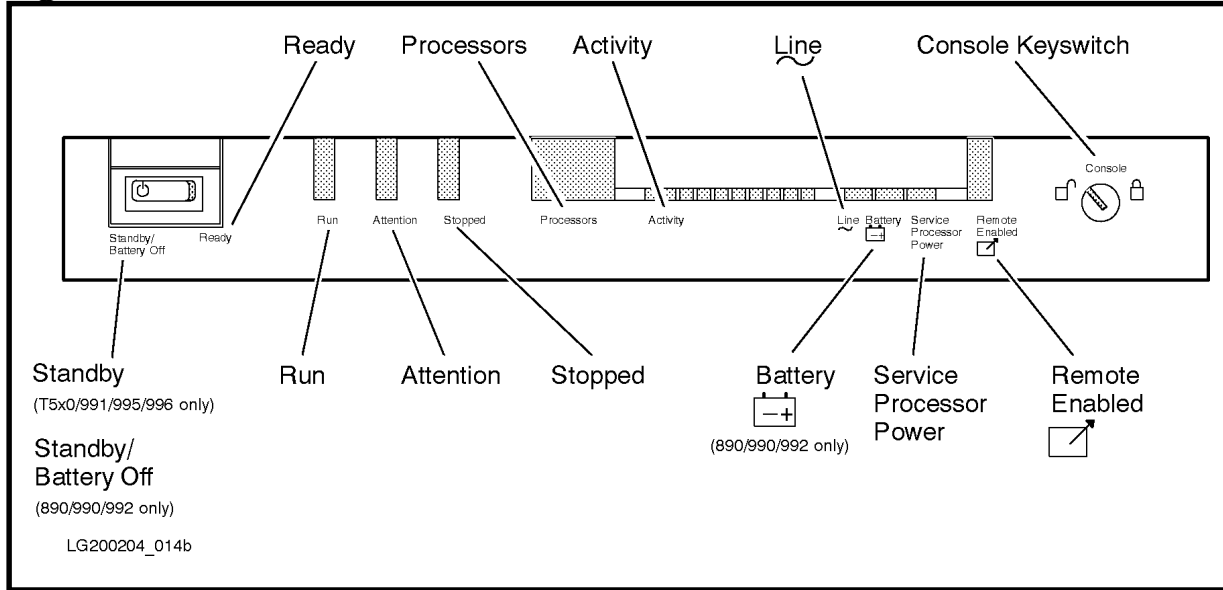
Chapter	Description
Chapter 1 (Overview)	Overview of this manual and of the interfaces available to the operator.
Chapter 2 (Procedures)	Step-by-step instructions on common operating procedures: <ul style="list-style-type: none"><li>■ Powering Up.</li><li>■ Powering Down.</li><li>■ Resetting/Rebooting the Computer.</li><li>■ Booting the Operating System.</li><li>■ Monitoring Hardware Status.</li><li>■ Displaying/Modifying Autostart Flag.</li><li>■ Examining the SP Error/Activity Logs.</li><li>■ Viewing the Chassis Code and Remote Console Status.</li><li>■ Using the OpenView Console.</li><li>■ Securing the Computer.</li><li>■ If the Computer Fails...</li><li>■ Accessing PDC Commands.</li><li>■ Changing the Autoboot Flag or Hardware Paths.</li><li>■ Updating Firmware.</li></ul>
Chapter 3 (Recovering from Failures on the T-Class Systems)	Explains how to recover from system interruptions (failures) on the T-Class Systems.
Chapter 4 (Recovering from Failures on the 99x)	Explains how to recover from system interruptions (failures) on the 99x.

<b>Chapter</b>	<b>Description</b>
Chapter 5 (Indicators, Switches, and Console)	Description of the indicators and front panel switches used to operate 99x/T-Class Systems. See Figure 1-1. Also describes the system console and how to access the commands available from it. You can execute Access Port (AP) and Service Processor (SP) commands from the console.
Chapter 6 (PDC)	Reference information on commands available from the Processor Dependent Code (PDC) interface.
Chapter 7 (Access Port)	Reference information on commands available from the Access Port (AP) interface.
Chapter 8(Service Processor)	Reference information on commands available from the Service Processor (SP) interface.
Appendix A (Glossary)	Glossary of terms.

## Front Panel

Figure 1-1 shows the indicators and switches on the front panel of 99x/T-Class Systems. These are described further in Chapter 5 (Indicators, Switches, and Console).

**Figure 1-1 Front Panel Indicators and Switches**



---

## System Startup

At system startup, the computer passes through several stages before loading the operating system (see <Undefined Cross-Reference>). At each stage, the operator has access to a different set of commands.

Steps involved in system startup:

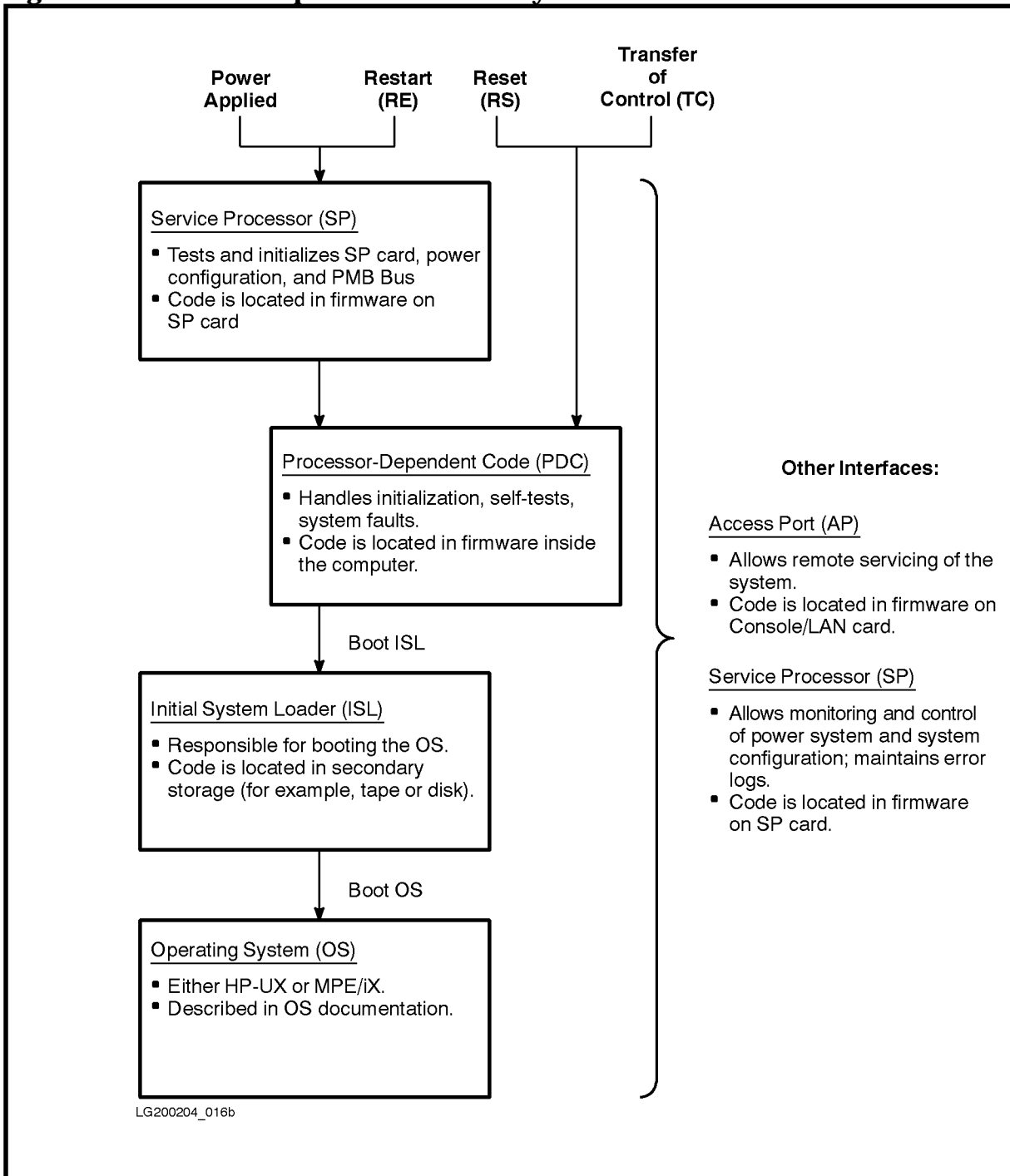
1. The operator can begin the system startup in one of four ways:
  - a. **Power-up:** Operator turns on rear circuit breaker and places the front panel Standby/Ready switch to the "Ready" position.
  - b. **TC:** Operator enters TC at the SP prompt when the computer is powered up and the operating system is running. (The TC command is used to reset the system when you want to preserve troubleshooting data, for example to prepare for a memory dump.)
  - c. **Reset:** Operator enters RS at the SP prompt when the computer is powered up. (The RS command is used to reset the system when you do not care about preserving troubleshooting information, for example when updating the operating system. An RS is also used to reset the system when a TC is not successful.)
  - d. **Restart:** Operator enters RE at the SP prompt when the computer is powered up. (RE is similar to the RS command, but initializes the computer more thoroughly. It also takes more time.)
2. The computer executes Service Processor (SP) firmware. SP firmware is located on the Service Processor card inside the computer. The SP firmware:
  - a. Performs a selftest (after a RE command or power-up; not after a TC or RS command).
  - b. Checks the card slots inside the computer to determine whether the system configuration is appropriate for the power.
  - c. Checks the outputs of the power supplies.
  - d. Displays message if configuration has changed since the last power-up. If the SP Autostart flag is set, continues to boot. If the SP Autostart flag is cleared, the computer halts and waits for operator input if the configuration has changed.
  - e. Allows the operator to access several SP commands. (The SP interface is available from this point on.)
3. The computer executes Processor Dependent Code (PDC). PDC is firmware located on the SP card inside the computer. PDC:
  - a. Performs hardware selftests.
  - b. Initializes the hardware.
  - c. If it detects a memory card failure and has de-allocated the memory, it displays a message. If the SP Autostart flag is set, continues to boot. If the SP Autostart flag is cleared, the computer halts and waits for operator input.

- d. Allows the operator to access several PDC commands.
  - e. Loads ISL.
4. The computer executes the Initial System Loader (ISL) program. ISL is code located in secondary storage (for example, tape or disk). ISL:
    - a. Allows the operator to access several ISL commands.
    - b. Loads the operating system (HP-UX or MPE/iX).
  5. The computer boots the operating system (HP-UX or MPE/iX)

The Access Port (AP) and Service Processor (SP) interfaces are available during all stages of system startup.



**Figure 1-2 Relationship of Interfaces to System States**



## **Operator Commands**

Several dozen commands are available for operating and monitoring the hardware. These commands are available from five different interfaces ( Table 1-3).

PDC, ISL, and OS commands are only available at certain stages of system startup. Many AP and SP commands are available at all stages of operation. See Figure 1-2.

**Table 1-3 Interfaces Used to Operate the System**

Abbrev	Full Name	Function	Commands Available
PDC	Processor Dependent Code	Initializes the hardware, conducts selftests, handles system faults. Allows operator to alter various system parameters. Provides a software interface for hardware implementation.	Important PDC commands include: <ul style="list-style-type: none"> <li>■ Display/change the default boot and console paths.</li> <li>■ Set/clear autoboot flag.</li> <li>■ Update firmware.</li> <li>■ View the HPMC tombstone.</li> </ul>
ISL	Initial System Loader	Responsible for booting the operating system.	Important ISL commands include: <ul style="list-style-type: none"> <li>■ Display/change default boot and console paths.</li> <li>■ Set/clear autoboot flag.</li> </ul>
AP	Access Port	Allows remote servicing of system.	Important AP commands include: <ul style="list-style-type: none"> <li>■ Enable/disable remote console access.</li> <li>■ Modify remote access security features.</li> <li>■ Enable/disable the SPU status display.</li> </ul>
SP	Service Processor	Provides functions for servicing the system, whether DC power is on or off. Monitors power system.	Important SP commands include: <ul style="list-style-type: none"> <li>■ Execute a Transfer of Control (TC).</li> <li>■ Execute a reset (RS or RE).</li> <li>■ Set/clear autostart flag.</li> <li>■ Monitor and control power system.</li> <li>■ Change/view system configuration.</li> <li>■ Change/view error logs and HPMC tombstones.</li> </ul>
OS	Operating System (HP-UX or MPE/iX).	See OS documentation.	See OS documentation.

The ISL and AP interfaces are similar to those on previous PA-RISC systems. PDC on 99x/T-Class Systems have a new user interface. The Service Processor (SP) is entirely new for 99x/T-Class Systems.

## 2 Procedures

---

This chapter gives common operator procedures in a step-by-step form. For detailed information, see the other chapters.

Procedures Given:

- Powering Up.
- Powering Down.
- Resetting/Rebooting the Computer.
- Booting the Operating System.
- Monitoring Hardware Status.
- Displaying/Modifying Autostart Flag.
- Examining the SP Error/Activity Logs.
- Viewing the Chassis Code and Remote Console Status.
- Using the OpenView Console.
- Monitoring the PowerTrust UPS.
- Securing the Computer.
- If the Computer Fails...
- Configuring a PowerTrust UPS on T-Class Systems
- If AC Power Fails...(T-Class Systems WITH Automatic Shutdown)
- If AC Power Fails...(T-Class Systems WITHOUT Automatic Shutdown)
- If AC Power Fails...(99x Systems with a PowerTrust UPS)
- Accessing PDC Commands.
- Changing the Autoboot Flag or Hardware Paths.
- Updating Firmware.

---

**NOTE** These procedures assume that the computer has been installed and configured by HP service personnel. The 99x/T-Class system is not a customer-installable system.

---

## Operating Procedures

### Powering Up

**To power up the computer:** (See Figure 2-1.)

1. Verify that the circuit breaker at the rear of the computer is turned off, and that the "Standby-Ready" switch at the top front of the computer is in the "Standby" position. Also verify that the computer cabinet is plugged in.
2. If the computer system includes PowerTrust Uninterruptible Power Systems (UPSs), verify that the computer cabinet is plugged into a PowerTrust UPS. Verify that other units in the system that should be plugged into the UPS are plugged in (for example the system disk); see the *PowerTrust System Guide* that came with the UPS for details.
3. Turn on power to each external HP-PB card cage by pushing its switch. A pushbutton switch is located on each HP-PB card cage in the expansion cabinets.
4. Turn on all the external equipment (except the DTC) connected to the computer and expansion cabinets.
5. If there is a power switch located on the front of the expansion cabinet, turn it on.
6. Check all READY or ONLINE indicator lights on the external equipment to be sure that the external equipment is powered up and ready.

---

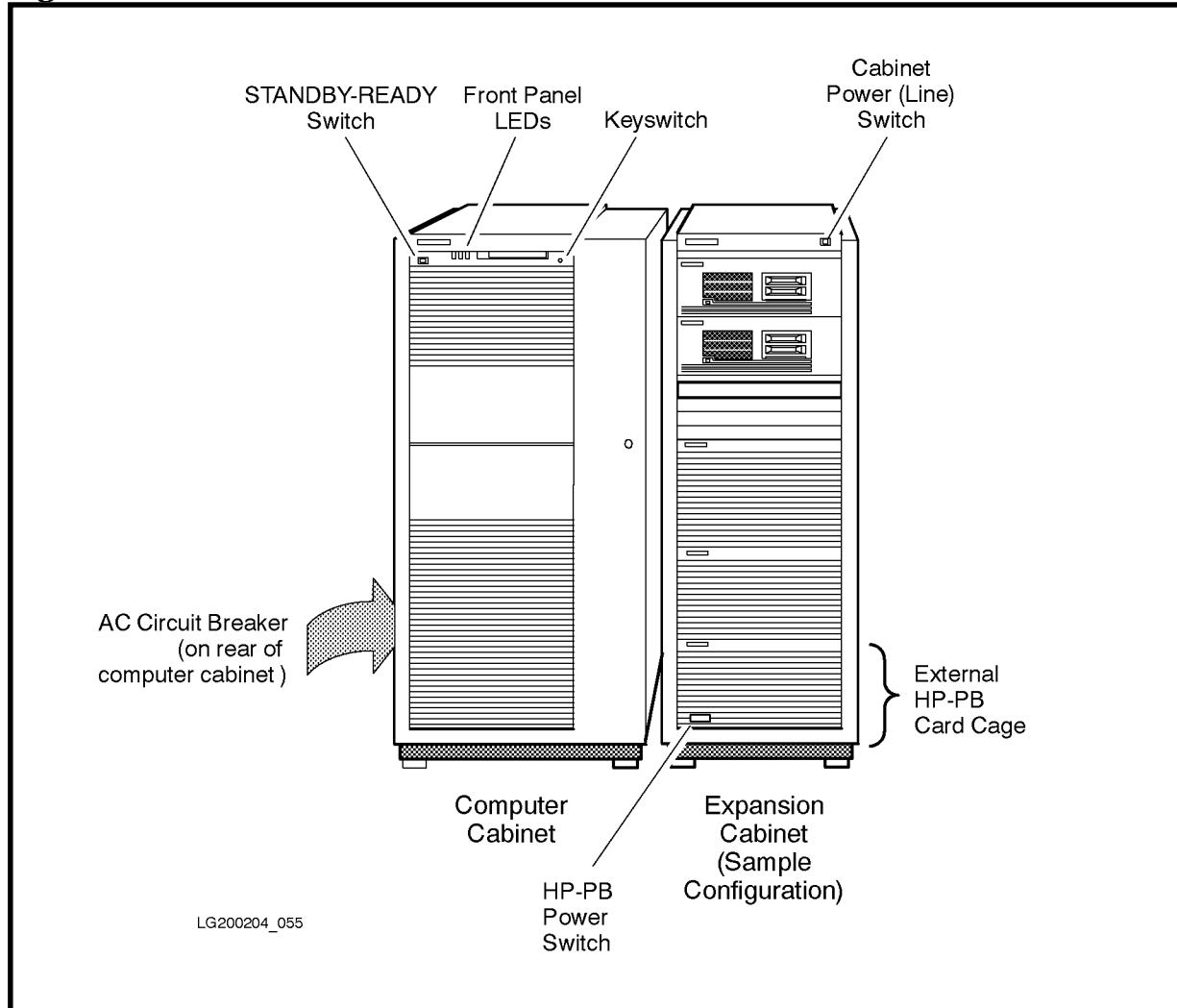
**CAUTION** If any of the external equipment has been OFF due to any environmental problems, such as heating or air conditioning failure, allow approximately 30 minutes for the temperature of the equipment to stabilize before turning on the computer.

---

7. Turn on the console.
  - a. On T-Class Systems 990, 991, 992, 995 (non-DX) systems, or 996 and 997 systems that is ordered with one, turn on the 700/96 terminal used as the console.
  - b. On 990DX, 991DX, 992DX, 995DX systems or 996 or 997 systems ordered with one, turn on the OpenView console and enter `WIN` at the `C:\>` prompt. In a minute or so, you should see a window labeled "Console ldev-20".
8. Insert the key into the keyswitch in the front panel of the computer and turn it to the Console Unlocked position (the icon of an unlocked padlock).
9. When all external equipment have their READY or ONLINE indicators lit, turn on AC to the computer cabinet by switching on the power switch (circuit breaker) at the bottom rear of computer cabinet.
10. Turn the "Standby-Ready" switch at the top front of computer cabinet to the "Ready" position.

11. After powering up the computer, you should see several LEDs on the front panel light. The front panel indicators turn off and on in various patterns as the computer goes through its startup process. The computer takes several minutes to go through the startup process.

**Figure 2-1 Switches and Indicators**



## Power-Up Problems

**If the computer does not seem to power up (if LEDs and indicators on the control panel don't light):**

1. Check LEDs on the front panel of the computer for possible problems (see Figure 2-2):

**Line:** If this LED is OFF, AC is not being supplied to the computer. Make sure that the AC circuit breaker switch on the lower rear of the cabinet is turned on. Make sure the unit is plugged in. Check to see if a circuit breaker has tripped or if there is a problem with power at the site.

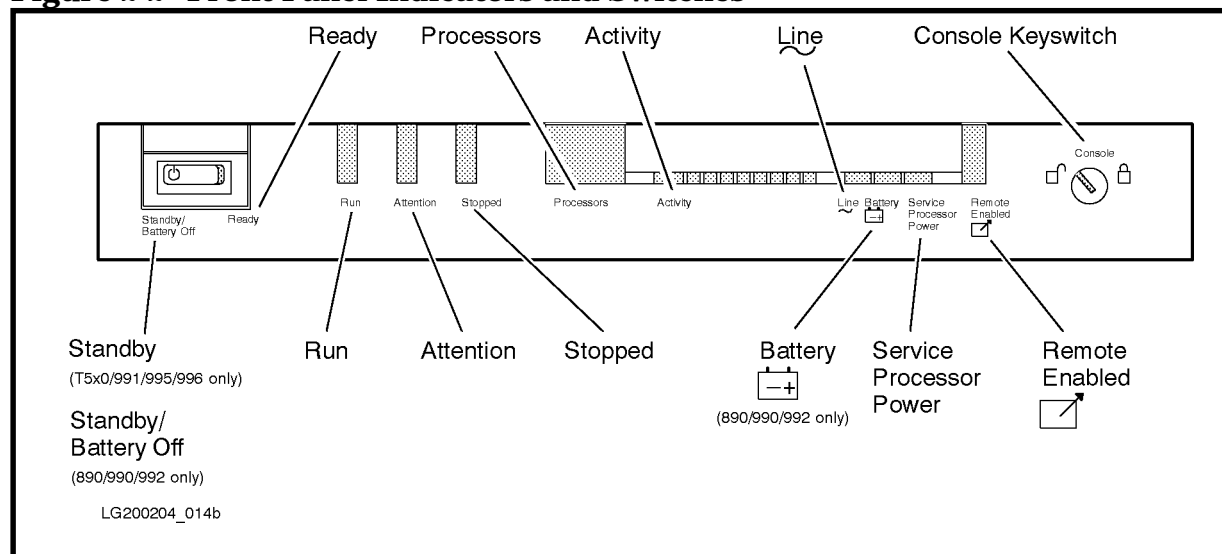
**SP Power:** If this LED is OFF, the Service Processor (SP) is not receiving power. If the "Line" LED is ON at the same time, there may be a problem with the power system or the SP. Contact the HP Customer Response Center (Hardware Assistance).

**Battery:** (990/992/890 only) If this LED is ON, the battery back-up unit is discharging/charging. Make sure the "Standby-Ready" switch on the top front of the computer is set to the "Ready" position. Make sure that AC power is being supplied to the computer.

**Stopped:** If this LED is ON, make sure the "Standby-Ready" switch on the top front of the computer is set to the "Ready" position. Make sure the console keyswitch on the front panel is in the unlocked position. Check for messages on the system console. Check the SP error logs.

2. If the previous step does not solve the problem, contact the HP Customer Response Center (Hardware Assistance).

**Figure 2-2 Front Panel Indicators and Switches**



## Powering Down

**To power down the computer:** (See Figure 2-1.)

1. Shut down the operating system. Consult the OS documentation for the appropriate procedure.
2. Wait until the OS has finished its shutdown routine.
3. Turn the "Standby-Ready" switch on the front panel to the "Standby" position. In this position:
  - a. DC power is no longer supplied to PMB cards in the cabinet.
  - b. (990/992/890 only) Battery back-up is disabled.



- c. Cabinet still contains AC, high voltage DC, and low-voltage DC bias voltages (for example on the SP card and the HP-PB card cage) if rear circuit breaker is in ON position.
4. Turn off power to all external HP-PB card cages by pressing the push-button switch on the front of each of them. (Both the computer and the external HP-PB card cage must be powered down before HP-PB cards can be installed or removed.)
5. Turn off power to the expansion cabinet(s) by placing the front power switch to the OFF position.
6. To completely turn off all voltages in the system cabinet, turn off power switch (circuit breaker) at the bottom rear of the cabinet. This switch disconnects the AC line from the cabinet. No lights or fans should remain on.
7. If the computer does not power off with both switches in the off position (if lights or fans remain on), call your HP Customer Response Center (Hardware Assistance).

## Resetting/Rebooting the Computer

There are four different ways to "reset" ("reboot") the computer. See Table 2-1.

**Table 2-1 Resetting the 99x/T-Class Systems**

Command	Accessing	Description	Use
TC (Transfer of Control)	<ol style="list-style-type: none"> <li>1. (OS should be running; if not, use RE or RS to reset)</li> <li>2. Enter &lt;Control&gt; - B at the system console</li> <li>3. Enter SP</li> <li>4. Enter TC</li> </ol>	On 99x systems, performs OS-specific tasks, then performs a soft boot. (A soft boot tests memory non-destructively, preserving troubleshooting data.) The computer performs PDC initialization. It does not perform SP initialization. On T-Class systems, performs a hard boot.	<p>To reset the system when you want to save troubleshooting data. For example:</p> <ul style="list-style-type: none"> <li>■ When the system is "hung" (does not respond to input) and you want to preserve troubleshooting data (for example in preparation for a memory dump).</li> </ul>
RS (Reset)	<ol style="list-style-type: none"> <li>1. Shut down the OS if possible.</li> <li>2. Enter &lt;Control&gt; - B at the system console</li> <li>3. Enter SP</li> <li>4. Enter RS</li> </ol>	Performs a hard boot. A hard boot tests memory destructively; some troubleshooting data is lost. The computer performs PDC initialization. It does not perform SP initialization.	<p>To reset the system when you do not care about saving troubleshooting data. For example:</p> <ul style="list-style-type: none"> <li>■ When updating the OS.</li> <li>■ After changing the console path.</li> </ul>
RE (Restart)	<ol style="list-style-type: none"> <li>1. Shut down the OS if possible.</li> <li>2. Enter &lt;Control&gt; - B at the system console</li> <li>3. Enter SP</li> <li>4. Enter RE</li> </ol> <p>(You can also enter RESTART at a PDC prompt.)</p>	Performs a more complete hard boot than the RS command. Like RS, this hard boot tests memory destructively so that some troubleshooting data is lost. The computer performs both an SP and PDC initialization. Both the SP and the power system are tested. The RESTART command takes more time to execute than does the RS command.	To reset the system COMPLETELY when you do not care about saving troubleshooting data.
Cycling Power	<ol style="list-style-type: none"> <li>1. Shut down the OS if possible.</li> <li>2. Turn "Standby-Ready" switch to "Standby"</li> <li>3. Turn off AC circuit breaker at rear of cabinet.</li> <li>4. Wait 5 to 10 seconds.</li> <li>5. Turn on AC circuit breaker.</li> <li>6. Turn "Standby-Ready" switch to "Ready"</li> </ol>	Similar to RESTART.	To reset the system COMPLETELY when you do not care about saving troubleshooting data.

## Booting the Operating System

Once 99x/T-Class Systems have been configured and the operating system is installed, booting up is largely automatic. The system automatically boots up if the autoboot option is set to true and the boot path is correct. (The autoboot option can be changed with either PDC or ISL commands.)

### To boot the operating system:

1. Power up the computer as described earlier in this chapter.
2. Respond to any prompts that ask whether to continue with the boot process. For example:

```
Continue with primary boot path? ([y]/n/)> Y
```

## Boot-Up Problems

### If you are unable to boot:

1. Follow the procedure for "Power-Up Problems" earlier in this chapter.
2. Check for messages on the system console.
3. Check the status information on the next-to-last line of the system console by entering <Control>-B.
4. Examine the SP error logs with the DL command at the SP prompt.
5. Make sure the primary boot device (that is, the system disk) is powered up and connected to the 99x/T-Class system.
6. Make sure the boot path is correct by using the Boot Menu in the PDC interface. See "Changing the Autoboot Flag or Hardware Paths" later in this chapter.
7. If the previous steps do not solve the problem, contact the HP Customer Response Center (Hardware Assistance).

---

**NOTE** During boot, the computer will halt with no console display if the following conditions are all true:

- The autostart flag (AF at the SP prompt) is not set.
- A module is de-configured.
- The front panel keyswitch is in the locked position.

If this should happen, recover the console display by putting the front panel keyswitch into the unlocked position.

---

## Monitoring Hardware Status

Table 2-4 shows the state of the switches and indicators during normal operation when the operating system is running. See Chapter 5 (Indicators, Switches, and Console) for more information on what the indicators mean.

**Table 2-2 Normal State of the Front Panel Indicators and Switches**

Indicator/ Switch	Normal State
Front "Standby-Ready" switch	"Ready" position.
Run (green LED)	ON for normal operating system (OS) system activity. Flashing for non-OS system initialization activity.
Attention (yellow LED)	OFF. (Will be ON if there is a critical unread message in the SP log.)
Stopped (red LED)	OFF. (Could be ON if user input is required.)
Processors	"01" or greater. (Shows the number of processors which are configured and have passed PDC selftest).
Activity	0 to 10 LEDs lit.
Line	ON.
Battery (890/990/992 only)	(990/992/890) OFF. On rare occasions, this LED may be ON, indicating that the battery is charging/discharging. (In this case, the battery is charging if the "Line" LED is ON; the battery is discharging if the "Line" LED is OFF.)
SP Power	ON.
Remote Enabled	ON or OFF. For maximum security, this should be OFF.
Console Keyswitch	Locked or unlocked. For maximum security, this should be locked unless needed. The keyswitch should be unlocked: <ul style="list-style-type: none"> <li>■ While performing installation tasks.</li> <li>■ To get to any SP messages.</li> <li>■ During boot, especially if the autostart flag (AF at SP prompt) is not set.</li> </ul>

**If the yellow If the If Attention LED lights:**

1. Look for warning messages on the system console.
2. Look for unread messages in the SP log. See "Examining the SP Error/Activity Logs" which follows.

**If the LED indicators show an abnormal system status, gather information to help the HP service organization troubleshoot the problem:**

1. Make a note of which indicators are on.
2. Write down the hex code displayed on the system console. (Enter <Control>-B at the system console; the hex code is on the bottom line.)

## Displaying/Modifying Autostart Flag

If the autostart flag is set, the computer startup process continues even if processor or memory modules are scheduled to be de-configured (for example if they fail selftest).

If the autostart flag is cleared, the computer startup process halts at the SP prompt if processor or memory modules are scheduled for de-configuration.

The autostart flag described here is different from the autoboot flag which can be modified from the PDC interface. The PDC autoboot flag allows the OS to boot automatically upon power-up.

For more information, see the entry for AF in Chapter 8 (Service Processor)

### To display/modify the autostart flag:

1. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
2. Enter <Control>-B at the system console.
3. Enter SP to enter the Service Processor interface.
4. Enter AF at the SP prompt.
5. The SP prompts you to set or clear the autostart flag. For example:

```
SP> AF

The Service Processor autostart flag is currently SET (autostart enabled)

Do you wish to CLEAR the flag (y/[n])? N

The Service Processor autostart flag will remain SET. (autostart enabled)
```

---

**CAUTION** Do not leave the console in SP mode or AP control mode for long periods of time or during boot. This blocks console messages and can eventually cause the OS to hang or crash. During boot, this can cause a processor selftest failure.

---

## Verifying PMB Card Cage Configuration

You can display and modify the the PMB card cage configuration inside the computer by using the HC command. For each Processor Memory Bus (PMB) slot, the display tells:

- Whether the slot is occupied.
- Which module type resides in the slot (bus converter, memory or processor).
- Whether the module is currently configured IN or OUT of the computer.
- Whether the module is scheduled to be configured at the next boot.

The HC command can be used to configure PMB modules IN or OUT of the computer. The new configuration status becomes effective during the next boot of the computer.

---

**CAUTION** De-configuring PMB cards by accident will interfere with computer operation (degraded performance or inability to boot-up).

---

The HC command does not show the configuration of I/O interface cards in the HP-PB card cages.

For more information, see the entry for HC in Chapter 8(Service Processor)

**To display/modify the hardware configuration:**

1. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
2. Enter <Control>-B at the system console.
3. Enter SP to enter the Service Processor interface.
4. Enter HC at the SP prompt. A sample display looks like this:

```
Host Hardware Configuration: (D = deconfigure; - = non-existent port)
-----
```

PMB Slot	Board Type	Deconfigured Ports				Ports to be deconf at next boot			
		0	1	2	3	0	1	2	3
0	Bus Converter		-	-	-		-	-	-
7	Memory		D	-	-		D	-	-
12	TNT Processor			-	-			-	-
13	TNT Processor			-	-			-	-
14	TNT Processor			-	-			-	-
15	TNT Processor			-	-			-	-

## Examining the SP Error/Activity Logs

The Service Processor (SP) maintains logs of hardware errors and activity. Three logs are maintained:

- **Activity Log:** records major changes in the state of the computer (for example, power-up and shutdown). Critical entries are displayed in reverse video. The information in the Activity Log is useful for determining how far computer operation proceeded before a failure occurred. The Activity Log is circular (once the log is filled to capacity, subsequent entries cause the earliest entries to be deleted).
- **Earliest Error Log:** contains the earliest error entries.
- **Latest Error Log:** contains error entries recorded after the Earliest Error Log is full.
- **SPU Tombstones Log:** contains up to 16 tombstones. A tombstone consists of troubleshooting data generated by an HPMC, LPMC, or Transfer of Control.

The **Error Logs** contain entries for critical and non-critical errors. Critical errors are those which require immediate attention; they usually indicate a failure of hardware or software. Critical errors are shown in reverse video in the SP log display.

When a critical error occurs, the yellow "Attention" LED on the front panel is lit to signal the operator. If the status line on system console is enabled, critical errors also cause a message to be displayed there. If the "Attention" LED is lit because of an unread critical-error entry, reading the SP error log will turn off the LED.

The time stamp for the entries is in Universal Time (Greenwich Mean Time).

**To examine the SP error or activity logs:**

1. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
2. Enter <Control>-B at the system console.
3. Enter SP to enter the Service Processor interface.
4. Enter DL at the SP prompt.
5. To see a record of errors:
  - a. If the "Latest Errors" log has entries, enter L;
  - b. If the "Latest Errors" log has no entries, enter E to see the "Earliest Errors" log. (The "Latest Errors" log only has entries if the "Earliest Errors" log is full.)
6. To see a history of system activity, enter A
7. At periodic intervals use the CL (Clear Log) command at the SP prompt to keep the error and activity logs to a manageable size.

For more information, see Chapter 8(Service Processor).

---

**CAUTION** Do not leave the console in SP mode or AP control mode for long periods of time or during boot. This blocks console messages and can eventually cause the OS to hang or crash. During boot, this can cause a processor selftest failure.

---

## Viewing the Chassis Code and Remote Console Status

**To see a line of status information on the console (including the four-digit hex code):**

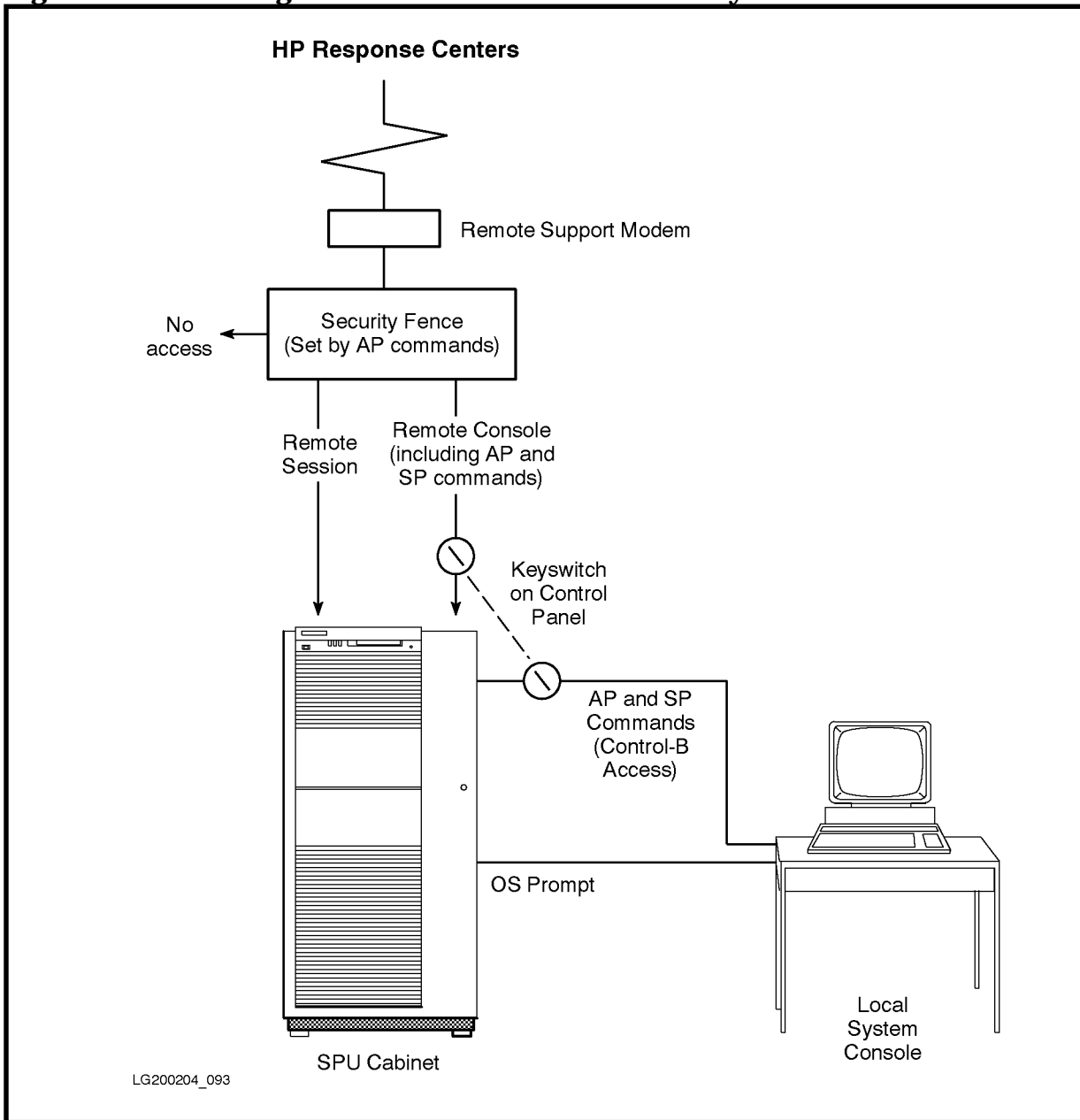
1. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
2. At the system console, enter <Control>-B to enter Access Port control mode.
3. Look on the next-to-last line of the display for status information. You will see a display like this:

```
TEST          90AA          REMOTE: enabled inactive multiple          ACCESS FAULT: 00
  ^            ^            ^            ^
  |            |            |            |
```





**Figure 2-3 Accessing the Console on the 99x/T-Class Systems**



### Limiting Access from the Local Console Terminal

To limit access from the local console terminal (Control-B access):

1. Put the front panel keyswitch into the locked position.
2. Follow normal OS security procedures. For example, do not leave the local console logged in as root or MANAGER.SYS.

---

**NOTE** Do not change the key position while the console is in Service Processor (SP) mode (that is, when the console is displaying the SP > prompt). Doing so can cause the console to "hang."

---

## Changing Access Parameters for Remote Support Modem and Remote Console

99x/T-Class Systems provide several levels of security for controlling access to the Remote Support Modem and the remote console. See Figure 2-4.

To change access parameters for the Remote Support Modem and for the remote console (Control-B access):

1. Study Figure 2-4 to determine the controls appropriate for your site. (Recommended settings for MPE/iX with Predictive Support: UR, ER, single access mode, set a password.)
2. If the console is locked, unlock it with the front panel keyswitch. (see Figure 2-2).
3. Enter <Control>-B at the system console to enter the Access Port control mode.
4. At the AP prompt (CM> ) (Control Mode), enter the desired commands.
  - a. UR or LR to unlock/lock all access through the remote support modem.
  - b. ER or DR to enable/disable remote console access. **Remote console access** means that the remote user is connected in parallel to the local console. The remote user sees the same displays and has access to the same commands as a local operator, including <Control>-B access to AP and SP commands.
  - c. ER to set additional access parameters:
    - i. Password for remote console access.
    - ii. Number of password faults allowed before remote console access is disabled.
    - iii. Single/multiple access mode. With single access mode, only one access to the remote console is permitted. After the one access, the remote console cannot be accessed again. Only remote sessions are permitted. To use the remote port as a remote console once again, the remote console capability must be re-enabled by the local console (ER command)

---

**NOTE** For predictive support to function correctly, the AP should be set to *single mode*.

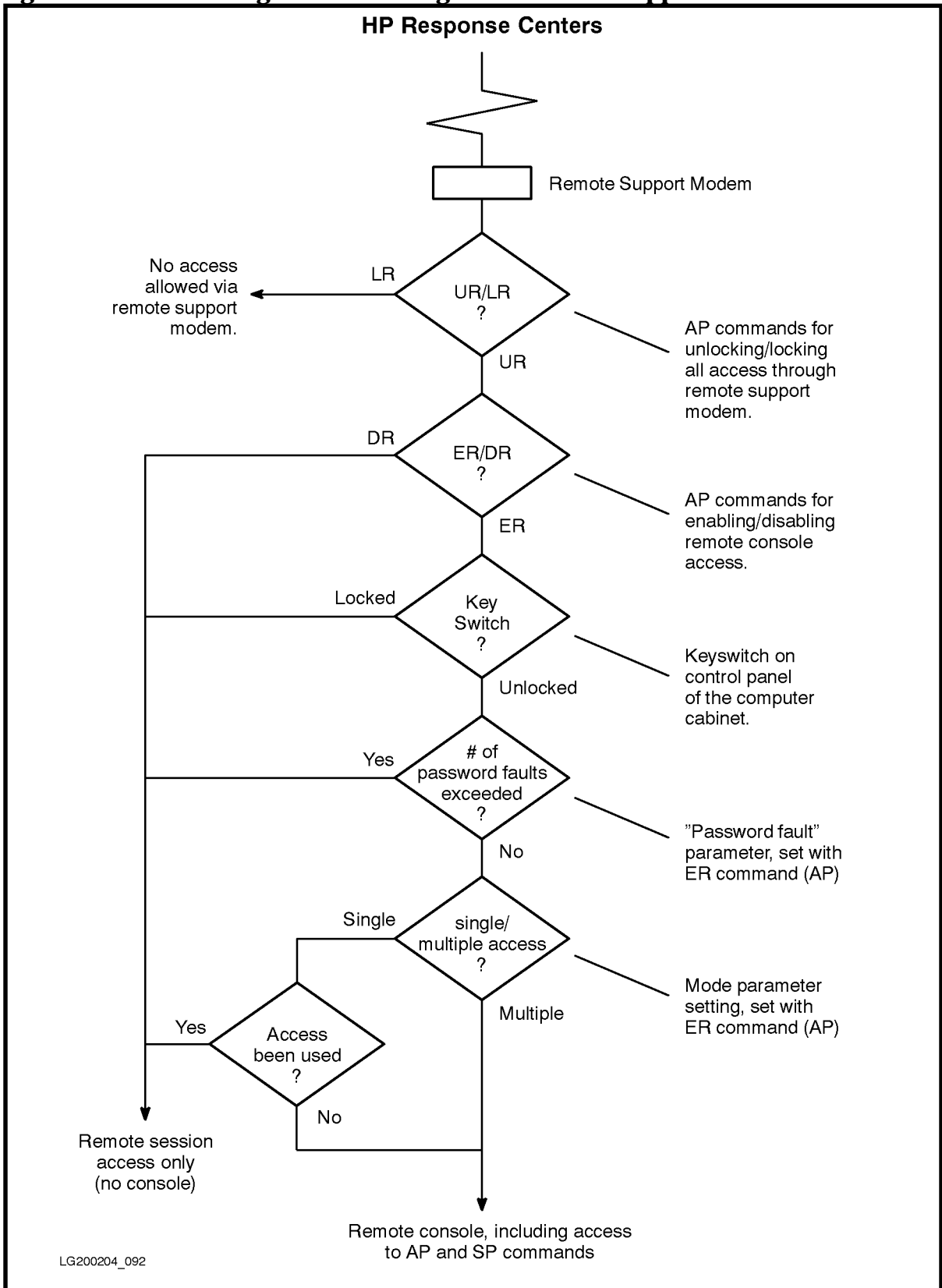
---

For more information on AP commands, see Chapter 7 (Access Port).

5. Exit the Access Port by entering CO at the AP prompt.
6. If you want to prevent both local and remote console access (Control-B access), put the front panel keyswitch into the locked position.

If the keyswitch is in the locked position, error messages sent to the console will not be displayed.

**Figure 2-4 Controlling Access Through the Remote Support Modem**



## If the Computer Fails...

If the computer fails or does not respond (it "hangs"), refer to the troubleshooting chapters later in this manual:

- **For the T-Class Systems:** see Chapter 3 (Recovering from Failures on the T-Class Systems).
- **For the 99x:** see Chapter 4 (Recovering from Failures on the 99x).

See also the procedure for "Resetting/Rebooting the Computer" earlier in this chapter.

## Configuring a PowerTrust UPS on T-Class Systems

On HP-UX 9.04 and later releases, you can use SAM (Peripheral Devices) to modify the UPS configuration. You can specify:

- The serial port(s) to be used for the UPS.
- Whether to activate or deactivate the automatic shutdown feature entirely.
- The parameter `shutdown_delay_mins` (default = 1 minute). This parameter specifies the number of minutes to wait before initiating shutdown -h following notification that AC power to the UPS is lost. This interval allows the computer to continue operation through brief electrical glitches.

---

**NOTE** Consider increasing the value of `shutdown_delay_mins` if the site commonly experiences momentary power interruptions greater than one (1) minute for which recovery of power is expected.

---

- The parameter `shutdown_timeout_mins`. This parameter specifies the number of minutes to monitor the shutdown -h operation before initiating reboot with the halt option. In this way a reboot is executed even if the shutdown process hangs.

---

**NOTE** Consider increasing the value of `shutdown_timeout_mins` if `shutdown(1M)` will take longer than 5 minutes (including the 60 second delay by `shutdown(1M)` after notification of users).

Consider decreasing the value of `shutdown_timeout_mins` if `shutdown(1M)` will take less than 5 minutes; small systems can take advantage of this.

---

For more information on UPS on HP-UX 9.04, see the man pages on `ups_mond(1M)` and `ups_conf(4)`.

## If AC Power Fails...(T-Class Systems WITH Automatic Shutdown)

---

**NOTE** If the automatic shutdown feature has been disabled, follow the procedure for T-Class Systems WITHOUT Automatic Shutdown.

---

**If AC power fails on an T-Class system with a PowerTrust UPS and with the automatic shutdown feature enabled:**

1. You will hear an alarm (a single beep every 7 seconds). If desired, you can turn off the auditory alarm by pressing the switch on the PowerTrust UPS labeled "Silence Alarm".

---

**CAUTION** Do NOT press the switch on the PowerTrust UPS labeled "Output On/ Output Off". Pressing this switch would shut off power to the SPU and other units connected to the UPS.

---

2. With the OS properly configured for UPS, you will see UPS messages on the console. See Appendix A in *PowerTrust System Guide* for explanations of the messages.
3. The indicators on the PowerTrust UPS front panel labeled "AC Output" and "Battery Power" will be lit.
4. **If AC power does not return** within the time specified by the parameter, `shutdown_delay_mins` (default = 1 minute), the `shutdown(1M)` command with the "-h" option is executed. Normal shutdown processing occurs. In case the shutdown process hangs, the reboot command with the halt option is executed after an interval specified by `shutdown_timeout_mins` (default = 5 minutes).

---

**CAUTION** Do NOT turn off power yourself, no matter what messages you see on the console. Power will be turned off automatically as part of the automatic shutdown. If you turn off power yourself, the system may be powered off automatically as it is rebooting, causing a hard crash.

---

5. **If the unit comes within approximately two (2) minutes of full battery discharge**, the reboot command with the halt option will execute, as described in the previous item. The PowerTrust UPS will issue three beeps every 7 seconds.

For more information, see the *PowerTrust System Guide* that accompanied the PowerTrust UPS.

The operating system should have been configured for the UPSs as part of the system installation. See <Undefined Cross-Reference> which appears later in this chapter.

Automatic shutdown is only supported on HP-UX 9.04 and later releases.

## **If AC Power Fails...(T-Class Systems WITHOUT Automatic Shutdown)**

**If AC power fails on an T-Class system with a PowerTrust UPS and with the automatic shutdown feature disabled:**

1. The PowerTrust Uninterruptible Power System (UPS) will supply power to the system from a battery for approximately 15 minutes if the battery is fully charged.
2. You will hear an auditory alarm (a single beep every 7 seconds). If desired, you can turn off the auditory alarm by pressing the switch on the PowerTrust UPS labeled "Silence Alarm".

---

**CAUTION** Do NOT press the switch on the PowerTrust UPS labeled "Output On/ Output Off". Pressing this switch would shut off power to the SPU and other units connected to the UPS.

---

3. For systems running HP-UX 9.04 and later releases (with the OS properly configured for UPS), you will see UPS messages on the console. See Appendix A in *PowerTrust System Guide* for explanations of the messages.
4. The indicators on the PowerTrust UPS front panel labeled "AC Output" and "Battery Power" will be lit.
5. **If you anticipate a long period without AC power**, you may want to shut down your system during the 15 minutes of reserve power:
  - a. Follow the usual OS shutdown procedure.
  - b. Power off the protected equipment.
  - c. Switch the UPS OUTPUT switch to the OFF (0) position.
6. **When the unit comes within approximately two (2) minutes of full battery discharge:** The PowerTrust UPS will issue three beeps every 7 seconds. Prepare for an immediate loss of battery power.

For more information, see the *PowerTrust System Guide* that accompanied the PowerTrust UPS.

On HP-UX 9.04 and later releases, the operating system should have been configured for the UPSs as part of the system installation. See "Configuring a PowerTrust UPS on T-Class Systems" which appears next in this chapter.

## **If AC Power Fails...(99x Systems with a PowerTrust UPS)**

### **If AC power fails on a 99x system with a PowerTrust UPS:**

1. The PowerTrust Uninterruptible Power System (UPS) will supply power to the system from a battery for approximately 15 minutes if the battery is fully charged.
2. You will hear an auditory alarm (a single beep every 7 seconds). If desired, you can turn off the auditory alarm by pressing the switch on the PowerTrust UPS labeled "Silence Alarm".

---

**CAUTION** Do NOT press the switch on the PowerTrust UPS labeled "Output On/ Output Off". Pressing this switch would shut off power to the SPU and other units connected to the UPS.

---

3. For systems running MPE/iX 5.0 and later releases (with the OS properly configured for UPS), you will see UPS messages on the console. See Appendix B in *PowerTrust System Guide* for explanations of the messages.
4. The indicators on the PowerTrust UPS front panel labeled "AC Output" and "Battery Power" will be lit.
5. **If you anticipate a long period without AC power**, you may want to shut down your system during the 15 minutes of reserve power:
  - a. Follow the usual OS shutdown procedure.
  - b. Power off the protected equipment.

- c. Switch the UPS OUTPUT switch to the OFF (0) position.
6. **When the unit comes within approximately two (2) minutes of full battery discharge:** The PowerTrust UPS will issue three beeps every 7 seconds. Prepare for an immediate loss of battery power.

For more information, see the *PowerTrust System Guide* that accompanied the PowerTrust UPS.

On MPE/iX 5.0 and later releases, the operating system should have been configured for the UPSs as part of the system installation.

## Accessing PDC Commands

### To access PDC commands:

1. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
2. Reset the system using the appropriate command (TC, RE, or RS) in <Undefined Cross-Reference>. Use TC if the operating system is running.
3. Watch the system console carefully.
4. After the computer has gone through its startup routine (this can take several minutes), you see a display similar to the following on the console:

```
-----  
PDC - Processor Dependent Code  
Version x.xx  
(c) Copyright 1990-1997  
The Hewlett-Packard Company  
All rights reserved  
-----  
Total Memory:          192MB  
Total Bus Converters  2  
Total Processors:     2  
  
Primary Boot Path:    0/52.0.0.0.0.0.0  
                    0 means BC 0 in PMB slot 0  
                    52 means I/O card in HP-PB slot 13  
                    0 means device ID of 0  
  
Alternate Boot Path:  0/36.0.0.0.0.0.0  
Console/Keyboard Path: 0/44.0.0.0.0.0.0  
-----
```

5. **If the autoboot flag is enabled, you see:**

```
Processor is starting the autoboot process.  
  
To discontinue, press any key within 10 seconds...
```

As soon as you see the above prompt, press a key. (If you do not press a key within several seconds, the system continues with its bootup and you will have to start over again by cycling power or by using the RS or RE command at the SP prompt.)

6. You see:

```
Continue with primary boot path? ([y]/n/<new_path>)> N
```

When you see the above prompt, press n.

7. You see:

```
Continue with alternate boot path? ([y]/n/<new_path>)> N
```

When you see the above prompt, press n.

8. You see:

```
Boot process discontinued. Going to Boot Console User Interface.
```

The PDC Main Menu is then displayed.



## Changing the Autoboot Flag or Hardware Paths

At the PDC user interface, you can change the autoboot flag or change hardware paths (primary boot path, alternate boot path, and console/keyboard path). Default boot paths for 99x/T-Class Systems are shown in Table 2-3 and Table 2-5.

**Table 2-3 99x/T-Class System Default Device Configuration (SCSI System Disk)**

Device	I/O Path	Logical Dev. No. (MPE/iX Only)
System disk	0/52.6.0	1
System tape (SCSI)	0/52.0.0	7
System tape (HP-IB)	0/12.0.3	7
System console	0/44.0	20

**Table 2-4 T-Class Systems Default Device Configuration (Fast/Wide SCSI System Disk)**

Device	I/O Path	Logical Dev. No. (MPE/iX Only)
System disk	0/52.6.0	1
System tape (SCSI)	0/36.0.0	7
System tape (HP-IB)	0/12.0.3	7
System console	0/44.0	20

**Table 2-5 99x/T-Class System Default Device Configuration (HP-FL System Disk)**

Device	I/O Path	Logical Dev. No. (MPE/iX Only)
System disk	0/52.0	1
System tape (SCSI)	0/36.0.0	7
System tape (HP-IB)	0/12.0.3	7
System console	0/44.0	20

The autoboot flag described here is different from the autostart flag which can be modified from the SP interface. The PDC **autoboot** flag allows the OS to boot automatically upon power-up. The SP **autostart** flag allows the computer startup process to continue even if processor or memory modules are scheduled to be de-configured (for example if they fail selftest).

### To change the autoboot flag or hardware paths:

1. Access the PDC main menu, as described in the previous procedure.

2. At the PDC main menu, enter **BO** to access the boot menu. You will see:

```
Main> BO

----- Boot Commands -----

Commands Available

PR Primary:      Bootsystem using primary boot path.
AL Alternate:    Boot system using alternate boot path.
AB Autoboot:     Change the autoboot flag.
PA Path:         Change a path (PA <path_type> <new_path>)
                   <path_type>= Pri, Alt, Cons, or Udate

Values stored in Stable Storage:

Autoboot Flag:           False
Primary Boot Path:       0/52.0.0.0.0.0.0
Alternate Boot Path:     0/36.0.0.0.0.0.0
Console/Keyboard Path:  0/44.0.0.0.0.0.0

HE Help:         Display help text on menu selections
eXit:           Return to previous menu

-----
Boot>
```

3. For most installations, the autoboot flag should be set to **TRUE**. To set the autoboot flag to **TRUE**, enter:

```
Boot> AB TRUE
```

4. Compare the paths displayed on the Boot menu with the appropriate values for the computer system (See Table 3-5 or Table 3-6). To change the path values, use the **PA Path** command.

a. To set the path values for a 99x with a SCSI system disk, enter the following commands:

i. To set a primary boot path of **0/52.6.0**:

```
Boot> PA P 0/52.6.0
```

ii. To set an alternate boot path of **0/52.0.0** (for a SCSI device):

```
Boot> PA A 0/52.0.0
```

iii. To set an alternate boot path of **0/12.0.3** (for an HP-IB device):

```
Boot> PA A 0/12.0.3
```

iv. To set console path of **0/44.0**:

```
Boot> PA C 0/44.0
```

b. To set the path values for a 99x with a HP-FL system disk, enter the following commands:

i. To set a primary boot path of 0/52.0:

```
Boot> PA P 0/52.0
```

ii. To set an alternate boot path of 0/36.0.0 (for a SCSI device):

```
Boot> PA A 0/36.0.0
```

iii. To set an alternate boot path of 0/12.0.3 (for an HP-IB device):

```
Boot> PA A 0/12.0.3
```

iv. To set console path of 0/44.0:

```
Boot> PA C 0/44.0
```

5. When you are satisfied with the hardware path values, continue to the next section.

6. If you would like more information on boot commands, access the online help screens by pressing HE :

```
Boot> HE
```

```
----- Boot Commands Help -----
```

```
Contents:      I.   RECOMMENDED PATHS
                II.  BOOT COMMAND DESCRIPTIONS
                III. WHAT IS A PATH?
                IV.  PATH FORMAT
```

```
I.   RECOMMENDED PATHS
```

	With SCSI system disk	With HP-FL system disk
Primary:	0/52.6.0	0/52.0
Alternate (SCSI dev):	0/52.0.0	0/36.1.0
Alternate (HP-IB dev):	0/12.0.3	0/12.0.3
Console:	0/44.0	0/44.0

Autoboot        Set autoboot flag TRUE or FALSE. If autoboot is TRUE the system automatically boots when powered up. (More precisely, it loads the software on the primary boot device.) During an autoboot, the process pauses for 10 seconds to allow the operator to stop the boot process.

If the autoboot flag is modified, the new setting takes effect when the system is powered up again.

Syntax:    AUTOBOOT <boolean>    For <boolean>:  
                      TRUE    =    T = 1  
                      FALSE =    F = 0

Example:    AUTOBOOT TRUE    or    AB TRUE    or    AB T

Path            Change/display paths kept in Stable Storage.

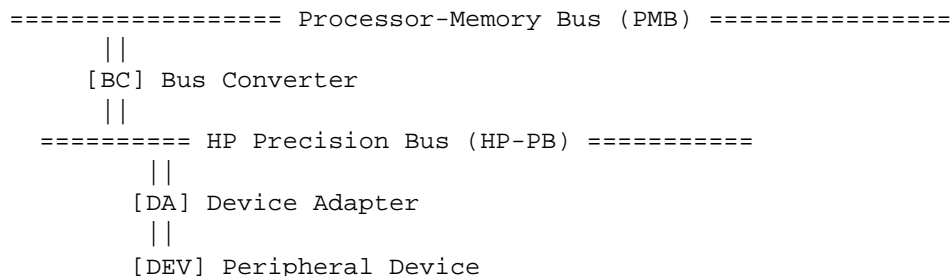
Syntax: PATH [ <path\_type> [ <new\_path> ] ]  
          <path\_type> is one of:  
          P = primary boot path  
          A = alternate boot path  
          C = console path  
          U = update path  
          <new\_path> = a path description

Examples:

PATH                            Displays all paths  
PATH A                          Displays only alternate path  
PATH P 0/52.0                  Changes primary path to 0/52.0

### III. WHAT IS A PATH?

A path is a hardware address, showing the location of a peripheral device in the bus structure. Typical bus structure:



#### IV. PATH FORMAT

On this system, a path has the format:

BC/DA.DEV

BC = The PMB module of the Bus Converter (BC). This decimal value is based on: 1) the slot number of the BC card.  
2) whether the upper or lower connector of the BC card is used.

BC = (4 \* slot number of the BC) + (BC module number)  
BC module number is 0 for the lower connector.  
2 for the upper connector.

Examples:

BC = 0 for BC card in slot 0, lower connector;  $(4*0)+0 = 0$   
= 2 for BC card in slot 0, upper connector;  $(4*0)+2 = 2$   
= 16 for BC card in slot 4, lower connector;  $(4*4)+0 = 16$

DA = The HP-PB module of the device adapter (DA).  
Equals 4 \* HP-PB slot number of the DA (decimal).

DEV = The ID number of the device, often set on the device itself (hexadecimal).

Example: 4/36.3 (decimal format)

BC = 4             $4/4 = 1$ . The BC is in PMB slot 1; module 0.  
DA = 36           $36/4 = 9$ . The I/O card is in HP-PB slot 9.  
DEV = 3          The ID on the device is set to 3.

Values for BC and DA are expressed in decimal notation.  
If there are additional values in the path (for example, to specify a LAN address), these are expressed in hexadecimal notation.

END

## Updating Firmware

The Processor Dependent Code (PDC) and Service Processor (SP) code exist as firmware inside the computer. This firmware can be updated via tape using the PDC commands described in the Firmware Menu.

---

**CAUTION**      Operators should not execute the commands in the Firmware Menu. If used improperly, these commands can damage system operation (for example, the computer may no longer be able to boot up and a service call may be necessary).

---



# **3 Recovering from Failures on T-Class Systems**

---

Although the T-Class System is an extremely reliable computer, it may experience a *system interruption* and require operator intervention for recovery. This chapter gives detailed information on recovering from HP-UX system interruptions.

## Determining the Type of Problem

Inevitably, the first symptom of a problem is that the system does not respond to user input. This lack of response indicates either a performance problem or a system interruption:

- With a *performance problem*: the system responds to one or more programs/users, but others just cannot seem to get things done (the system seems very SLOW...).
- With a *system interruption* (system hang or system panic), there is a total loss of CPU resources for ALL users/programs.

Table 3-1 summarizes the symptoms and recovery procedures for the main types of system interruptions. System panics and High Priority Machine Checks (HPMCs) are described in more detail later in this chapter.



**Table 3-1 System Interruptions: Symptoms and Solutions (T-Class Systems)**

<b>Interruption Type</b>	<b>Symptoms</b>	<b>Recovery Procedure</b>
Performance problem	<ol style="list-style-type: none"> <li>1. System responds to one or more programs/users.</li> <li>2. Other programs/users cannot seem to get a response.</li> <li>3. System seems SLOW...</li> </ol>	<ol style="list-style-type: none"> <li>1. See if any active processes are making heavy use of computer resources. (For example, a massive compilation or a real time process.)</li> <li>2. Try sending an interrupt (Control-C) at a terminal.</li> <li>3. Check another terminal to verify that the problem is not just a console hang.</li> <li>4. Check for deconfigured processor, memory, or BC modules with the HC command (SP).</li> <li>5. Contact your CE or the HP Customer Response Center.</li> </ol>
System Hangs	<ol style="list-style-type: none"> <li>1. The machine is running (the green RUN light is lit), but no one can access the system.</li> <li>2. The system console may or may not be hung.</li> </ol>	<ol style="list-style-type: none"> <li>1. If possible, wait about 15 minutes to see if the computer is really hung or if it has performance problem. With some performance problems, a computer may not respond to user input for 15 min. or longer.</li> <li>2. If the computer is really hung, perform a soft reboot on the machine by issuing a "TC" command at the SP prompt. (Do NOT use the "RS" command if possible; "RS" may destroy important troubleshooting information.)</li> <li>3. Save the core dump file and call the HP Response Center to have it analyzed. (See description of core dumps in this chapter.)</li> </ol>
System panic	<ol style="list-style-type: none"> <li>1. All user activity stops.</li> <li>2. Core file saved to dump device.</li> <li>3. Computer attempts to reboot HP-UX.</li> <li>4. System panic message on console (usually).</li> <li>5. Red STOPPED LED is lit if reboot fails.</li> </ol>	<ol style="list-style-type: none"> <li>1. If an HPMC tombstone appears on the console, copy or print out the "Machine Check Parameters" fields, as well as all information that follows it.</li> <li>2. Record system panic message on console.</li> <li>3. If panic message indicates a peripheral, check the device's cabling, power, address and online status. Record error status on device's display. Cycle power on the device (power off then power on).</li> <li>4. If panic message indicates an I/O card or internal computer problem, gather troubleshooting information, reboot, and call the HP Response Center:             <ol style="list-style-type: none"> <li>a. Record the sequence of 4-digit codes at bottom of console display (Press Control-B first).</li> <li>b. If yellow "Attention" LED is lit, record the most current entries in the SP error logs (enter the DL command at the SP prompt).</li> </ol> </li> <li>5. If panic message indicates a problem with the file system, LAN, or LVM, consult Solving HP-UX Problems or Error Message Catalog (HP-UX).</li> <li>6. If the system does not reboot by itself, reboot the computer with the TC or RS command at the SP&gt; prompt. (See Table 2-1.)</li> </ol>

---

**NOTE** Refer to the rest of this chapter for more information on system panics, HPMCs, tombstones, and core dumps.

---

**Table 3-2 System Interruptions: Symptoms and Solutions (T-Class System)  
 (Cont'd)**

<b>Interruption Type</b>	<b>Symptoms</b>	<b>Recovery Procedure</b>
High Priority Machine Checks (HPMCs)	<ol style="list-style-type: none"> <li>1. All user activity stops.</li> <li>2. HPMC tombstone displayed on console.</li> <li>3. May display an HPMC message and stop (HPMC&gt; prompt).</li> <li>4. May try to reboot and display a system panic message.</li> <li>5. Red STOPPED LED is lit if reboot fails.</li> </ol>	<ol style="list-style-type: none"> <li>1. If computer does not reboot, record the sequence of 4-digit codes at bottom of console display. (Press &lt;Control&gt;-B first.)</li> <li>2. If you are at the HPMC&gt; prompt, record information from the HPMC tombstone for the processor that failed:                         <ol style="list-style-type: none"> <li>a. Enter the PDC command TOMB,</li> <li>b. Enter the PDC command DISPLAY n/m (where n is the slot # and m is the module # of the processor with the most current HPMC). For 890 computers, specify the slot # only.</li> <li>c. Copy or print out the "Machine Check Parameters" fields, as well as all information that follows it. For T500, T520, and T600 Systems, also copy the Chassis Code that appears at the top of the tombstone.</li> </ol> </li> <li>3. If there is a system panic message on console, record it.</li> <li>4. If yellow "Attention" LED is lit, examine the SP error logs with the DL command at the SP prompt.</li> <li>5. If the system does not reboot by itself, reboot the computer with the TC or RS command at the SP&gt; prompt. (See Table 2-2.)</li> </ol>

---

## System Panics

**NOTE** This chapter concentrates on system panics caused by hardware problems. For further information on system panics, refer to:

- *Solving HP-UX Problems* (PN B1862-90010).
- *Error Message Catalog (HP-UX)* (PN B1862-90004). In particular, refer to Chapter 3 (Error Messages Containing the Word "Panic").

A **system panic** means that HP-UX ran into a condition that it did not know how to respond to, so it halted your computer.

System panics are rare and are not always the result of a catastrophe. They sometimes occur on bootup if your system was previously not shut down properly. Sometimes they occur as a result of hardware failure.

Recovering from a system panic can be as simple as rebooting your system. The worst case scenario involves reinstalling HP-UX and restoring any files that were lost or corrupted. If this situation was caused by a hardware failure such as a disk head crash, you will, of course, have to have the hardware fixed before you can perform the reinstallation.

---

**NOTE** It is important to maintain an up-to-date backup of the files on your system so that, in the event of a disk head crash or similar situation, you can recover your data. How frequently you update these backups depends on how much data you can afford to lose. For information on how to back up data, refer to *System Administration Tasks*

---

### How HP-UX Handles Panics

After HP-UX experiences a system panic, the computer:

- May display an HPMC **tombstone** on the console if panic was caused by an HPMC. A tombstone is about three screenfuls of register values used for troubleshooting. For an example of a tombstone, see “High Priority Machine Checks (HPMC)” later in this chapter.
- May attempt to save a core file (an image of physical memory) to the dump device (by default this is the primary swap device).
- Attempts to reboot.
- Usually displays a **panic message** on the console. A panic message consists of several lines of text starting with the heading `System Panic:`
- If HP-UX can reboot, it may attempt to copy the core file to the file system (by default, to the directory `/tmp/syscore`).

### What To Do When Your System Panics

**To recover from a system panic:**

## System Panics

1. If an HPMC tombstone appears on the console, copy or print out the "Machine Check Parameters" fields, as well as all information that follows it. (See the section "High Priority Machine Checks (HPMC)" later in this chapter.)
2. Record the panic message displayed on the system console. Look for text on the console that contains terms like "System Panic:", "HPMC", "Privilege Violation," "Data Segmentation Fault," or "Instruction Segmentation Fault". (See the section "Sample System Panic" later in this chapter.)
3. Determine the cause of the panic. The panic message tells you why HP-UX panicked. Sometimes panic messages refer to internal structures of HP-UX (or its file systems) and the cause might not be obvious.

Generally, the problem is in one of the following areas. The wording of the panic message should allow you to classify it into one of them:

Peripheral problem.

Computer or I/O card problem.

File system problem (e.g., corruption).

LAN communication problem.

LVM-related problem.

Other.

4. **Peripheral problem.** If the hardware failure appears to be associated with a peripheral:
  - a. Check to be sure that the peripheral's cables are tightly connected to their proper locations.
  - b. Make sure the address of the peripheral is set to the correct value.
  - c. Make sure the device is powered on and in an "online" status.
  - d. If there is an error indicated on the device's display:
    - i. Record the error message or display in your log book.
    - ii. Turn the device off.
    - iii. If the device is a disk drive, wait for it to stop spinning.
    - iv. Turn the device back on.
  - e. If the system does not reboot by itself, reboot the computer with the TC or RS command at the SP> prompt. (See Table 2-1.)
5. **Interface card or computer problem.** If the problem reappears on the device or if the hardware failure appears to be associated with an interface card or with the an internal component of the computer:
  - a. Collect troubleshooting information:
    - i. If an HPMC tombstone is displayed, record it (see "High Priority Machine Checks (HPMC)" later in this chapter).

- ii. Record the sequence of four-digit hexadecimal codes that appear on the hex display on the system console:
    - 1) Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
    - 2) At the system console, enter <Control>-B to enter Access Port control mode.
    - 3) Look on the bottom lines of the display.
  - iii. If the yellow "Attention" LED is lit, examine the SP error logs:
    - 1) Enter <Control>-B at the system console.
    - 2) Enter SP to enter the Service Processor interface.
    - 3) Enter DL at the SP prompt.
    - 4) If the "Latest Errors" log has entries, enter L; otherwise enter E to see the "Earliest Errors" log.
    - 5) Record the most current entries in the error logs.
  - b. If the system does not reboot by itself, reboot the computer with the TC or RS command at the SP> prompt. (See Table 2-1.)
6. **File system problem (for example, corruption), LAN communication problem, or LVM-related problem.** See *Solving HP-UX Problems* (PN B1862-90010) and *Error Message Catalog (HP-UX)* (PN B1862-90004). In particular, refer to Chapter 3 (Error Messages Containing the Word "Panic").
- If the panic is a result of a recent significant change to the kernel, you may want to try rebooting the backup kernel.
7. **Other.** If you cannot classify the problem as one of the problems listed above, reboot the system with the TC command. (See Table 2-1.) Many times, that is all that is required to recover from a system panic. In this case, it is especially important that you write down the exact text of the panic message, in case you need it for future troubleshooting. Save the core dump file and call the HP Response Center to have it analyzed. (See the description of core dumps later in this chapter.)

## Rebooting the Computer

If HP-UX does not reboot after a system panic, you can reboot in one of the four ways described in Table 2-1. The fastest and safest way to reboot is with the TC command at the SP> prompt. If the TC is not successful, use one of the other methods.

## Automatic Core Dump

As HP-UX reboots following a system panic, the computer may save a **core file** to disk. This core file is a snapshot of physical memory at the time of the panic. If it becomes necessary, this core file can be analyzed using special tools to determine more about what caused the panic.

Actually, saving a core file is a two-part process:

## System Panics

1. After the panic occurs, the HP-UX kernel writes an image of its physical memory onto the dump device. This is the **core file (crash file)**. By default, the dump device is the primary swap device.
2. Usually when the core dump is complete, the system will attempt to reboot the system. During reboot, HP-UX will attempt to save the previously created core file (on the dump device) into the `/tmp/syscore` directory on disk.

Specifically, the `/etc/rc` bootup script runs `savecore (1M)`, the command for saving the core file and the `/hp-ux` file to disk. By default, the `/etc/rc` script specifies the target directory as `/tmp/syscore`.

The two files copied by `savecore` are named:

- `hp-ux.n` (a copy of the original kernel, `/hp-ux`)
- `hp-core.n` (a copy of the physical memory image).

Together these two files make up a **core dump pair**. The `n` in the file names is a number assigned to a particular core dump pair.

## What To Do With Core Files

The core files created by `savecore` are very big (the same size as your system's physical memory). If you know why your system panicked, you can delete the core files.

If you feel you need to save these files for future analysis, it is best to save them to tape and remove them from your file system in order to free up space.

Troubleshooting difficult problems (especially intermittent problems) often requires two or more core files.

## Problems With Automatic Memory Dump

The following conditions may prevent the automatic memory dump from succeeding:

- The `savecore` command line has been commented out or removed from the `/etc/rc` script.
- The directory in which `savecore` has been told to put the crash file does not exist. By default this directory is `/tmp/syscore`. This directory is not automatically created during install.
- There is not enough room in the dump device(s) or in the partition that `savecore` is told to use. If the dump device is too small to contain the image of physical memory, the dump will be only partially saved and will be invalid.

## Avoiding Problems with Automatic Memory Dump

The best way to avoid memory dump problems is to make sure your system is properly set up. For example, make sure that the target directory for `savecore` has already been created on your computer.

There are several ways to deal with the problem of the dump device or partition being too small to contain the core files:

- You can modify */etc/rc* to specify an appropriately sized target directory for *savecore*. The next time a core dump occurs, it will be saved to the new directory.
- Once a computer is down, you can specify a different target file system by booting the system in single user mode and running the *savecore* manually. See next section.
- If your system has a large physical memory, you might want to use the *-i* option to *savecore*. This option (new with HP-UX 9.0) causes *savecore* to save as much important information as possible after a system panic.

With the *-i* option, *savecore* saves the complete core file if there is enough space in the target directory. If there is insufficient space in the target directory, *savecore -i* saves the kernel pages and (if possible) user pages into a compressed core file. These compressed core files are easier to transport. However, the analysis tools cannot be used directly on compressed core files.

For more information on *savecore* and its options, see the entry for *savecore* (1M) in the *HP-UX Reference* or the HP-UX man page. Also, see *HP-UX System Tasks*.

---

**NOTE** HP-UX 9.0 (and above) contains new features for saving core files, and configuring dump device and swap space. For example, *savecore* can now save the core file to multiple swap/dump devices. These features are documented in the HP-UX system administration documentation. For example, see *HP-UX System Tasks*.

---

## Running savecore Manually

The *savecore* command can be run manually. Typically, you enter a series of commands like the following:

```
ISL> hpx -is          /* to boot single user after a crash */
                    /* (specify driver name and hardware address */
                    /* for the device you want to boot from) */

# /etc/fsck -p       /* to fix the file system */
# /etc/mount -a     /* to mount all disks (maybe "-a -t hfs") */
# /bin/df           /* to find where there is enough space */
# mkdir /tmp/syscore /* assuming /tmp has enough space */
# cd /tmp/syscore
# /etc/savecore .   /* to save the core file to the current directory */
```

If the system is configured with the primary swap device as the dump device (default configuration), a problem can occur if *savecore* is run after the system has been brought up multi-user. Once the system starts back up, it is free to start swapping over the swap device. This could corrupt a crash image written out to the swap device.

If the dump device is configured to use another logical volume or file system rather than the primary swap device, the system's physical memory image remains intact; you can *savecore* after the system has been brought up to multi-user mode. At this point, you can mount a magnetic tape and use the *-t* option to *savecore* to save the system's physical memory image to magnetic tape.

### **Sample System Panic**

The following is the display resulting from a software-generated system panic. The most relevant information is shaded.



```
# trap type 15, pcsq.pcoq = 0.9535c, isr.iior = 0.14c

Attempting to dump memory to disk 0x7000002.      /* Storing core to */
buf 0x1fb0b4: bcount = 50329600                 /* dump device */
buf 0x1fb0b4: b_bufsize = 0
buf 0x1fb0b4: b_dev = 0x7000002
buf 0x1fb0b4: b_addr = 0x0
buf 0x1fb0b4: b_blkno = 514912
**** iodic_DDCONFIG called : b_dev = 0x7000002 b_bcount = 50329600,
b_blkno =514912
  ** iodic_open is called
  ** iodic_bootdev_init: bootdev_module_info - 0x247a80
  exiting iodic_bootdev_init
**** iodic_DDUMP called : b_dev = 0x7000002 b_bcount = 50329600,
b_blkno =514912

Disk write: Mem addr 0x0, disk addr 0x1F6D8000, count 1048576.
Disk write: Mem addr 0x100000, disk addr 0x1F7D8000, count 1048576.
Disk write: Mem addr 0x200000, disk addr 0x1F8D8000, count 1048576.
Disk write: Mem addr 0x300000, disk addr 0x1F9D8000, count 1048576.
Disk write: Mem addr 0x400000, disk addr 0x1FAD8000, count 1048576.
Further "Disk write:" messages suppressed.
$$$$$$$$$ returning from iodic_dump err = 0

Stored message buffer up to panic:
Beginning I/O System configuration
16 bus_converter
16/0 mux2
16/4 hpib1
                                o      /* More boot-up messages */
                                o
                                o
                                /* See next page */
```

#### Configuring Dump Devices

Warning: insufficient space on dump device to save full crashdump.  
Should a crashdump be necessary only 50329600 of 401604608 bytes will  
be saved.

```
/* HP-UX begins boot-up */
@(#)9245XA HP-UX (A.09.00) #0: Wed Aug 5 00:58:14 PDT 1992
physical page size = 2048 bytes, logical page size = 4096 bytes
real mem = 401604608
lockable mem = 258883584
avail mem = 344756224
using 9804 buffers containing 40157184 bytes of memory
trap type 15, pcsq.pcoq = 0.9535c, isr.ior = 0.14c
```

```
System Panic: /* Panic message */
@(#)9245XA HP-UX (A.09.00) #0: Wed Aug 5 00:58:14 PDT 1992
panic: (display==0xbf00, flags==0x0) Data segmentation fault
```

```
PC-Offset Stack Trace (read across, most recent is 1st):
stktrc: can't find rp
    0x00158e00  0x000c5478  0x000b4814  0x0009535c
End of Stack
```

```
sync'ing disk (0 buffers to flush): (0 buffers to flush):
0 buffers not flushed
2 buffers still dirty
```

```
dumping 50329600 bytes to dev0x7000002, offset 51492
/* Copying core dump to /tmp/syscore */
```

```
Warning: insufficient space on dump device to save full crashdump.
Only 50329600 of 401604608 bytes can be saved...
Dumpsys() is called
Dump successfully completed.
```

```
/* HP-UX continues its boot-up */
```

---

## High Priority Machine Checks (HPMC)

One type of failure is the *High Priority Machine Check (HPMC)*. An HPMC is an abnormal condition which has compromised the integrity of system processing. The CPU detects the HPMC and halts the system. Typically, an HPMC is caused by a hardware problem.

### How HP-UX Handles HPMCs

After the computer detects an HPMC, it:

1. Halts all user activity.
2. Displays an HPMC tombstone on the console.
3. May display an HPMC message and stop (HPMC> prompt).
4. Will usually TOC.
5. May display a system panic message and try to reboot.
6. Causes red STOPPED LED to light if reboot fails.

### What To Do When the Computer Has an HPMC

**If the computer has an HPMC:**

1. You see an HPMC tombstone on the display. For example

```
---- Unexpected HPMC -----  
01/21/97 15:35:16 PDC Version J526B Processor[15/0] Chassis Code:cefd  
  
GR2 00000000 00000000 GR30 00000000 00000000  
IPSW 00000000 00000000 IIR 00000000 IVA 00000000 00000000 Check Type 00000000  
PC Queue:Front 00000000 00000000.00000000 00000000 (IIASQ.IIAOQ)  
Back 00000000 00000000.00000000 00000000 (IIASQ.IIAOQ)  
  
PCXU: DR2 00000000 00000000 Stat0 00000000 00000000 Stat1 00000000 00000000  
PSBI: STATUS0 00000000 STATUS1 00000000 CONTROL0 00000000 CONTROL1 00000000  
PMB: SADDLOG 00000000 VADDLOG 00000000 MADDLOG 00000000 MISCLOG 00000000  
IO_DATA 00000000 IO_ARB 00000000 SLAVEADR 00000000  
Cache: L1DTLOG 00000000 L2TAGERR 00000000 L2ADDR 00000000 L2_OP 00000000  
  
Syn: LMPC_0_3 00000000 LPMC_4_7 00000000 HPMC_0_3 00000000 HPMC_4_7 00000000  
  
Runway: SADDLOG 00000000 VADDLOG 00000000 TRANSTYP 00000000  
  
Memory: Slot IO_Stat Err_Resp Info+Req NbrBanks BankSize BLKIDs
```

Recovering from Failures on T-Class Systems  
High Priority Machine Checks (HPMC)

```
00 00000000 00000000 00000000 0 00 00000000
PGIA: Slot Type IO HI/LO IO_Stat Err_Resp Info+Req Syn0_1 Syn2_3
0/0 PGIA 00000000 00000000 00000000 00000000 00000000 00000000
HP_HSC 00000000 00000000 00000000
HSC_UP 00000000 00000000 00000000 00000000
HSC_LO 00000000 00000000 00000000
0/0 PGIA 00000000 00000000 00000000 00000000 00000000 00000000
HP_HSC 00000000 00000000 00000000
HSC_UP 00000000 00000000 00000000 00000000
HSC_LO 00000000 00000000 00000000
. /* SEE NEXT PAGE */
```

2. Copy or print the information on the display.
3. In some cases, the computer may display an HPMC message and halt:

```
-----Failure Commands -----
+-----+
|                                     |
|              NOTICE !!            |
| The system has experienced an unrecoverable error |
| (a High Priority Machine Check - HPMC) and has    |
| been halted.                               |
|                                               |
| Please call Hewlett-Packard Services. Enter HELP |
| for further instructions.                |
+-----+

RE Restart:      Restart the system
FI Firmware:    Update firmware (menu)
SE Service:     Service the system (menu)
TO Tomb:        Display HPMC troubleshooting information (menu)
BO Boot:        Performance boot tasks (menu)

HE Help:        Display help text

-----
HPMC>
```

4. If you are at the HPMC> prompt, you have another chance to record information from the HPMC tombstone for the processor that failed. (For more details, see Chapter 4 (Recovering from Failures on the 99x).)
  - a. Enter the PDC command TOMB.

- b. Enter the PDC command `DISPLAY n/m` (where *n* is the slot # and *m* is the module # of the processor with the most current HPMC). For 890 computers, specify the slot # only.
  - c. Copy or print out the "Machine Check Parameters" fields, as well as all information that follows it. For T500, T520, and T600 Systems, copy the Chassis Code that appears at the top of the tombstone.
5. If you are at the HPMC> prompt and have recorded the HPMC tombstone, you can gather more troubleshooting information:
  - a. Copy down the states of the CPU status lights.
  - b. Record the sequence of four-digit hexadecimal codes that appear at the bottom of the system console:
    - i. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
    - ii. At the system console, enter `Control-B` to enter Access Port control mode.
    - iii. Look on the bottom lines of the display.
  - c. If the yellow "Attention" LED is lit, examine the SP error logs:
    - i. Enter `Control-B` at the system console.
    - ii. Enter `SP` to enter the Service Processor mode.
    - iii. Enter `DL` at the SP prompt.
    - iv. If the "Latest Errors" log has entries, enter `L`; otherwise enter `E` to see the "Earliest Errors" log.
    - v. Record the most current entries in the error logs.
6. If you are at the HPMC> prompt and have finished gathering troubleshooting information, you can reboot the system with the `TC` command at the `SP>` prompt. See Table 2-1.
7. If the computer treats the HPMC as a system panic, HP-UX will attempt to boot up. Record the system panic message when it appears on the console. If HP-UX does not automatically reboot, you can initiate a reboot with the `TC` command; see Table 2-1.

---

**NOTE** Tombstones can also be read online with the `DL` command at the `SP` prompt.

---

## Calling the Response Center

### If your problem is serious enough to call the HP Response Center:

1. Gather the following information to give to the Response Center engineer who will be calling back:
  - a. The modem telephone number and Baud rate.
  - b. History and nature of the problem:
    - i. When did the problem first occur?
    - ii. What changes have occurred on the system?
    - iii. Has the problem ever occurred before?
    - iv. Can the problem be reproduced?
    - v. Is the problem intermittent?
  - c. All troubleshooting information gathered so far. For example:
    - i. The system panic message displayed on the console.
    - ii. If the yellow "Attention" LED was lit, the most current entries in the SP error logs with (use the DL command at the SP prompt).
    - iii. If an HPMC tombstone is displayed, the "Machine Check Parameters" fields, as well as all information that follows it.
    - iv. If the system did not reboot, the sequence of 4-digit codes at bottom of console display. (Press <Control>-B first.)
2. Call the Response Center. If you are certain the problem is hardware, ask for "Hardware Assistance."
3. Use your judgment about whether to reboot at this point and allow users to log back on, without waiting for the Response Center engineer to call back. For example, if the computer does not execute *savecore*, you may want to talk with the Response Center before rebooting.

If you choose to wait for the Response Center engineer to call back before allowing users back on, please note this fact to the Response Center Coordinator so that your call is appropriately prioritized.

# 4 Recovering from Failures on the 99x

---

Although the 99x is an extremely reliable computer, it may experience a *system interruption* and require operator intervention for recovery. This chapter gives detailed information on recovering from MPE/iX system interruptions.

This chapter describes the possible causes of a system interruption so you can:

- Gather valuable troubleshooting data.
- Bring the system back online as quickly as possible.

This chapter also describes how to take a memory dump, an important source of troubleshooting data. With a memory dump, the Response Center can remotely analyze the cause of the interruption.

---

**NOTE** This chapter assumes that AUTORESTART/iX is not installed or enabled. Users of that product should refer to the AUTORESTART/iX User's Guide Part Number 36375-90001.

---

## Summary

Although the specific recovery procedures are different for the different types of system interruptions, the basic steps are:

1. Record troubleshooting data. For example:
  - a. Four-digit error/status codes on the bottom of the console display (after pressing <Control>-B).
  - b. Error messages from the console (HPMC tombstone in the case of an HPMC).
  - c. The status of the indicators on the front panel of the computer.
  - d. If yellow "Attention" LED is lit, examine the SP error logs with the DL command at the SP prompt.
2. Perform a Transfer of Control (TC) if possible.
3. If the Transfer of Control is successful, take a memory dump.

Table 4-1 summarizes the symptoms and recovery procedures for the different types of system interruptions.



**Table 4-1 System Interruptions: Symptoms and Solutions (99x)**

Interruption Type	Symptoms	Recovery Procedure
Performance problem	<ol style="list-style-type: none"> <li>1. System responds to one or more programs/users.</li> <li>2. Other programs/users cannot seem to get a response.</li> <li>3. System seems SLOW...</li> </ol>	<ol style="list-style-type: none"> <li>1. See if any active processes are making heavy use of computer resources. (For example, a massive compilation or a real time process.)</li> <li>2. Try sending an interrupt (&lt;Control&gt;-Y) at a terminal.</li> <li>3. Check another terminal to verify that the problem is not just a console hang.</li> <li>4. Check for deconfigured processor, memory, or BC modules with the HC command (SP).</li> <li>5. Contact your CE or the HP Customer Response Center.</li> </ol>
System abort	<ol style="list-style-type: none"> <li>1. System halts ("System Halt 7" message).</li> <li>2. All user activity stops.</li> <li>3. System abort message on console (usually).</li> <li>4. Red STOPPED LED is lit.</li> <li>5. Sequence of 4-digit codes at bottom of console display. (Press &lt;Control&gt;-B first.)</li> </ol>	<ol style="list-style-type: none"> <li>1. Record entire system abort message on console.</li> <li>2. Record the sequence of 4-digit codes at bottom of console display. (Press &lt;Control&gt;-B first.)</li> <li>3. If yellow "Attention" LED is lit, examine the SP error logs with the DL command at the SP prompt.</li> <li>4. Take a memory dump.</li> <li>5. Restart the system when dump is finished.</li> </ol>
Monitor halt	<ol style="list-style-type: none"> <li>1. System halts</li> <li>2. All user activity stops.</li> <li>3. No message on console (usually).</li> <li>4. Red STOPPED LED is lit.</li> <li>5. Sequence of 4-digit codes at bottom of console display. (Press&lt; Control&gt;-B first.) One of the codes is Bx00.</li> </ol>	<ol style="list-style-type: none"> <li>1. Record error message on console if one appears.</li> <li>2. Record the sequence of 4-digit codes at bottom of console display. (Press &lt;Control&gt;-B first.)</li> <li>3. If yellow "Attention" LED is lit, examine the SP error logs with the DL command at the SP prompt.</li> <li>4. Take a memory dump.</li> <li>5. Restart the system when dump is finished.</li> </ol>

Interruption Type	Symptoms	Recovery Procedure
High Priority Machine Check (HPMC)	<ol style="list-style-type: none"> <li>1. System halts.</li> <li>2. All user activity stops.</li> <li>3. HPMC error message on console.</li> <li>4. Red STOPPED LED is lit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Record the sequence of 4-digit codes at bottom of console display. (Press &lt;Control&gt;-B first.)</li> <li>2. Record information from the HPMC tombstone for the processor that failed:               <ol style="list-style-type: none"> <li>a. Enter the PDC command TOMB,</li> <li>b. Enter the PDC command DISPLAY n/m (where n is the slot # and m is the module # of the processor with the most current HPMC). For 890/990/992 systems, you specify the processor slot number (n) only.</li> <li>c. Copy or print out the "Machine Check Parameters" fields, as well as all information that follows it.</li> </ol> </li> <li>3. If yellow "Attention" LED is lit, examine the SP error logs with the DL command at the SP prompt.</li> <li>4. Take a memory dump. (If the computer did not respond to TC and you had to perform an RS hard boot, do not bother to take a memory dump.)</li> </ol>
Hardware Failure	<ol style="list-style-type: none"> <li>1. The 4-digit code on the system console does not begin with an "F." (Press &lt;Control&gt;-B first.)</li> <li>2. Red STOPPED LED is lit.</li> <li>3. Symptoms do not indicate a system abort, monitor halt, or HPMC.</li> </ol>	<ol style="list-style-type: none"> <li>1. Copy down the states of the status lights on the computer front panel.</li> <li>2. Record the sequence of 4-digit codes at bottom of console display. (Press &lt;Control&gt;-B first.)</li> <li>3. Call the Response Center (HW Assistance).</li> </ol>
System Hang	<ol style="list-style-type: none"> <li>1. The machine is running (the green RUN light is lit), but no one can access the system.</li> <li>2. The system console may or may not be hung.</li> <li>3. The Control-A ("=" prompt) may or may not be functioning.</li> <li>4. The hex display typically displays one of two possible states:               <ol style="list-style-type: none"> <li>a. F0FF/FFFF (the hex display alternates between F0FF and FFFF),</li> <li>b. FAFF/FFFF (the hex display alternates between FAFF and FFFF).</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. Halt the machine by issuing a "TC" command. (Do NOT do a "=SHUTDOWN" command first. Do NOT use the "RS" command. Either of these commands may destroy important troubleshooting information.)</li> <li>2. If yellow "Attention" LED is lit, examine the SP error logs with the DL command at the SP prompt.</li> <li>3. Take a memory dump.</li> <li>4. Restart the system as soon as the dump is finished.</li> </ol>

---

## Determining the Type of Problem

When a system problem occurs, the first step is to determine the type of problem.

Inevitably, the first symptom of a problem is that the system does not respond to user input. This lack of response indicates either a system problem or a system interruption:

- With a *performance problem*: the system responds to one or more programs/users, but others just cannot seem to get things done (the system seems very SLOW...).
- With a *system interruption*, there is a total loss of CPU resources for ALL users/programs.

If you suspect performance problems, contact your Customer Engineer (CE) or the HP Customer Response Center.

## Five Types of System Interruptions

MPE/iX systems can have five different types of interruptions.

- System aborts.
- Monitor halts.
- High Priority Machine Checks (HPMCs).
- Hardware failures.
- System hangs.

Each of these interruptions is described in the following sections.

## System Aborts

A *system abort* is "a condition experienced by the MPE/iX operating system in which either system or data integrity may be compromised by continued operation". While the causes of system aborts are many, the result is always the same: the system immediately halts and displays system abort information on the physical console (Ldev #20). All user activity stops.

A system abort message typically has the following format:

```
SYSTEM ABORT xxxx FROM SUBSYSTEM xxxx
SECONDARY STATUS: INFO = xxxx, SUBSYS = xxx {this line may not appear}
SYSTEM HALT 7, $xxxx
```

If you find a messages in this format on your console, you have definitely experienced a system abort. The red STOPPED light on the CPU is lit and the hex display shows a sequence of four-digit codes, such as the following (where an *x* stands for any character from 0 to F).

```
Bx07.....01xx.....02xx.....DEAD.....Bx07.....01xx.....02xx.....DEAD.....
\                                     /
  --- repeats this pattern ---
```

One code in a system abort sequence is always "Bx07". (On any given pass through a sequence, some of the four-digit codes may not appear.)

This pattern repeats until the system is reset.

You should:

1. Record the entire system abort message on the console.
2. Record the sequence of four-digit hexadecimal codes that appear at the bottom of the system console:
  - a. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
  - b. At the system console, enter <Control>-B to enter Access Port control mode.
  - c. Look on the bottom lines of the display.
3. If the yellow "Attention" LED is lit, examine the SP error logs:
  - a. Enter <Control>-B at the system console.
  - b. Enter SP to enter the Service Processor mode.
  - c. Enter DL at the SP prompt.
  - d. If the "Latest Errors" log has entries, enter L; otherwise enter E to see the "Earliest Errors" log.
  - e. Record the most current entries in the error logs.
4. Take a memory dump, following the procedure described later in this chapter.
5. Restart the system as soon as the dump is finished.

If you have a system abort message on the console, it is probably unnecessary to copy down the hex display pattern. However, if there was nothing printed on the console AND the hex display looks like that above (it includes a "Bx07" sequence) then you have probably experienced a system abort which didn't identify itself on the console display. In this case, write the codes down - the Response Center can determine the system abort number from this information.

## Monitor Halts

Another cause of system interruptions is a *monitor halt* (similar to a *system halt* on MPE V systems). A monitor halt can have its roots in either software or hardware.

Like the system abort described above, the red STOPPED light is lit and the hex display shows a sequence of four-digit codes. However, the console probably does not show a message describing the condition.

The sequence of hex codes typically begins with a "Bx00" to distinguish it from the Bx07 "system halt 7" characteristic of system abort sequences.

You should:

1. Record the entire system abort message on the console if one appears (a message probably won't appear).
2. Record the sequence of four-digit hexadecimal codes that appear at the bottom of the system console:
  - a. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
  - b. At the system console, enter <Control>-B to enter Access Port control mode.
  - c. Look on the bottom lines of the display.
3. If the yellow "Attention" LED is lit, examine the SP error logs:
  - a. Enter <Control>-B at the system console.
  - b. Enter SP to enter the Service Processor mode.
  - c. Enter DL at the SP prompt.
  - d. If the "Latest Errors" log has entries, enter L; otherwise enter E to see the "Earliest Errors" log.
  - e. Record the most current entries in the error logs.
4. Take a memory dump, following the procedure described later in this chapter.
5. Restart the system as soon as the dump is finished.

## High Priority Machine Checks (HPMCs)

A third type of failure is the *High Priority Machine Check (HPMC)*. An HPMC is an abnormal condition which has compromised the integrity of system processing. The CPU detects the HPMC and halts the system.

Troubleshooting information for the HPMC is encoded in an *HPMC tombstone display*. On the 99x, an error message appears on the system console; you use PDC commands to display the HPMC tombstone.

---

<b>NOTE</b>	PA-RISC machines other than the 99x have different ways for displaying the HPMC tombstone. For example, members of the S950 family (that is 950s, 955s, 960s, and 980s) automatically display the HPMC tombstone on the physical console if an HPMC occurs.
-------------	---

---

On the 99x, the following message displays on the console after an HPMC:

```
----- Failure Commands -----
+-----+
|                                     |
|               NOTICE !!          |
| The system has experienced an unrecoverable error |
| (a High Priority Machine Check - HPMC) and has    |
| been halted.                                |
|                                     |
| Please call Hewlett-Packard Service.  Enter HELP |
| for further instructions.                |
+-----+

RE Restart:           Restart the system
FI Firmware:         Update firmware (menu)
SE Service:          Service the system (menu)
TO Tomb:             Display HPMC troubleshooting information (menu)
BO Boot:             Perform boot tasks (menu)

Help:                 Display help text

-----
HPMC>
```

Enter the HELP command (HE for short) to see further instructions:

```
HPMC> HE
----- HPMC Commands Help -----
+-----+
|       The system has experienced an unrecoverable error.       |
|   1. Record troubleshooting data such as:                       |
|       * Error messages on console.                             |
|       * Status of front panel indicators on computer.          |
|   2. Enter the TOMB command to display HPMC troubleshooting    |
|       information. At the tombstone menu, enter the            |
|       DISPLAY <slot_num> command for the tombstone with the    |
|       latest date/time.                                         |
|   3. Print the tombstone display on a printer. If a printer is  |
|       not available, copy Machine Check Parameters onto paper.  |
|       If time allows, also copy Control Registers.             |
|   4. On the 990/992, take a memory dump if possible. See the   |
|       Operator's Guide.                                         |
|   5. Call Hewlett-Packard Service.                              |
|   6. Attempt to restart the operating system by entering      |
|       the RESTART command.                                     |
+-----+
```

END

Enter the TOMB command (TO for short) to see a list of tombstones that have been saved. (Each processor in the 99x can have its own HPMC information.) The following is an example from a 991/995/996/T-Class system.

```
HPMC> TO

----- Tombstones -----
Current Date: 07/24/93
Time: 02:28:32

Proc.  Date-Time  Type  State  Proc.  Date-Time  Type  State
-----|-----
      8/0                Empty  |      8/1                Empty
      9/0                Empty  |      9/1                Empty
     10/0                Empty  |     10/1                Empty
     11/0                Empty  |     11/1                Empty
     12/0                Empty  |     12/1                Empty
     13/0                Empty  |     13/1                Empty
     14/0                Empty  |     14/1                Empty
     15/0                Empty  |     15/1                Empty

DI Display:      Display tombstone for processor (DI <slot>/<mod>)

HE Help:        Display help text on menu selections
eXit:          Return to previous menu

-----
Tomb>
```



For help on the format of this display, enter the HELP command (HE for short): The following display is from a 991/995 and 996. (The 990/992 help display is similar.)

```

Tomb> HE
---- Tombstone Commands Help -----

This display shows the status of tombstone information for each
processor in the system.  Interpret each entry as follows:

Slot and module # of the processor that experienced the TOC, LPMC, or HPMC.
HPMC: High Priority Machine Check
LPMC: Low Priority Machine Check
TOC: Transfer of Control

      |                               +-----+
      |                               |
Proc.  Date-Time  Type  State      Proc.  Date-Time  Type  State
-----
15/0   06/14 21:59  HPMC  Read      | 15/1
      ^-----^
      |
      +----+
      |
Date and time that each tombstone was recorded.
Empty: No tombstone has been recorded.
Unread: Tombstone has not been read; it cannot be overwritten.
Read: Tombstone has been read; it can be overwritten by a subsequent HPMC or TOC.

END
    
```

Enter the DISPLAY command (DI for short), specifying the slot number and (for 991/995/996/997 Systems) the module number of the processor that had the error (probably the tombstone with the most recent date). A tombstone has the following format:

Recovering from Failures on the 99x  
Determining the Type of Problem

```
Tomb> DI 15/1
----- Tombstone Review -----
01/21/97 15:35:16 PDC Version J526B Processor[15/0] Chassis Code:cefd

GR2 00000000 00000000 GR30 00000000 00000000

IPSW 00000000 00000000 IIR 00000000 IVA 00000000 00000000 Check Type 00000000
PC Queue:Front 00000000 00000000.00000000 00000000 (IIASQ.IIAOQ)
  Back 00000000 00000000.00000000 00000000 (IIASQ.IIAOQ)

PCXU: DR2 00000000 00000000 Stat0 00000000 00000000 Stat1 00000000 00000000
PSBI: STATUS0 00000000 STATUS1 00000000 CONTROL0 00000000 CONTROL1 00000000
PMB: SADDLOG 00000000 VADDLOG 00000000 MADDLOG 00000000 MISCLOG 00000000
      IO_DATA 00000000 IO_ARB 00000000 SLAVEADR 00000000

Cache: L1DTLOG 00000000 L2TAGERR 00000000 L2ADDR 00000000 L2_OP 00000000

Syn: LMPC_0_3 00000000 LPMC_4_7 00000000 HPMC_0_3 00000000 HPMC_4_7 00000000

Runway: SADDLOG 00000000 VADDLOG 00000000 TRANSTYP 00000000

Memory: Slot IO_Stat Err_Resp Info+Req NbrBanks BankSize BLKIDs
00 00000000 00000000 00000000 0 00 00000000

/* CONTINUED ON NEXT SCREEN */
```

```

PGIA: Slot Type  IO HI/LO  IO_Stat  Err_Resp  Info+Req  Syn0_1  Syn2_3
      0/0  PGIA  00000000  00000000  00000000  00000000  00000000  00000000
      HP_HSC                00000000  00000000  00000000
      HSC_UP 00000000  00000000  00000000  00000000
      HSC_LO                00000000  00000000  00000000
      0/0  PGIA  00000000  00000000  00000000  00000000  00000000  00000000
      HP_HSC                00000000  00000000  00000000
      HSC_UP 00000000  00000000  00000000  00000000
      HSC_LO                00000000  00000000  00000000
    
```

If you get an HPMC message on the 99x, you should:

1. Copy or print the information on the display. In the above example, you should copy or print the shaded information.
2. If the yellow "Attention" LED is lit, examine the SP error logs:
  - a. Enter <Control>-B at the system console.
  - b. Enter SP to enter the Service Processor mode.
  - c. Enter DL at the SP prompt.
  - d. If the "Latest Errors" log has entries, enter L; otherwise enter E to see the "Earliest Errors" log.
  - e. Record the most current entries in the error logs.
3. Take a memory dump, following the procedure described later in this chapter.

---

**CAUTION** Sometimes after an HPMC, you may not be able to perform a TC. If after repeated attempts you cannot perform a TC, you will have to perform a Reset (RS). Resetting the system with the RS command (hardbooting) invalidates memory. In this case, do NOT take a memory dump since the results would be invalid.

---

4. Restart the system as soon as the dump is finished.

---

**NOTE** Tombstones can also be read online with the DL command at the SP prompt.

---

## Hardware Failures

A *hardware failure* is an interrupt caused purely by hardware. It is catastrophic enough that the CPU cannot run.

As a rule of thumb, a hardware failure has occurred if:

- The hex display does not begin with an "F" (such as, F1FF), AND...
- The red STOPPED light is lit, AND...
- None of the previously described interruptions apply (that is, the machine has not experience a system abort, monitor halt, or HPMC).

You should:

1. Copy down the states of the CPU status lights.
2. Record the sequence of four-digit hexadecimal codes that appear at the bottom of the system console:
  - a. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
  - b. At the system console, enter <Control>-B to enter Access Port control mode.
  - c. Look on the bottom lines of the display.
3. If the yellow "Attention" LED is lit, examine the SP error logs:
  - a. Enter <Control>-B at the system console.
  - b. Enter SP to enter the Service Processor mode.
  - c. Enter DL at the SP prompt.
  - d. If the "Latest Errors" log has entries, enter L; otherwise enter E to see the "Earliest Errors" log.
  - e. Record the most current entries in the error logs.
4. Call the Response Center (Hardware Assistance).

## System Hang

The last type of interrupt is a *system hang*. With a system hang, the machine is running (the green RUN light is lit), but no one can access the system.

Symptoms:

- The system console may or may not be hung.
- The Control-A ("=" prompt) may or may not be functioning.
- The hex display typically displays one of two possible states: F0FF/FFFF or FAFB/FFFF:

- ❑ The F0FF/FFFF state (display alternating between F0FF and FFFF) indicates a problem in which no process is capable of running and the CPU is basically "paused" - waiting to do something.
- ❑ The FAFF/FFFF state (display alternating between FAFF and FFFF) indicates a problem in which a high-priority process is not allowing any other process to obtain access to the CPU and the CPU is basically "looping" on a piece of code.

You should:

1. Halt the machine by issuing a "TC" command. (Do NOT use the "RS" command. Do NOT do a "=SHUTDOWN" command first. Either of these commands may destroy important troubleshooting information.)
2. If the yellow "Attention" LED is lit, examine the SP error logs:
  - a. Enter <Control>-B at the system console.
  - b. Enter SP to enter the Service Processor mode.
  - c. Enter DL at the SP prompt.
  - d. If the "Latest Errors" log has entries, enter L; otherwise enter E to see the "Earliest Errors" log.
  - e. Record the most current entries in the error logs.
3. Take a memory dump.
4. Restart the system as soon as the dump is finished.

---

NOTE	<p>On 99x Systems, the four-digit hexadecimal code (the "hex display") is visible on the system console.</p> <p>To see a line of status information on the console (including the four-digit hex code):</p> <ol style="list-style-type: none"><li>1. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.</li><li>2. At the system console, enter &lt;Control&gt;-B to enter Access Port control mode.</li><li>3. Look on the bottom line of the display for status information.</li></ol>
------	---

---

## Performing a Memory Dump

To perform a memory dump, use the following procedure. Taking the wrong steps, or performing the steps out of order can result in an invalid dump, lost data, and a waste of system processing time.

### Step 1: Do a Transfer of Control (TC).

Initiate a "Transfer of Control" to change the CPU from its current state to the `ISL >` prompt. The aim is to preserve the current environment, so that data in the memory dump are valid.

1. Check the position of the key switch on the front of the computer to make sure that it is unlocked ("Enabled"). PA-RISC systems have a key switch position which secures the system by preventing access to AP Control Mode on the console.
2. Get into the "Control Mode" on the physical console. Type Control-B (hold the Control key `<CTRL>` down and simultaneously press the `B` key). The result should be the prompt for the Access Port (AP) Control Mode: `CM > .`
3. 99x only: at the AP Control Mode prompt (`CM>` ), enter `SP` to access the Service Processor (SP) commands.
4. At the `SP >` prompt (for the 99x) or the `CM >` prompt (for other computers), enter `TC` and a single carriage return to execute a Transfer of Control (TOC).

For the latest SP firmware, you also get a prompt asking which processor you want to TOC (display is similar to HC display).

5. To ensure that the TC took effect, watch the hex display located in the lower left hand corner of the console when in CM mode. The hex display should change from the code it displayed prior to the TC to a different series of codes (the series of codes displayed when the CPU undergoes selftest and the system boots ISL.)
6. If the hex code DOES NOT change, the TC did not take effect. Try the following tactics:
  - a. Try typing a Control-M (no carriage return). If this produces no effect, do a hard reset of the terminal and attempt another Control-B TC key sequence (for 99x, the sequence is: Control-B, SP, TC).
  - b. If the hex code still does not change, call the Response Center. The Response Center may be able to help.
  - c. If all efforts to do a TC fail, you probably will have to do a Hard Reset. Perform a hard reset by entering `RS` at the `SP >` prompt (for the 99x) or at the `CM >` prompt (for other computers).

If you do a reset, do not waste your time taking a memory dump. Instead, just bring the machine up and report the problem to the Response Center.

---

**CAUTION** Do not do a hard reset (RS) unless absolutely necessary. A hard reset invalidates the memory dump and destroys important troubleshooting information.

---

## Step 2: Boot to ISL.

At this point, you have successfully initiated a TC and are watching the hex display change through all of its selftest codes.

1. After a TC, the console is automatically placed into console mode so you can monitor the boot process messages.
2. When the console displays a prompt for booting the computer, enter a response so that the computer boots from the PRIMARY PATH - as you would for any normal system start attempt.
3. The boot prompt can take one of two forms:
  - a. If the autoboot flag is not enabled, you see:

```
Continue with primary boot path? ([y]/n/<path>/?)> n
```

If you see, the above prompt, press y.

- b. If the autoboot flag is enabled, you see:

```
Processor is starting the autoboot process.
```

```
To discontinue, press any key within 10 seconds...
```

As soon as you see the above prompt, press a key. (IMPORTANT!)

---

**CAUTION** Autoboot is basically a script of ISL commands that are automatically executed.

If your site uses the Autoboot feature, **make sure that you abort the autoboot sequence!** Otherwise the memory dump will be lost unless the autoboot file contains a DUMP command (it probably doesn't).

---

---

**NOTE** If you find that you do not get this console prompt - but instead seem to be hanging at the xxxx, 9120, or C402 code, try typing CO at the SP > or CM > prompt. This should switch you into Console Mode and, if autoboot is not enabled or if the 10 second autoboot sequence has not expired, you should be able to boot to ISL.

---

## Step 3: Dump the System.

At this point, you are at the ISL > prompt.

1. Select the appropriate media for your tape drive device. For example, select a known good 2400' reel of tape when dumping to a 1/2-inch tape drive. A DDS can also be used.
2. Mount the tape on the tape drive configured as the "Alternate Path" device (the tape drive from which you normally UPDATE or INSTALL).

3. Put the drive online and ensure that the tape loaded properly.

---

**NOTE** If you find that your inputs to the `ISL >` prompt are being rejected (or considered invalid), check the console configuration (MODES softkey). Ensure that `AUTOLINEFEED` and `BLOCK MODE` are not enabled (only `REMOTE` should be enabled) ! Also, the terminal should be set to the HP defaults: 9600 Baud, 8 bits/no parity, ENQ/ACK.

---

4. Type `DUMP` at the `ISL >` prompt to initiate the dump program.

5. The dump program prompts you with `Enter Dump Name`.

The dump name is written to tape as an identifier which is useful if the tape is accidentally mislabeled or is mixed up with another dump tape. The dump name should begin with an alpha character. For naming conventions, the Response Center recommends that:

- a. System Aborts be named "Axxxx" where the xxxx is the system abort number.
- b. HPMCs be named "HPMC".
- c. System hangs can be labeled "HANG".

Type in your name, reason for taking the dump, site name and timestamp of the system interruption.

6. If you do not respond to the prompt within a few seconds, the dump continues. If this happens the dump does not receive a name, but the contents of the dump are not harmed.
7. Monitor the progress of the dump, recording any error messages that occur. Report these error messages to the Response Center when you call.

## Step 4: Restart the System.

At this point, the dump has completed and you should be at the `ISL >` prompt.

1. You can now restart the system using a `START RECOVERY` (Warmstart) or a `START NORECOVERY` (Coolstart) at your option.

If you do a `START RECOVERY`, it is typically not necessary to do a `START NORECOVERY` after spoolfile processing, as was recommended on the "MPE V" HP3000 systems.

2. At this point, it is normally safe to perform your typical system/data base recovery procedures and resume system processing.

## Step 5: Process the Memory Dump.

At this point, your system is back up and running normally. You should also have a memory dump tape of the failure which completed without error.

The next step is to process the dump tape so that its contents can be remotely analyzed. Do this by running the Dump Analysis Tool (DAT), a utility residing in the `DAT.TELESUP` group/account.



1. Log on as MGR.TELESUP,DAT.
  2. Type DAT at the colon prompt to initiate the Dump Analysis Tool.
    - a. If you get the following error message:

```
"Program requires more capabilities than group is allowed
(LDERR 505)".
```

the DAT group was not created with full capabilities. Enter:

```
:ALTGROUP DAT;CAP=IA,BA,PH,MR,DS,PM
```

then retry the DAT command.
  3. You should see a \$ nmdat> prompt.
  4. Enter a GETDUMP command in the format "GETDUMP xxxxx" where the xxxxx is the 5-character dump name you gave to the dump.
  5. The console displays an I/O Request message for the dump tape. Reply as normal.
  6. Monitor the subsequent process for unusual error messages.
    - a. The DAT utility may abort because of insufficient disk space. The memory dump may require hundreds of thousands of sectors of permanent disk space on the system. If there is not enough space to accomplish this task, the DAT utility aborts. Report this event to the Response Center.
  7. Once the dump is finished, type EXIT to leave the utility.
- The memory dump now resides as file(s) in the DAT.TELESUP account.

## Step 6: Call the Response Center.

In the last step, you gather information and call the Response Center to report the system interruption:

1. Gather the following information to give to the Response Center engineer who will be calling back:
  - a. The modem telephone number and Baud rate.
  - b. The passwords to MGR.TELESUP and any additional security provisions needed to access the system on which the memory dump resides.
  - c. The operating system release (type :SHOWME to get current release number).
  - d. All troubleshooting information gathered so far.
2. Call the Response Center. If you are certain the problem is hardware, ask for "Hardware Assistance." Report the full system abort message printed on the console and the contents of the hex display (on the 99x/T-Class Systems, hex codes are displayed on the console). Also report any unusual messages encountered during the subsequent system startup.
3. The Response Center recommends that you allow users to log back on, without waiting for the Response Center engineer to call back.

**If you choose to wait for the Response Center engineer to call back before allowing users back on, please note this fact to the Response Center Coordinator so that your call is appropriately prioritized.**

## Summary: Taking a Memory Dump

To perform a memory dump:

1. Do a Transfer of Control (TC):
  - a. Type CTRL-B to get to CM > prompt on console.
  - b. 99x systems only: Type SP to get to SP > prompt.
  - c. Type "TC" and hit RETURN key.  
For latest SP firmware, you also get a prompt asking which processor you want to TOC (display is similar to HC display).
  - d. If Autoboot is enabled, hit any key to interrupt it.
2. Boot from Primary Boot Path:
  - a. Type "yes" to the "Interact with IPL" prompt.
3. Perform a memory dump:
  - a. Mount the appropriate media on the ALTPATH tape drive and put the drive online.  
For example, a DDS or a known good 2400' reel of tape (with a write ring)
  - b. At ISL > prompt, type "DUMP" command.
  - c. Enter appropriate site and problem data at "Enter Dump Name" prompt.
4. Restart the operating system:
  - a. At "ISL >" prompt, type "START" or "START NORECOVERY" as desired.
  - b. Resume normal system processing.  
If you are reluctant to let users on the system until the Response Center engineer approves further processing, call the Response Center. Report your concern to the Response Center coordinator and request a Priority One code.
5. Process the memory dump:
  - a. Mount the first dump tape on the tape drive.
  - b. Log on as MGR.TELESUP,DAT.
  - c. Type "DAT" to initiate the Dump Analysis Tool (DAT) program.
  - d. Type "GETDUMP xxxxx" at the DAT program prompt (where xxxxx is the 5 character dump identifier name).
  - e. Reply to the tape I/O request at the system console.
  - f. When all tapes are read in, EXIT the DAT utility.
6. Call the Response Center and report the problem.

Recovering from Failures on the 99x  
**Summary: Taking a Memory Dump**

# 5 Indicators, Switches, and Console

---

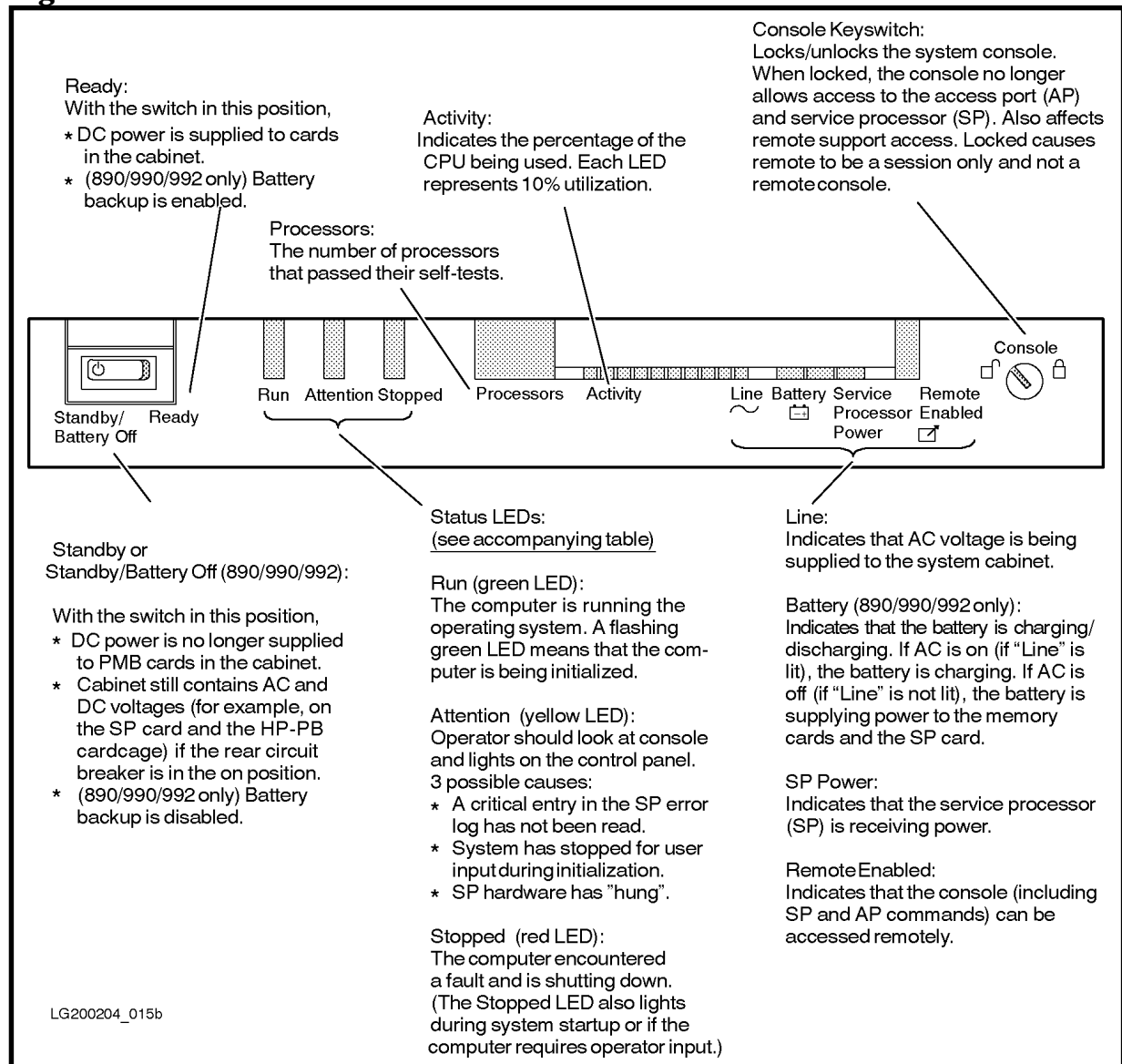
This chapter explains the ways in which you can interact with the hardware and firmware:

- Indicators and Switches on the Front Panel.
  - Power System Switches and Indicators
- System Console.
  - Attention Messages.
  - Hexadecimal Code.
  - Access Port (AP) and Service Processor (SP).

## Indicators and Switches on the Front Panel

To operate 99x/T-Class Systems, you interact with the indicators and switches on the front panel ( Figure 5-1). Table 5-1 summarizes information on the front panel.

**Figure 5-1 Front Panel Indicators and Switches**



**Table 5-1 Front Panel Indicators and Switches**

Label	Description
Standby (99x/T-Class Systems)  Standby/ Battery Off (890/990/992)	<p>With the "Standby-Ready" switch in this position:</p> <ul style="list-style-type: none"> <li>■ DC power is no longer supplied to PMB cards in the cabinet.</li> <li>■ (990/992/890) Battery back-up is disabled.</li> <li>■ Cabinet still contains AC, high voltage DC, and low-voltage DC bias voltages (for example on the SP card and the HP-PB card cage) if rear circuit breaker is in ON position.</li> </ul>
Ready	<p>With the "Standby-Ready" switch in this position:</p> <ul style="list-style-type: none"> <li>■ DC power is supplied to PMB cards in the cabinet.</li> <li>■ (990/992/890) Battery back-up is enabled.</li> </ul>
Run (green LED)	The computer is running the operating system. A flashing "Run" LED indicates non-OS system activity. See <Undefined Cross-Reference>.
Attention (yellow LED)	<p>Operator should look at console messages and LEDs on the control panel (front panel). Three possible causes:</p> <ul style="list-style-type: none"> <li>■ Computer may have a critical unread message in the SP log. Use the DL command at the SP prompt; see Chapter 2 (Procedures).</li> <li>■ System has paused for user input during initialization.</li> <li>■ SP hardware has "hung."</li> </ul>
Stopped (red LED)	<p>The computer encountered one of the following conditions (see &lt;Undefined Cross-Reference&gt;):</p> <ul style="list-style-type: none"> <li>■ Errors (computer will shut down): <ul style="list-style-type: none"> <li><input type="checkbox"/> Power supply failure or over-temperature shutdown.</li> <li><input type="checkbox"/> High Priority Machine Check (HPMC).</li> <li><input type="checkbox"/> Power-on selftest failures (if PDC failed selftest on a processor or memory card and the SP Autostart flag is not set).</li> <li><input type="checkbox"/> Operating system kernel panic.</li> </ul> </li> <li>■ User input required (for example to confirm PMB configuration if configuration has changed.)</li> </ul>
Processors	The number of processors that passed their selftests. During system boot, shows the section of the SP selftest being executed.

Label	Description
Activity	For MPE/iX, indicates percentage of CPU in use (each LED = 10% utilization). For HP-UX, indicates the exact number of processes in the run queue. This display flashes each time the OS updates the value. The Activity LEDs represent the same data as the chassis activity codes (FxxF and Exxx). If the display stops flashing, the system may be hung. During system boot, shows the section of the SP selftest being executed (duplicating the information in the "Processors" display). Read this display as binary-weighted digits (rightmost LED = 1, next LED = 2, etc.). Add them up to find the selftest that failed.
Line	Indicates that AC voltage is being supplied to the system cabinet and the circuit breaker switch is in the ON position.
Battery (890/990/ 992 only)	(990/992/890) Indicates that the battery is charging/discharging. If AC is ON (if "Line" is lit), the battery is charging. If AC is OFF (if "Line" is not lit), the battery is supplying power to the memory cards.
SP Power	Indicates that the Service Processor (SP) is receiving power. This LED can be lit (and the SP can respond to commands) even if the Standby-Ready switch is in the "Standby" position.
Remote Enabled	Indicates that the system can be accessed remotely. Use the AP commands ER/DR and UR/LR to control remote access. See Chapter 2 (Procedures).
Console Keyswitch:	Locks/unlocks the system console. When locked, the console no longer allows access to the Access Port (AP) and Service Processor (SP). (That is, the console no longer responds to <Control>-B.) Affects both local and remote consoles.

**Table 5-2 Conditions Indicated by System Status LEDs**

Run (green LED)	Attention (yellow LED)	Stopped (red LED)	Condition
OFF	OFF	OFF	<b>Main Power Failure.</b> All power has failed and the Service Processor is unable to display a message to the operator. Possible causes: AC power failure, system power failure.
Flashing	OFF	OFF	<b>Non-OS system activity.</b> The green LED is flashing at about a one-second rate. The system is in a normal and expected state, but is not yet doing "useful" operating system work. The system is probably undergoing initialization, selftest, or bootup.
ON	OFF	OFF	<b>Normal OS system activity.</b> Normal state. The system is functioning normally and doing useful operating system work.



Run (green LED)	Attention (yellow LED)	Stopped (red LED)	Condition
ON	ON	OFF	<b>OS system activity with an attention condition.</b> Attention condition encountered, but otherwise the system is functioning and doing useful operating system work. See the system console for warning messages; see the Service Processor log (DL command at the SP prompt) for critical error log entries. Critical errors are highlighted in the SP log.
x	ON	x	<b>Attention.</b> Attention condition encountered or the Service Processor (SP) log has an unread entry. See the system console for warning messages; see the Service Processor log (DL command at the SP prompt) for critical error log entries. Critical errors are highlighted in the SP log.
OFF	x	ON	<b>System stopped.</b> Several possibilities: <ul style="list-style-type: none"> <li>■ System requires user input (for example, the console is waiting for a response to a "continue booting?" prompt).</li> <li>■ Operator gave the OS command to shut down the computer.</li> <li>■ The system detected a critical catastrophic condition and stopped operation. Contact an HP Customer Response Center (Hardware Assistance) immediately. A reboot performed by the operator may or may not be successful. If this state occurs, it will replace any other state of the LEDs (including initialization and warning).</li> </ul>
ON	ON	ON	<b>Lamp test.</b> During system selftest or boot, the status LEDs all flash on for a moment and then flash off. Afterwards, the LEDs return to their normal display state, reflecting the current state of the system.

## Power System Switches and Indicators

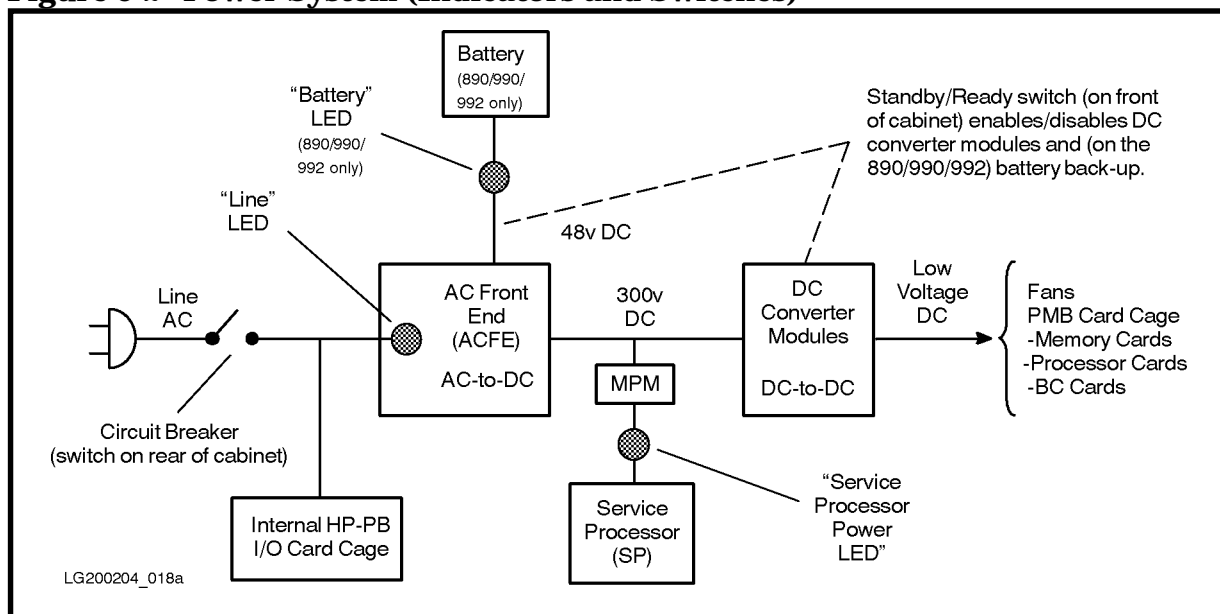
Several of the switches and indicators affect the power system.

The power system is made up of several components ( <Undefined Cross-Reference>):

- The AC Front End (ACFE) which transforms the AC line voltage to 300 VDC.
- The DC Converter Modules which transform the 300 VDC to the low DC voltages used to power the fans and the PMB Card Cage (memory cards, processor cards, and bus converter (BC) cards).

- The Miscellaneous Power Module (MPM) which provides power to the Service Processor (SP).
- The Service Processor (SP) card which plays an important role in bringing up the power system.
- (990/992/890 only) The Battery (Battery Back-Up) which supplies power to memory cards in the event that AC power is no longer supplied. The battery can supply power for several minutes; the exact length of time depending on the number and types of memory cards in the system.
- On the 991/995/T500 and 996/T520, power back-up is provided by an optional PowerTrust Uninterruptible Power System (UPS).

**Figure 5-2 Power System (Indicators and Switches)**



The switches and indicators have the following functions:

- The power switch on the rear of the cabinet (circuit breaker) disconnects the AC line from the cabinet. 990/992/890 systems without the PowerTrust UPS contain batteries for battery back-up; these batteries are NOT disconnected by the power switch on the front of the cabinet.
- The "Line" LED indicates the presence of AC line voltage in the cabinet.
- The "Standby-Ready" switch on the front of the cabinet shuts down most of the DC Converter Modules. Consequently, this switch shuts off power to memory cards, processor cards, and BC cards in the PMB card cage. (On the 990/992/890 this switch also disables battery back-up.) This switch DOES NOT shut off power to the fans and power to the HP-PB I/O card cage. AC and DC voltages are still present in the cabinet even when this switch is set to "Standby."
- The "SP Power" LED indicates whether power is being supplied from the MPM to the Service Processor (SP).

- (990/992/890 only) The "Battery" LED indicates that the battery is charging/discharging. If the Battery LED is ON, then the "Line" LED indicates whether the battery is charging or discharging. If AC is ON (if "Line" is lit), the battery is charging. If AC is OFF (if "Line" is not lit), the battery is supplying power to the memory cards.

## System Console

The system console may display status information for the system. In addition, the system console is used to access the Access Port (AP) and the Service Processor (SP).

### Attention Messages

When the yellow "Attention" LED lights on the front panel, look to the system console for warning messages. For example, if the system experiences an over-temperature condition, the yellow "Attention" LED lights and a warning message is displayed on the system console.

The yellow "Attention" LED may also indicate an unread message in the SP error log. To access these messages:

1. Enter `<Control>-B` at the system console.
2. Enter `SP` to enter the Service Processor interface.
3. Enter `DL` at the SP prompt.
4. If the "Latest Errors" log has entries, enter `L`; otherwise enter `E` to see the "Earliest Errors" log.

### Hexadecimal Codes and Status Line

On 99x/T-Class Systems, the four-digit hexadecimal code (the "hex display") is visible on the system console.

**To see a line of status information on the console (including the four-digit hex code):**

1. Make sure that the Console keyswitch on the computer front panel is in the unlocked position.
2. At the system console, enter `<Control>-B` to enter Access Port control mode.
3. Look on the next-to-last line of the display for status information. You will see a display like this:

```
TEST      90AA      REMOTE: enabled inactive multiple      ACCESS FAULT: 00
^         ^         ^         ^
|         |         |         |
|         |         |         |
System status      Status of remote console:      # of password
(sysstat).      * Current security level (enabled,      faults made while
Possible states:      disabled, pending, locked)      trying to access
OFF, TEST, INIT, WARN,      * Current activity (active, inactive)      system remotely
SHUT, RUN, FAULT, ALL      * Current access mode (single, multiple)
(ALL = all lights ON
to test indicators).
```

4. On the bottom line of the display, you may see a message reporting that a critical entry has been made to the SP error log, or that there has been a system halt.

## Hex Codes During Startup

As the system goes through its startup, the hex code display changes from one number to another. This is normal and requires no operator intervention.

## Hex Codes During Normal Operation

When the computer has finished booting and is running the operating system, the system console displays a hex code to indicate normal operation.

HP-UX systems indicate system activity by displaying the hex number:

F        U        N        F

where

"F" is always displayed in the first and last digits.  
U is the exact number of processes in the run queue.  
N = number of processors configured by HP-UX.

MPE/iX systems indicate system activity by flashing the hex number between FFFF and:

F        U        F        F

where

"F" is always displayed in the first, third, and fourth digits.  
U is a hex number from 0 to A, representing the % of CPU utilized  
(U times 10 = % utilization of CPU).

## Hex Codes During System Faults

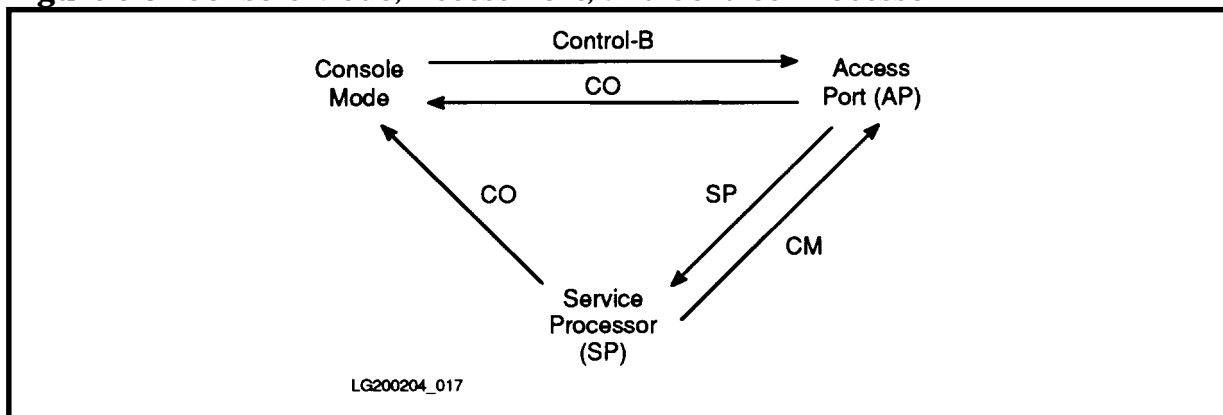
If your system experiences a system fault, record the hex code displayed on the console. If the console displays several hex codes, one after another, record all the hex codes.

The hex code contains information useful in troubleshooting. Give this information to your HP Response Center.

## Access Port (AP) and Service Processor (SP)

From the system console, you can access the commands available from the Access Port (AP) and the Service Processor (SP). Figure 5-3 summarizes how to change from one mode to another.

**Figure 5-3 Console Mode, Access Port, and Service Processor**



You access the Access Port through the system console by entering <Control>-B.

You access the Service Processor by:

1. Entering `control-B` at the console to enter Access Port control mode.
2. At the Access Port prompt (`CM>`), entering `SP`.

You can return to console mode by entering `CO`. You can return to the console mode from either either the AP control mode prompt or the Service Processor (SP) prompt.

You can return from the SP prompt to the AP control mode, by entering `CM`.

# 6 PDC

---

This chapter covers the Processor Dependent Code (PDC) user interface.

PDC is firmware located internal to the computer. PDC initializes the hardware, conducts selftests, and handles system faults.

Several dozen commands are available at the PDC user interface. Important PDC commands include:

- Change the autoboot flag and the default boot paths.
- View the HPMC tombstone.
- Update firmware.

The chapter is organized as follows:

- Accessing PDC.
- PDC Command Reference.
- Initial Display.
- Messages and Prompts.
  - Message for Insufficient Memory.
  - Autoboot Flag True.
  - Autoboot Flag False.
- Main Menu.
  - Paging Prompt for Online Help.
  - Online Help.
- Boot Menu.
  - Online Help.
- Firmware Menu.
  - Online Help.
  - Display from VERIFY Command.
- Service Menu.
  - Online Help.
  - Test Flags Commands.
- Failure Display.

- Online Help.
- Tombstone Menu.
  - Online Help.
  - Tombstone Display.



---

## Accessing PDC

1. Reset the system or cycle power (power down, then power up) as described in Chapter 1 (Overview).
2. Watch the system console carefully.
3. When the system is going through its startup routine, you will see a display similar to the following on the console:

```
-----  
PDC - Processor Dependent Code  
Version x.xx  
(c) Copyright 1990-1997  
The Hewlett-Packard Company  
All rights reserved  
-----  
Total Memory:          192 MB  
Total Bus Converters:  2  
Total Processors:      2  
  
Primary Boot Path:     0/28/52.0.0.0.0.0.0  
                        0 means BC 0 in PMB slot 0  
                        52 means I/O card in HP-PB slot 13  
                        0 means device ID of 0  
  
Alternate Boot Path:   0/28/36.0.0.0.0.0.0  
Console/Keyboard Path: 0/28/44.0.0.0.0.0.0  
-----
```

4. At the bottom of the display, you will also see one of two possible prompts:
  - a. If the autoboot flag is **not** enabled, you will see:

```
Continue with primary boot path? ([y]/n/<new_path>)> N
```

If you see the above prompt, type n. You will see:

```
Continue with alternate boot path? ([y]/n/<new_path>)> N
```

If you see the above prompt, press n.

**b. If the autoboot flag is enabled, you will see:**

```
Processor is starting the autoboot process.
```

```
To discontinue, press any key within 10 seconds...
```

As soon as you see the above prompt, press a key. (If you do not press a key within several seconds, the system continues with its bootup and you will have to start over again by cycling power or by using the RS or RE command at the SP prompt; to get to the SP prompt, you must hit CNTRL-B.)

After you press the key, you will see:

```
Continue with primary boot path? ([y]/n/<new_path>)> N
```

When you see the above prompt, press n. You will see:

```
Continue with alternate boot path? ([y]/n/<new_path>)> N
```

When you see the above prompt, press n.

---

# PDC Command Reference

## Initial Display

```
-----  
PDC - Processor Dependent Code  
Version x.xx  
(c) Copyright 1990-1997  
The Hewlett-Packard Company  
All rights reserved  
-----
```

```
Total Memory:          192 MB  
Total Bus Converters:  2  
Total Processors:      2  
  
Primary Boot Path:     0/28/52.0.0.0.0.0.0  
                        0 means BC 0 in PMB slot 0  
                        52 means I/O card in HP-PB slot 13  
                        0 means device ID of 0  
  
Alternate Boot Path:   0/28/36.0.0.0.0.0.0  
Console/Keyboard Path: 0/28/44.0.0.0.0.0.0  
-----
```

## Messages and Prompts

### Autoboot Flag True

Processor is starting the autoboot process.

To discontinue, press any key within 10 seconds ... discontinued.

Continue with primary boot path? ([y]/n/<new\_path>) > N

Continue with alternate boot path? ([y]/n/<new\_path>) > N

Boot process discontinued. Going to Boot Console User Interface.

### Autoboot Flag False

Continue with primary boot path? ([y]/n/<new\_path>) > N

Continue with alternate boot path? ([y]/n/<new\_path>) > N

Boot process discontinued. Going to Boot Console User Interface.

---

## Main Menu

```
----- Main Commands -----  
  
Commands Available  
  
PR Primary:      Continue boot using primary boot path  
RE Restart:      Restart the system and activate new settings  
  
Menus Available  
  
BO Boot:         Perform boot tasks (menu)  
FI Firmware:     Update firmware (menu)  
SE Service:      Service the system (menu)  
TO Tomb:         Display HPMC troubleshooting information (menu)  
  
Help:             Display help text on menu selections  
  
-----  
Main>
```

## Paging Prompt for Online Help

The following message appears at the bottom of each "help" page:

```
-----  
Forward Back Quit? >
```

You can press <Enter> instead of F to page through help text. At the end of the help text, pressing <Enter> or F returns you to the menu you started from. Pressing Q returns you to the previous menu regardless of where you are in the help text. Commands may be entered in upper or lower case letters.

## Online Help

```
Main> HE
```

```
----- PDC Help -----  
--
```

```
Contents:      I.  OVERVIEW OF PDC  
               II. ENTERING PDC COMMANDS  
               III. SYNTAX OF ALL PDC COMMANDS
```

### I. OVERVIEW OF PDC

Processor Dependent Code (PDC) is firmware-based code that a system executes before loading ISL and the operating system. Several dozen commands are available from this interface enabling the user to:

- \* Change boot paths.
- \* Change the autoboot flag.
- \* Update firmware.
- \* Service the system.

To leave the PDC interface and continue the boot process, enter the command PRIMARY (to boot from disk or other media) or ALTERNATE (to boot from a tape drive or other media).

For detailed information on a command, get into the menu in which the command occurs, then type HELP.

### II. ENTERING PDC COMMANDS

Commands and options are case insensitive. (help = HELP).

Commands in the current menu have two-key shortcuts. For example you can type "PR" for PRIMARY at the Main Menu.

You can execute any command from any menu by typing the FULL NAME of the command.

### III. SYNTAX OF ALL PDC COMMANDS

Capitalized words "EXAMPLE" are commands and should be typed as is.

Words within brackets <example> are Parameters

Square brackets [] enclose optional parameters

The OR symbol | separates valid parameters

**ALTERNATE** (Boot Menu)

Boot from the alternate boot path.

**AUTOBOOT** [<boolean>] (Boot Menu)

<boolean> = TRUE | T | 1 | FALSE | F | 0 .

Display or optionally change the autoboot flag.

**CHASSIS** <chassis\_code> (Service Menu)

<chassis\_code> = 4-digit hexadecimal number displayed on 26th  
line of console after entering Control-B.

Display a string describing the meaning of a chassis code.

**DISPLAY\_TOMB** <slot\_num>/<mod\_num> (Tombstone Menu)

<slot\_num> = Processor slot number ranging between 8 - 15.

<mod\_num> = Module number 0 or 1.

Display troubleshooting data (a tombstone) generated by  
an HPMC, LPMC, or Transfer of Control.

**HELP** | H | ? (All Menus)

Display help for current menu.

**NOAUTOTOMB** [<boolean>] (Service Menu)

<boolean> = TRUE | T | 1 | FALSE | F | 0 .

Display or optionally change the automatic tombstone display flag.

**PATH** [<path\_type> <new\_path>] (Boot Menu, Firmware Menu)

<path\_type> = PRIMARY | PRI | P |  
ALTERNATE | ALT | A |  
CONSOLE | CONS | C  
UPDATE | U

<new\_path> = See Boot Commands Help Menu.

Change a path stored in stable storage.

**PRIMARY** (Main Menu, Boot Menu)  
Boot from the Primary Boot Path.

**RESTART** (Main Menu)  
Restart the system. This is equivalent to a hard power on.

**SHOWPDT** (Service Menu)  
Show the contents of the Page Deallocation Table.

**UPDATE <name>** (Firmware Menu)  
<name> = ASCII string corresponding to the file name of the  
new firmware located in the LIF partition of  
storage media.

Updates firmware from the LIF file <name> by copying the firmware  
to the inactive bank of PDC, then it restarts the machine using the  
new firmware.

**VERIFY** (Firmware Menu)  
Display the PDC/SP firmware revisions and related information.

**END**



---

## Boot Menu

```
Main> BO
----- Boot Commands -----
Commands Available

PR Primary:      Boot system using primary boot path.
AL Alternate:    Boot system using alternate boot path.
AB Autoboot:     Change the autoboot flag.
PA Path:         Change a path (PA ,path_type> <new_path> )
                   <path_type>= Pri, Alt, Cons, or Uppdate

Values stored in Stable Storage:

Autoboot Flag:           TRUE
Primary Boot Path:       0/28/28.0.0.0.0.0.0
Alternate Boot Path:     0/28/36.0.0.0.0.0.0
Console/Keyboard Path:  0/28/44.0.0.0.0.0.0

HE Help:         Display help text on menu selections
eXit:            Return to previous menu
-----
Boot>
```

## Online Help

```
Boot> HE
```

```
----- Boot Commands Help -----
```

```
Contents:      I.  RECOMMENDED PATHS
                II. BOOT COMMAND DESCRIPTIONS
                III. WHAT IS A PATH?
                IV. PATH FORMAT
```

### I. RECOMMENDED PATHS

	With SCSI system disk	With HP-FL system disk
Primary:	0/28/52.6.0	0/28/52.0
Alternate (SCSI dev):	0/28/52.0.0	0/28/36.1.0
Alternate (HP-IB dev):	0/28/12.0.3	0/28/12.0.3
Console:	0/28/44.0	0/28/44.0

### II. BOOT COMMAND DESCRIPTIONS

Primary	Boot from primary boot path. The primary boot path points to the device used to boot the operating system (usually the system disk).
Alternate	Boot from alternate boot path. The alternate boot path points to the device (typically a tape drive) used to load the operating system from the distribution media.

---

**NOTE** In the above help text, the value for Alternate (SCSI dev) on systems with an HP-FL system disk should be 0/36.0.0.

---

**Autoboot**      Set autoboot flag TRUE or FALSE. If autoboot is TRUE, the system automatically boots when powered up. (More precisely, it loads the software on the primary boot device.) During an autoboot, the process pauses for 10 seconds to allow the operator to stop the boot process.

If the autoboot flag is modified, the new setting takes effect when the system is powered up again.

Syntax:    AUTOBOOT <boolean>. For <boolean>:  
               TRUE = T = 1  
               FALSE = F = 0

Example:    AUTOBOOT TRUE or B TRUE or B T

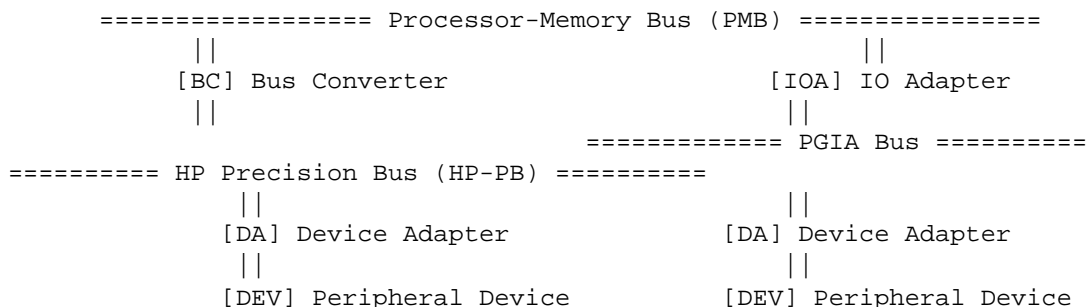
**Path**            Change/display paths kept in Stable Storage.

Syntax: PATH [ <path\_type> [ <new\_path> ] ]  
 <path\_type> is one of:  
               P = primary boot path  
               A = alternate boot path  
               C = console path  
               U = update path  
 <new\_path> = a path description

Examples:  
 PATH                    Displays all paths  
 PATH A                 Displays only alternate path  
 PATH P 0/52.0         Changes primary path to 0/52.0

### III. WHAT IS A PATH?

A path is a hardware address, showing the location of a peripheral device in the bus structure. Typical bus structure:



#### IV. PATH FORMAT

On this system, a path has the format:

BC/DA.DEV

BC = The PMB module of the Bus Converter (BC). This decimal value is based on: 1) the slot number of the BC card.  
2) whether the upper or lower connector of the BC card is used.

$BC = (4 * \text{slot number of the BC}) + (\text{BC module number})$   
BC module number is 0 for the lower connector.  
2 for the upper connector.

Examples:

BC = 0 for BC card in slot 0, lower connector;  $(4*0)+0 = 0$   
= 2 for BC card in slot 0, upper connector;  $(4*0)+2 = 2$   
= 16 for BC card in slot 4, lower connector;  $(4*4)+0 = 16$

DA = The HP-PB module of the device adapter (DA).  
Equals  $4 * \text{HP-PB slot number of the DA (decimal)}$ .

DEV = The ID number of the device, often set on the device itself (hexadecimal).

Example: 4/36.3 (decimal format)

BC = 4             $4/4 = 1$ . The BC is in PMB slot 1; module 0.  
DA = 36           $36/4 = 9$ . The I/O card is in HP-PB slot 9.  
DEV = 3          The ID on the device is set to 3.

Values for BC and DA are expressed in decimal notation.  
If there are additional values in the path (for example, to specify a LAN address), these are expressed in hexadecimal notation.

END

---

## Firmware Menu

---

**CAUTION** Operators should not execute the commands in the Firmware Menu. If used improperly, these commands can damage system operation (for example, the computer may no longer be able to boot up and a service call may be necessary).

---

```
Main> FI

----- Firmware Commands -----

+-----+
| NOTICE!!  A successful UPDATE will change the version |
|                               of firmware and hardboot the system. |
+-----+

Values stored in Stable Storage:
  Update Path:          0/0/0/0/0/0/0.0.0.0.0.0.0

Commands Available
PA Path:          Change the update path (PA U <path>)
VE Verify:       List firmware revisions
UP Update:       Update inactive firmware from LIF (UP <name>)

HE Help:         Display help text on menu selections
eXit:            Return to previous menu

-----
Firmware>
```

## Online Help

```
Firmware> HE
```

```
----- Firmware Commands Help -----
```

Firmware Commands are used to update firmware on the service processor (SP). This firmware contains Processor Dependent Code (PDC) and service processor code.

To perform a firmware update:

1. Check the path displayed in the menu. If the path is incorrect, change the firmware update path with the command:

```
Firmware> PATH UPDATE <new_path>
```

2. Determine the name of the file on the LIF partition that has the new revision of firmware.
3. List firmware presently installed on the service processor. This function performs a checksum on firmware present and indicates revisions of the software, the active revision, and the revision that will be active after a restart.

```
Firmware> VERIFY
```

4. Perform the firmware update.

```
Firmware> UPDATE <name>
```

The firmware update writes to the inactive bank of firmware from the file in LIF containing the new firmware. (The name of the LIF file is automatically converted to all upper-case.) After a successful update, the machine automatically restarts and uses the new firmware.

```
END
```

## Display from VERIFY Command

```
Firmware> VE
Performing checksums ...
-----
Active Bank Information          | Alternate Bank Information
-----|-----
Bank Status:      Firmware OK   | Bank Status:      Firmware OK
PDC Revision:     3.81           | PDC Revision:     4.8X
SP Revision:      1.8X           | SP Revision:      1.8X

Update file name:  FWETX381     | Update file name:  FWEUP481

Dates:
  Creation:        08/12/95 16:00:54 | Creation:        08/11/95 21:26:12
  Installation:    08/12/95 16:20:16 | Installation:    08/12/95 14:51:28
  Activation:      08/12/95 16:21:54 | Activation:      08/12/95 14:53:05

Service Processor Board ID: X3XXX
-----
Firmware>
```

---

## Service Menu

Main> SE

----- Service Commands -----

Commands Available

CH Chassis:        Decode a chassis code

SP ShowPDT:       Display page deallocation table

Values stored in Stable Storage:

AT Noautotomb    TRUE

HE Help:            Display help text on menu selections

eXit:                Return to previous menu

-----  
Service>



## Online Help

```
Service> HE
```

```
----- Service Commands Help -----
```

Commands in this menu are for service personnel.

Chassis <chassis\_code>

Displays explanatory text for a specified chassis code. Chassis codes are 4-digit hex codes displayed on the console. If a system failure occurs, the chassis code often indicates the location of the failure.

Selftest

Displays a screen that allows selftest flag modification. These flags control the behavior of the selftests executed when the computer is powered up or reset.

ShowPDT

Displays all of the page deallocation table entries.

```
Noautotomb [t|f]          Default = F (Display tombstone  
                           automatically)
```

If set to TRUE, this option prevents troubleshooting information (the tombstone) from automatically appearing after an HPMC.

```
    true  = t = on  = 1
```

```
    false = f = off = 0
```

```
END
```

---

## Failure Display

If an HPMC occurs and the operating system HPMC Handler is non-existent or corrupt, the following message appears on the system console.

```
----- Failure Commands -  
  
+-----+  
|               NOTICE !!               |  
| The system has experienced an unrecoverable error |  
| (a High Priority Machine Check - HPMC) and has   |  
| been halted.                                     |  
|  
| Please call Hewlett-Packard Service.  Enter HELP |  
| for further instructions.                       |  
+-----+  
  
RE Restart:          Restart the system  
FI Firmware:        Update firmware (menu)  
SE Service:         Service the system (menu)  
TO Tomb:           Display HPMC troubleshooting information (menu)  
BO Boot:           Perform boot tasks (menu)  
  
HE Help:           Display help text  
  
-----  
HPMC>
```

## Online Help

HPMC> HE

----- HPMC Commands Help -

The system has experienced an unrecoverable error.

1. Record troubleshooting data such as:
  - \* Error messages on console.
  - \* Status of front panel indicators on computer.
2. Enter the TOMB command to display HPMC troubleshooting information. At the tombstone menu, enter the DISPLAY command for the tombstone with the latest date/time.
3. Print the tombstone display on a printer. If a printer is not available, copy Machine Check Parameters onto paper. If time allows, also copy Control Registers.
4. On the 990/992, take a memory dump if possible. See the Operator's Guide.
5. Call Hewlett-Packard Service.
6. Attempt to restart the operating system by entering the RESTART command.

END

---

## Tombstone Menu

### TOMB Display for the 990/992/890

The following is an example from a 990/992/890 system (maximum 8 processors.)

```
HPMC> TO

----- Tombstones -----
Current Date: 12/25/92
Time: 22:45:10

Processor
Slot #  Date      Time      Type  State
-----
      8
      9
     10
     11
     12
     13
     14
     15  12/23/92  01:25:27  HPMC  Read

DI  Display      Display tombstone for processor (DI <slot>).

HE  Help:        Display help text on menu selections
eXit:           Return to previous menu

----
Tomb>
```

---

**NOTE** HPMC tombstones can be viewed at any time by using the DL command at the SP> prompt.

---

## TOMB Display for the 991/995/996/T-Class Systems

The following is an example from a 991/995/T500 996/T520 or 997/T600 System.

```
HPMC> TO

----- Tombstones -----
                                     Current Date: 07/24/93
                                     Time: 02:28:32
Proc.  Date-Time  Type  State      Proc.  Date-Time  Type  State
-----
   8/0                                Empty   |      8/1                                Empty
   9/0                                Empty   |      9/1                                Empty
  10/0                                Empty   |     10/1                               Empty
  11/0                                Empty   |     11/1                               Empty
  12/0                                Empty   |     12/1                               Empty
  13/0                                Empty   |     13/1                               Empty
  14/0                                Empty   |     14/1                               Empty
  15/0                                Empty   |     15/1                               Empty

  DI Display:      Display tombstone for processor (DI

  HE Help:        Display help text on menu selections
  eXit:           Return to previous menu

-----
Tomb>
```

## Online Help

The following display is from a 991/995/T500 996/T520, or 997/T600 System. (The 990/992/890 System help display is similar.)

```
Tomb> HE
----- Tombstone Commands Help -----

This display shows the status of tombstone information for each
processor in the system. Interpret each entry as follows:

Slot and module # of the processor that experienced the TOC, LPMC, or HPMC.
HPMC: High Priority Machine Check
LPMC: Low Priority Machine Check
TOC: Transfer of Control

|                                     +-----+
|                                     |
Proc.  Date-Time  Type  State  |  Proc.  Date-Time  Type  State
-----|-----
15/0   06/14 21:59  HPMC  Read  |  15/1
      ^-----^
      |
      +----+
      |
Date and time that each tombstone was recorded.
Empty: No tombstone has been recorded.
Unread: Tombstone has not been read; it cannot be overwritten.
Read: Tombstone has been read; it can be overwritten by a subsequent HPMC or TOC.
```

END

## Tombstone Display

```
Tomb> DI 15/1
----- Tombstone Review -----
01/21/97 15:35:16 PDC Version J526B Processor[15/0] Chassis Code:cefd

GR2 00000000 00000000 GR30 00000000 00000000

IPSW 00000000 00000000 IIR 00000000 IVA 00000000 00000000 Check Type 00000000
PC Queue:Front 00000000 00000000.00000000 00000000 (IIASQ.IIAOQ)
      Back 00000000 00000000.00000000 00000000 (IIASQ.IIAOQ)

PCXU: DR2 00000000 00000000 Stat0 00000000 00000000 Stat1 00000000 00000000
PSBI: STATUS0 00000000 STATUS1 00000000 CONTROL0 00000000 CONTROL1 00000000
PMB: SADDLOG 00000000 VADDLOG 00000000 MADDLOG 00000000 MISCLOG 00000000
      IO_DATA 00000000 IO_ARB 00000000 SLAVEADR 00000000

Cache: L1DTLOG 00000000 L2TAGERR 00000000 L2ADDR 00000000 L2_OP 00000000

Syn: LMPC_0_3 00000000 LPMC_4_7 00000000 HPMC_0_3 00000000 HPMC_4_7 00000000

Runway: SADDLOG 00000000 VADDLOG 00000000 TRANSTYP 00000000

Memory: Slot IO_Stat Err_Resp Info+Req NbrBanks BankSize BLKIDs
00 00000000 00000000 00000000 0 00 00000000

/* CONTINUED ON NEXT SCREEN */
```

## Tombstone Menu

```
PGIA: Slot Type IO HI/LO IO_Stat Err_Resp Info+Req Syn0_1 Syn2_3
      0/0 PGIA 00000000 00000000 00000000 00000000 00000000 00000000
      HP_HSC          00000000 00000000 00000000
      HSC_UP 00000000 00000000 00000000 00000000
      HSC_LO          00000000 00000000 00000000
      0/0 PGIA 00000000 00000000 00000000 00000000 00000000 00000000
      HP_HSC          00000000 00000000 00000000
      HSC_UP 00000000 00000000 00000000 00000000
      HSC_LO          00000000 00000000 00000000
```



```

        .          /* ITLB, ICache, DCache registers only
        .          /* displayed for the x90 (not for T-Class and
        .          991/995/996 systems)
ITLB_DIAG      = 7db806xx      DTLB_DIAG = 1bc006xx

ICache Diagnose Registers:
r00/04  4bdf027f          6bd33f99          47d53ea5
r05/09  4bdf7dfd 4bdf4dfd 4810c8ff 4810c8e1 4fdf7fff

DCache Diagnose Registers:
r00/04  000c3fff 00008548 0006000f 84e28000 0000000b
r05/09  d9b0fff0 4390fff0 38084abf 382354bf 3df67fff

Machine Check Parameters:
Check Type      = 40000000      CPU STATE      = 9e000007
Cache Check     = 00000000      PIM state      = Fresh
TLB Check       = a0000000      Bus Check      = 00000000
PMBI STATUS     = 00040000      PMBI SRClog    = 00400000
PMBI SADDlog    = fff7f008      PMBI MADDlo    = fffbc70d
SYNlog          = 55555555      CPU DIAG0      = 019c3e03

Slave Address   = fff7f008
BLKID          = 0000      BANK           = 66
SLOT           = 0

MADDlog Breakdown:
ARB            = f          FLEX|FIXED     = ffbc
R              = 0          M              = 1
S              = 1          T              = 1
Trans. Type    = 000d

MAC_Slot       IO_Stat  Err_Resp  Info+Req
5              00006540 000065a0 4ffbc0b3

BC Slot IOHI/LO  IO_Stat  Err_Resp  Info+Req
0       fff8fff0 00700040 03de9a52  fffbffdb (upper)
         00011e48 fff7d008 0ffbcbf80 (lower)
0       fd77f554 f0d048c3 86d9ede3  fdf9ff5f (upper)
         00000000 00000000 00000000 (lower)

```

PDC  
Tombstone Menu

# 7 Access Port (AP)

---

This chapter covers the Access Port (AP) user interface.

The AP is firmware located on the Console/LAN card in the system cabinet. The AP allows the system to be remotely serviced.

Important AP commands include:

- Configure the access port functions of the I/O card.
- Enable and disable remote console access.
- Modify remote access security features.
- View the system status display.
- Enable/disable the SPU status display.

The chapter is organized as follows:

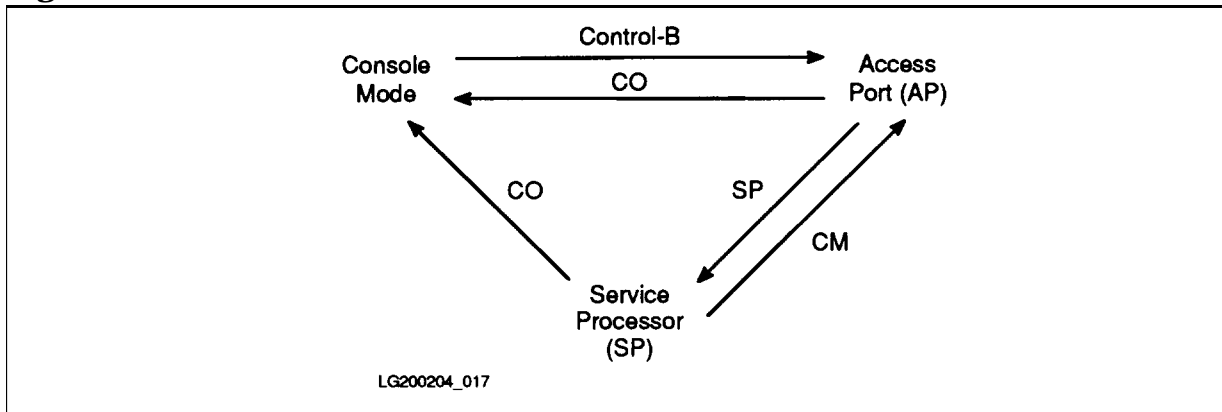
- Accessing AP.
- Summary of AP Commands.
- AP Command Reference.
  - CA: Configure AP.
  - CO: Console.
  - CS: Copy Screen.
  - DR: Disable Remote.
  - DS: Disable Status.
  - ER: Enable Remote.
  - ES: Enable Status.
  - HE: Help.
  - LR: Lock Remote.
  - RS: Reset.
  - SP: Service Processor.
  - TA: Test AP.
  - TC: Transfer of Control.
  - TE: Tell.
  - UR: Unlock Remote.

---

## Accessing AP

From the system console, you can access the commands available from the Access Port (AP) and the Service Processor (SP). <Undefined Cross-Reference> summarizes how to change from one mode to another.

**Figure 7-1 Console Mode, Access Port, and Service Processor**



You can access the Access Port through the system console by entering <Control>-B.

Commands may be entered in upper or lower case characters.

---

**CAUTION** Do not leave the console in SP mode or AP control mode for long periods of time. This blocks console messages and can eventually cause the OS to hang or crash.

---

## Summary of AP Commands

Table 7-1 Access Port Commands

Control Mode Commands			Valid At	
Command	Mnemonic	Function	LC	RC
CA	Configure AP	Configure remote support modem port	Y	Y
CO	COonsole	Return to console mode	Y	Y
CS	Copy Screen	Copy display memory of local console to remote console	Y	Y
DI	DIscconnect	(Service personnel only) Disconnect remote console	N	Y
DR	Disable Remote	Disable remote operator access	Y	Y
DS	Disable Status	Disable SPU status display	Y	Y
ER	Enable Remote	Enable remote operator access	Y	N
ES	Enable Status	Enable SPU status display	Y	Y
HE	HElp	Display help menu	Y	Y
LR	Lock Remote	Lock remote support modem access	Y	Y
RS	ReSet	Reset SPU. (You must issue the SP command first.)	Y	Y
SE	SEssion	(Service personnel only) Enter session mode on remote port	N	Y
SP	Service Processor	Enter Service Processor mode	Y	Y
TA	Test AP	Initiate AP selftest	Y	Y
TC	Transfer of Control	Initiate SPU Transfer of Control (TOC). (You must issue the SP command first.)	Y	Y
TE	TEll	Send a message to other console	Y	Y
UR	Unlock Remote	Unlock Remote Support Modem Access	Y	N

■ LC = Local Console

■ RC = Remote Console

## AP Command Reference

This section gives detailed descriptions of AP commands appropriate for customer use.

### CA: Configure AP

#### Configure Remote Support Modem Port

Allows the local console operator to set the modem protocol, bit rate, CCITT Rate Select, and the optional system identification for the remote support modem port.

Parameters set with this CA command:

- Bit Rate: 300, 1200, 2400, 4800, 9600, 19200 bits/sec
- Modem Protocol: CCITT, Bell, or CCITT\_BIS
- Autodial Protocol: V25.bis or Hayes
- System Identification: 1 to 23 displayable characters

Valid From: Local Console Port, Remote Modem Port

#### Example

```
CM> CA

Current remote support modem port configuration:

Bit rate:                9600 bits/sec
Protocol:                Bell
Autodial Protocol:      Hayes
System identification:   System_name

Do you wish to change the configuration? (Y/[N]):
```

The "Bit rate" field must be set for the speed of the incoming modem. This function is not speed-sensed; the bit rate **MUST** match the speed of the incoming call.

In most cases, the "Protocol" field should be set to "Bell" or "CCITT". In the United States, the protocol is usually "Bell." In Europe, the protocol is usually "CCITT".

The "Autodial Protocol" should match that of the modem.

If you need to change parameters, enter Y in response to the prompt. The system displays a change menu:

```
Enter your change. <CR> retains the current value.

Current bit rate is 9600 bits/sec. Select the new bit rate.
(0=300, 1=1200, 2=2400, 3=4800, 4=9600, 5=19200): 2
Current Protocol is CCITT. Select the new protocol.
(0=CCITT, 1=Bell, 2=CCITT_BIS): 1
Current Autodial Protocol is V25.BIS. Select the new protocol.
(0=V25.bis, 1=Hayes): 1
Current System identification: System_name
New system identification (limited to 1 to 23 displayable characters
or space for none): (New_system_name)

New configuration (takes effect at next remote connection):

Bit rate:                2400 bits/sec
Protocol:                 Bell
Autodial Protocol:       Hayes
System identification:    System_name
```

After the commands are processed, the new configuration is written to non-volatile memory (NVM).

The new configuration takes effect after the current operator session is disconnected and the next incoming call is answered.

If you enter an incorrect configuration, re-execute the the CA command.

## CO: Console

### Return to Console Mode

Switches the console terminal from control mode to console mode.

Valid From: Local Console Port, Remote Modem Port

### Example

```
CM> CO
```

## CS: Copy Screen

### Copy Display Memory of Local Console to Remote Console

Copies the contents of display memory on the local console to the remote console display. This is useful if error messages or a tombstone display are still in display memory. Service personnel at the remote console can read this information with the CS command even if the information has scrolled off the screen at the local console (but is still in display memory).

The CS command may take a long time to complete. For example, assume that a local console has 16 pages of display memory and each page is filled with 80 characters per line. The CS command could take as long as 3 minutes to complete, assuming a remote console connection of 2400 bits per second.

The local operator can terminate the CS command before it completes by resetting the terminal. AP firmware detects an error which terminates the CS process.

The remote operator can terminate the CS command by entering or .

The local console transmits all characters in display memory, including carriage return, line feed, and other control characters. If a line of characters from the local console fills a line on the remote console, the remote console terminal will wrap the text around to the next line. This may cause what appears to be an extra carriage return and line feed on the remote console.

The AP allows the remote console to stop character transmission (for example, with for only 20 seconds at a time. This feature prevents the local console from becoming stuck in a state such that the only way to recover use of the local console would be to reset it (for example, if the remote console failed to send a to re-start transmission,).

Valid From: Local Console Port, Remote Modem Port

### Example

```
CM> CS
```

## DR: Disable Remote

### Disable Remote Operator Access

Disables remote console access on the support modem port. Causes remote access attempts on the support modem port to be handled by the OS as a user session.

If an operator is connected as a parallel console when this command is executed, the remote console is disconnected. Future incoming calls to the remote support modem are handled by the system as a user session. If remote operator access is already disabled when this command is executed, this command has no effect.

Valid From: Local Console Port, Remote Modem Port



## Example

```
CM> DR
Remote console access disabled.
```

## DS: Disable Status

### Disable SPU Status Display

Disables display of the system's operating status and hex display to the console terminals when in console mode.

The DS command does not affect the display of this information when the console is in AP control mode or in SP mode.

See ES (Enable Status) command.

Valid From: Local Console Port, Remote Modem Port

## Example

```
CM> DS
System status display during console mode is disabled.
```

## ER: Enable Remote

### Enable Remote Operator Access

Enables remote console access and sets security parameters for the connection. **Remote console access** means that the remote user is connected in parallel to the local console. The remote user sees the same displays and has access to the same commands as a local operator, including <Control>-B access to AP and SP commands.

This command is available only on the local console.

The security parameters include the remote CS parameter, the mode parameter (single/multiple) and the password fault parameter.

### Remote CS Parameter

The *remote CS* parameter enables the Copy Screen (CS) to be executed from the remote console. The CS command copies a screen from the local console to the remote console.

### Mode Parameter

The *mode* parameter establishes how many times the remote user may connect, disconnect, and reconnect the remote console before remote console access is automatically disabled. The two modes possible are *single* and *multiple*

In *single mode*, only one access from outside to the remote console is permitted. (The AP defines an "access" as successfully answering the password prompt.) After the one access, the remote console cannot be accessed again. Only remote sessions are permitted. To use the remote port as a remote console once again, the remote console capability must be re-enabled by the local console (ER command).

---

**NOTE** For predictive support to function correctly, the AP should be set to *single mode*.

---

In *multiple mode*, the remote console can be accessed multiple times.

In both single and multiple modes, the remote user has three attempts to enter the correct password. If the user succeeds, the remote console session is begun and remains until the user disconnects or until the user is disconnected by the local console operator. If the user fails, the line is disconnected and dropped.

### **Password Fault Parameter**

If the user does not provide the correct password, a password fault count is increased, the caller is disconnected, and the line is dropped. When the password fault count exceeds an operator set limit, the remote operator access capability is disabled. Afterwards, the modem port may only be used as a normal session port until the local console operator re-enables the remote capability with the ER command.

The *password fault* parameter sets the number of password faults allowable (three password attempts per fault) before remote console access is automatically disabled. The password parameter is set by the local console operator and stored in non-volatile memory (NVM).

Valid From: Local Console Port

## Example

```
CM> ER

Current remote console access configuration:

Remote CS:      Enabled
Mode:          Multiple
Password:      the quick brown fox
Password Faults: 10

Do you wish to change the configuration? (Y/[N]): Y

Enter your changes. (CR) retains the current value.

Remote CS command: Enabled
  Select the new setting (E=enabled, D=disabled): [Enter]

Current mode: Multiple
  Select the new setting (S=single, M=multiple): S

Current Password: the quick brown fox
  New password (1 to 18 displayable characters or space if
  no password is to be required): [Enter]

Current password fault limit: 10
  New number of password faults (Range: 0-99 or space.
  Space or 0 will permit unlimited password faults.): 5

New remote console access configuration:
Remote CS:      Enabled
Mode:          Multiple
Password:      the quick brown fox
Password Faults: 05

Remote console is now enabled.
```

On initial power-up the remote configuration defaults to:

- Remote Operator Access Disabled (see DR command)
- Mode = Multiple
- Password = None
- Password Faults = 3
- Remote Copy Screen = Enabled

For predictive support to function correctly, the AP should be set to *single mode*. In single mode, the port is a normal session port.

## ES: Enable Status

### Enable SPU Status Display

Enables display of the system's status line (for example, the hex code) on the console terminals when they are in console mode.

After the ES command, the status line appears in place of the softkey labels when the console returns to console mode. The console status line is always enabled in AP control mode and in SP even if the DS command has been entered.

Valid From: Local Console Port, Remote Modem Port

### Caveats

It is not recommended that the ES command be used. Writing the status line can interfere with some programs which use escape codes to manipulate the console screen. The *vi* program in HP-UX is one such program. The screen data become corrupted when the writing of the status line coincides with a screen update by such programs.

If you want to enable the status line in console mode with the ES command and screen data corruption is a problem, use the DS command until you have finished using the conflicting software.

### Example

```
CM> ES
System status display during console mode is enabled.
```

## HE: Help

### Display Help Menu

Displays help information on the console terminal:

Help information is displayed if either HE or HELP is entered.

Valid From: Local Console Port, Remote Modem Port

## Example

```
CM> HE or HELP

      nnnnnn Access Port Revision xxxx - dddd

CA:  Configure system remote support modem port.
CO:  Enter console mode.
CS:  Copy screen from local console to remote console.
DI:  Disconnect line to remote console terminal.
DR:  Disable access by a remote console terminal (enable session access)
DS:  Disable display of system status line during console mode.
ER:  Enable access by a remote console terminal (disable session access)
ES:  Enable display of system status line during console mode.
HE:  Display this screen.
LR:  Lock remote (disable modem access).
RS:  Use RS command in SP mode.
SE:  Transfer remote terminal from console/control to session mode.
SP:  Enter Service Processor mode.
TA:  Initiate Access Port selftest.
TC:  use TC command in SP mode.
TE:  Send message between the local and remote console terminals.
UR:  Unlock remote (enable modem access).
```

The nnnnnn in the first line is the product number of the I/O card on which the AP is implemented.

xxxx is the AP firmware revision number.

dddd is a date code indicating the year and week that the code revision was last updated.

## LR: Lock Remote

### Lock Remote Support Modem Access

Disables access to the remote support modem.

After the local operator issues this command, neither a remote operator nor the system can use the remote support modem. Active session on the remote support modem are disconnected (this includes user session or a remote operator). Incoming calls are ignored. Requests by the system for establishing a modem connection are also ignored.

This command may be issued by the local or remote console operators. A remote operator issuing this command will lose connection to the system. If the modem is already in the locked state, this command has no additional effect.

This command does not affect the state of remote operator access (enabled or disabled). However, no remote operator connection can be established after executing this command.

The local console operator must use the UR (Unlock Remote support modem access) command to re-enable access to the remote support modem.

The state of the lock (either locked or unlocked) is saved in non-volatile memory (NVM). If power fails, the same state as existed before the power failure will exist after power is restored. Initially, the lock is set to the unlocked state.

Valid From: Local Console Port, Remote Modem Port

### Example

```
CM> LR
Remote is now locked.
```

## RS: Reset

### Reset SPU

Not available at the AP interface.

---

**NOTE** To reset the system, enter the SP command first:

```
CM> SP
SP> RS
```

---

## SP: Service Processor

### Enter Service Processor Mode

Enters Service Processor (SP) mode. In SP mode, more than 20 commands are available for servicing the system. Important SP commands include:

- Execute a Transfer of Control (TOC).
- Execute a reset.
- Monitor and control power system.
- Change/view system configuration.
- Change/view error logs.

The Transfer of Control (TC) and reset (RS) commands can only be executed in SP mode.

Valid From: Local Console Port, Remote Modem Port

### Example

```
CM> SP
Connecting to Service Processor. (APMSG 10)

SP>
```

## TA: Test AP

### Initiate AP Selftest

Causes the AP card to execute its selftest.

Execution of the selftest does not alter the configuration or disconnect the modem port if on line. However, any data sent to the I/O card during selftest is lost.

Valid From: Local Console Port, Remote Modem Port

### Example

```
CM> TA

Console data arriving during selftest execution will be lost.

Type Y to confirm your intention to execute AP selftest (Y/N): Y
0001 0002 0003 0004 0005 0006 0007 0008 0009

All tests passed (APMSG 01)
```

## TC: Transfer Of Control

### Initiate Transfer Of Control (TOC)

Not available at the AP interface.

---

**NOTE** To perform a Transfer of Control on 99x/T-Class Systems, enter the SP command first:

```
CM> SP
SP> TC
```

---

## TE: Tell

### Send a Message to Other Console

Sends a message to the other console.

All displayable characters following the TE command are treated as a comment. Since characters are echoed to the local console terminal and to the remote console terminal if it is connected, this has the effect of sending a message to the other terminal. The comment string, including the command mnemonic, is limited to a maximum of 80 characters.

Valid From: Local Console Port, Remote Modem Port

### Example

```
CM> TE Any comments you care to write to the other console operator
```

## **UR: Unlock Remote**

### **Unlock Remote Support Modem Access**

Enables access to the remote support modem.

After the local operator issues this command, either a remote operator or the system can use the remote support modem.

If remote operator access had been enabled previously, the card returns to the remote operator enabled state, allowing incoming calls to be connected as a mirrored console.

If remote operator access had been disabled previously, the card returns to the remote operator disabled state, allowing system usage of this port for user sessions.

If the modem was already in the unlocked state, this command has no additional effect.

This command does not affect the state of remote operator access (either enabled or disabled). After unlocking the remote support modem access, if remote operator access was enabled before locking, it continues to be enabled. If it was disabled, it continues to be disabled.

The state of the lock (either locked or unlocked) is saved in non-volatile memory (NVM) so that if power fails, the same state as existed before the power failure will exist after power is restored. Initially, the lock is set to the unlocked state.

Valid From: Local Console Port, Remote Modem Port

### **Example**

```
CM> UR  
Remote is now unlocked.
```



# 8 Service Processor (SP)

---

This chapter covers the Service Processor (SP) user interface.

SP firmware is located on the Service Processor card in the system cabinet. SP provides functions for servicing the computer. One set of commands is available when DC power is on. A subset of SP commands is available when DC power is off.

More than 30 commands are available from the service processor prompt. Many of these commands are designed for service personnel rather than for customers. However, the SP commands allow the operator to:

- Initiate a Transfer of Control (TOC) to recover a computer that has hung.
- Initiate a hard reset to recover a hung computer if the TOC is not successful.
- See more information about errors indicated by the yellow ATTENTION LED on the control panel.

The chapter is organized as follows:

- Accessing SP.
- SP Prompts.
- Summary of SP Commands.
  - SP Commands for Customers.
  - SP Commands for Service Personnel.
- SP Command Reference.
  - AF: Autostart Flag.
  - BA: Battery Enable/Disable. (Not applicable for T500, T520, and T600)
  - CL: Clear Logs.
  - CN: Power Converter On/Off. (Used by Manufacturing)
  - CM: Control Mode.
  - CO: COnsole.
  - DA: Disable Activity Codes.
  - DC: Display Converter.
  - DL: Display Logs.
  - DN: Power Down.
  - EA: Enable Activity Codes.
  - EN: ENvironmental.

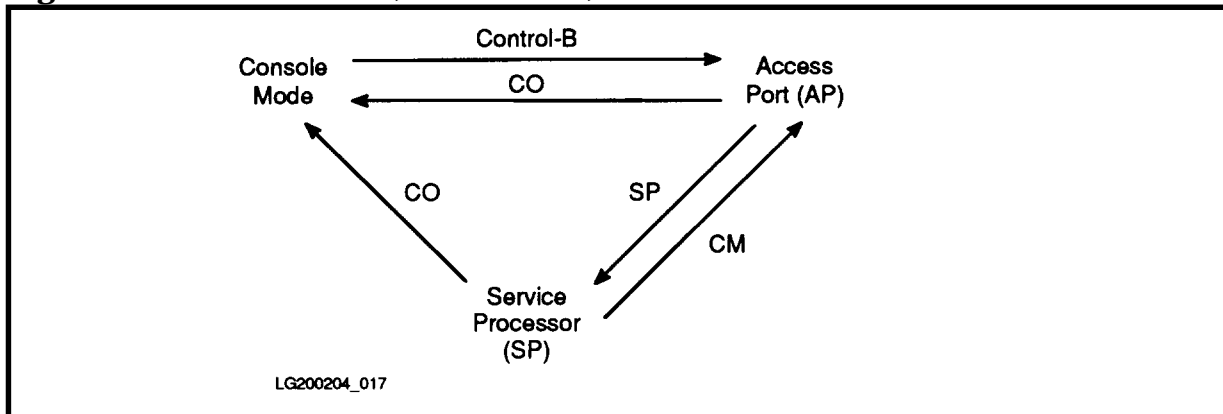
- FE: Front End.
- FV: Firmware Version.
- GO: GO.
- HC: Host Configuration.
- HE: HElp.
- ID: Display/Modify SP ID Code. (Used by Manufacturing)
- JS: Display Service Processor Board Status
- PC: Power Configuration.
- PR: Display Processor Status
- PS: Power Status.
- RE: REstart.
- RS: ReSet.
- SM: Software Monitor.
- TC: Display/Modify Voltag Shutdown Threshold.
- TO: Turn On User-Selected PFC Unit.
- UP: Power UP.

---

## Accessing SP

From the system console, you can access the commands available from the Access Port (AP) and the Service Processor (SP). <Undefined Cross-Reference> summarizes how to change from one mode to another.

**Figure 8-1 Console Mode, Access Port, and Service Processor**



To access the service processor:

1. Enter <Control>-B at the console to enter access port mode.
2. At the access port prompt (CM>), enter SP.

Commands may be entered in upper or lower case characters.

---

**CAUTION** Do not leave the console in SP mode or AP control mode for long periods of time or during boot. This blocks console messages and can eventually cause the OS to hang or crash. During boot, this can cause a processor selftest failure.

---

## **SP Prompts**

When you access the SP commands, you normally see the prompt:

SP>

For non-normal conditions, you may see one of three other prompts. See Table 8-2.

**Table 8-1 Service Processor (SP) Prompts**

Prompt	Condition	Causes	Actions
SP>	Normal state of SP.	After main SPU power is up.	No action required.
(SPU Power Control) SP>	At least one power rail is not nominal. OS cannot run.	<ul style="list-style-type: none"> <li>■ "Standby/Ready" switch in "Standby" position.</li> <li>■ CN, DN, or RL command used to turn off at least one power rail.</li> <li>■ A power supply fault causes at least one power rail to turn off.</li> </ul>	<ul style="list-style-type: none"> <li>■ If no fault, be sure "Standby/Ready" switch is in "Ready" position; then use GO or UP if needed to begin boot process.</li> <li>■ If fault, read error logs and use PS to display power system status. Take appropriate corrective action.</li> </ul> <p>* (All SP commands available, but HC and RP may give obsolete configuration status. The TC command will not perform a TOC at this prompt.)</p>
(SPU Configuration) SP>	SP has paused the OS boot process to allow user to change or confirm the SPU hardware configuration.	<ul style="list-style-type: none"> <li>■ The user pressed a key during startup after SP displayed the prompt "Press ANY key within 10 SECONDS to cancel boot with this configuration."</li> <li>■ Autostart flag is cleared and the current/pending hardware configuration is different from the configuration used for the last boot (for example, if processor or memory modules have been de-configured).</li> </ul>	<ul style="list-style-type: none"> <li>■ Read error logs to determine if some hardware was automatically de-configured due to a hardware failure; take appropriate corrective action.</li> <li>■ Use the HC command at the SP prompt to display/modify hardware configuration.</li> </ul>
(Fault) SP>	SP detected a severe hardware fault that will prevent the OS from booting or from continuing to run. At least one critical error should be recorded in the SP error log.	Various hardware faults in SP, PSCM, or SPU, if they can be detected by the SP.	Read the SP error logs to identify cause and take appropriate corrective action.

---

## Summary of SP Commands

SP commands are divided into two groups:

- SP commands usable by customers.
- SP commands for service personnel only.

### SP Commands for Customers

Table 8-2 summarizes the SP commands that are appropriate for customer use. These commands are explained in detail in the last part of this chapter.

---

**CAUTION** Inappropriate use of some commands in Table 8-2 can crash the computer or interfere with computer operation.

---

**Table 8-2 Service Processor (SP) Commands: Usable by Customers**

<b>Command</b>	<b>Mnemonic</b>	<b>Function</b>
AF	Autostart Flag	Display/modify SP autostart flag. If the autostart flag is set, the computer continues its startup even if memory modules or processors are to be deconfigured. If the autostart flag is cleared, the computer halts for user input during startup if memory modules or processors are to be deconfigured.
BA	Battery Enable/Disable	Not applicable for T500, T520, and T600.
CL	Clear Logs	Clear one or more troubleshooting logs maintained by SP.
CM	Control Mode	Enter AP control mode.
CN	Power Converter On/Off	Used by Manufacturing.
CO	COncole	Enter AP Console mode.
DA	Disable Activity Codes	Disable updates of SPU activity chassis codes (codes in the form FxxF or Exxx).
DC	Display Converter	View status of power system modules.
DL	Display Logs	Displays troubleshooting logs maintained by the Service Processor.
DN	DowN	Shut down main DC power (shuts down all DC-DC converters except MPM bias).
EA	Enable Activity Codes	Enable SPU Activity Chassis Codes
EN	ENvironmental	Display power system environmental status.

<b>Command</b>	<b>Mnemonic</b>	<b>Function</b>
FE	Front End	Display AC front-end status.
FV	Firmware Version	Display version information for PDC, SP and PSCM firmware.
GO	GO	Continue the boot process.
HC	Host Configuration	Display/modify host configuration. Allows you to see what modules are configured in the PMB card cage. Also allows you to de-configure hardware modules such as BCs, processors, and memory.
HE	HElP	Display help information
ID	Display/Modify SP ID Code	Used by Manufacturing.
JS	Processor Board Status	Display current status of the Service Processor Circuit Board.
PC	Power Configuration	Display power system configuration.
PR	Processor Exception Status	Show count of machine checks for each processor.
PS	Power Status	Display power system status.
RE	REstart	Restart the computer (hard boot). Performs SP and PDC initialization. Destroys some troubleshooting information. Same as the PDC RESTART command.
RS	ReSet	Reset the computer (hard boot). Performs only PDC initialization. Used to reset the machine after a system hang, if TC fails. Destroys some troubleshooting information.
SM	Software Monitor	Display/modify software monitor flag. If the software monitor flag is set, the SP reports an error if no OS activity is detected within any 10-second interval.
TC	Perform TOC	Perform TOC on selected processor.
TO	Turn On User-Selected PFC Unit	Display status of/turn on an ACFE unit.
UP	UP	Bring up main DC power.

## SP Commands for Service Personnel

Some of the SP commands are designed for service personnel rather than for customers:

- They display information that requires a detailed knowledge of the computer to interpret.

- They can interfere with computer operation if they are invoked at the wrong time.

For your reference, these commands are listed in Table 8-3. These commands are not described in the reference section that follows, since they are for service use only.

---

**CAUTION** Inappropriate use of some commands in Table 8-3 can crash the computer or interfere with computer operation. Some commands can cause the computer to fail, requiring a service call.

---

**Table 8-3 Service Processor (SP) Commands: For Service Use Only**

<b>Command</b>	<b>Mnemonic</b>	<b>Function</b>
BA	BAttery	Enable/disable battery back-up.
CN	CoNverter	Enable/disable the individual SPS power converter modules (HVDC to LVDC).
ID	ID Code	Display/modify Service Processor (SP) hardware date code.
MR	Margin a Rail	Set permissible margins for voltage on the power system rails.
RL	RaiL	Enable/disable individual power system rails.
RP	Revision Ports	Display/modify revision port information.
SW	SWitch	Switch SP and PDC firmware banks. (Dangerous command.)
TH	Voltage THresholds	Display/Modify Voltage Shutdown Thresholds



## SP Command Reference

This section gives detailed reference information on SP commands that might be used by customers.

SP commands for service use only are not described.

### AF: Autostart Flag

#### Display/Modify Autostart Flag

Used to display or modify the autostart flag.

If the autostart flag is set, the computer startup process continues even if processor, memory, or bus converter (BC) modules will be de-configured during the boot process (for example if they fail selftest).

If the autostart flag is cleared, the computer startup process halts at the SP or PDC prompts if processor, memory, or BC modules are de-configured during a boot.

The autostart flag described here is different from the autoboot flag which can be modified from the PDC interface. The PDC autoboot flag allows the OS to boot automatically upon power-up.

#### Purpose

Set the autostart flag if you want the computer to boot up regardless of whether some modules are de-configured.

Clear the autostart flag to ensure that the operator is warned about modules being de-configured. By default, the autostart flag is cleared.

#### Caveats

If you want to be certain that the computer reboots during powerfail recovery, SET the autostart flag. Otherwise the computer will not automatically reboot during powerfail recovery if processor or memory modules are scheduled for de-configuration.

If you want to be certain that the computer never runs with fewer memory modules or processors than expected, CLEAR the autostart flag. Otherwise the computer could be running with fewer memory modules or processors than are physically present. System performance would be degraded. The computer signals the operator of the de-configuration by:

- Displaying a de-configuration message during startup.
- Lighting the yellow "Attention" LED on the control panel because a critical entry has been logged to the SP error log.
- Creating an entry in the SP log when de-configuration occurs.

The OS can choose not to use processors that have been configured by the SP. This is only known by seeing the OS start-up messages.

---

**NOTE** During boot, the computer will halt with no console display if the following conditions are all true:

- The autostart flag (AF at the SP prompt) is not set.
- A module is de-configured.
- The front panel keyswitch is in the locked position.

If this should happen, recover the console display by putting the front panel keyswitch into the unlocked position.

---

### Example (Setting/Clearing the Autostart Flag)

```
SP> AF

The Service Processor autostart flag is currently SET (autostart enabled)

Do you wish to CLEAR the flag (y/[n])? N

The Service Processor autostart flag will remain SET. (autostart enabled)
```

### Example (Boot-up sequence if autostart flag is set):

```

.
.
Service Processor: Commanding PSCM to turn on Main DC.

The contents of the following PMB slots have changed since the last boot:
(NONE)

The configuration of the following PMB modules changed since the last boot:
Memory module 0 in slot 6, from OUT to IN

The following PMB modules are present, but will be deconfigured for the
upcoming boot:
(NONE)

==> Press ANY key within 10 SEC to cancel boot with this configuration. %<==

No key was pressed. Continuing with system initialization...

Service Processor: Finished initialization. Starting PDC boot process...

Proc[13/0]: PDC Version 1.11 (HARDBOOT)
Proc[15/0]: PDC Version 1.11 (HARDBOOT)
.
.
```

### Example (If operator presses key to cancel boot):

```
      .  
      .  
==> Press ANY key within 10 SEC to cancel boot with this configuration. %<==  
  
BOOT PAUSED: Change configuration if desired using the HC command:  
              then enter UP or GO to continue with system initialization.  
  
(SPU Configuration) SP> HC  
      .  
      .
```

## CL: Clear Logs

### Clear the SP Logs

Clears entries in one or more logs maintained by the SP. You can clear the activity log, the error logs, activity and error logs, or the SPU tombstone logs.

#### Purpose

Use the CL command to keep the SP logs to a manageable size.

#### Caveats

Clearing SP logs can delete information useful for troubleshooting the system.

#### Example

```
SP> CL  
  
Select the Log to be cleared :  
  
Activity Log           = a  
Error Logs             = e  
Activity and Error Logs = ae  
SPU Tombstone Log     = t  
  
Enter (a/e/ae/t/CR = exit) : A  
  
Clear the Activity Log? (y/[n]) : Y  
  
The Activity Log has been cleared
```

## CM: Control Mode

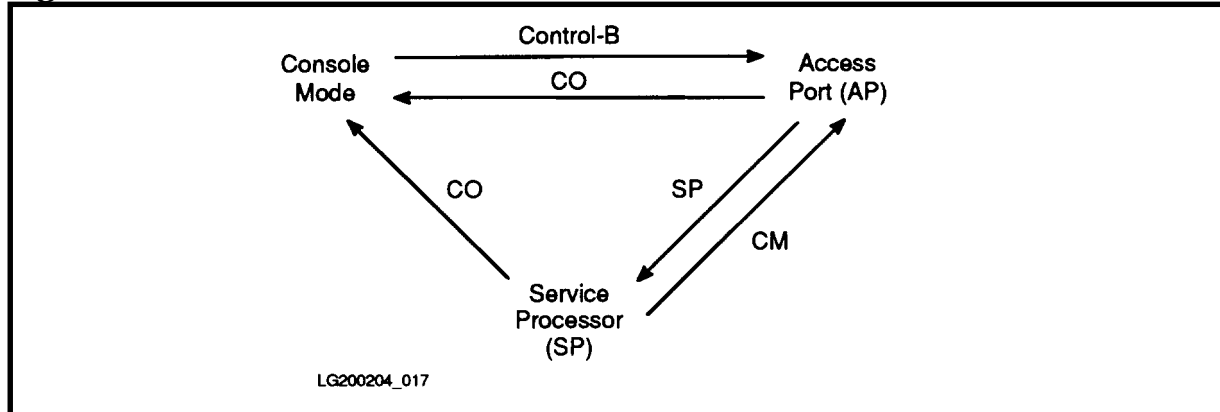
### Enter AP Control Mode

Used to leave the SP interface and enter the Access Port (AP) Control Mode. The user can then enter commands at the AP prompt (CM>).

### Purpose

The CM command is one of several commands used to change modes:

**Figure 8-2 Console Mode, Access Port, and Service Processor**



### Example

```
SP> CM  
  
CM>
```

## CO: COnsole

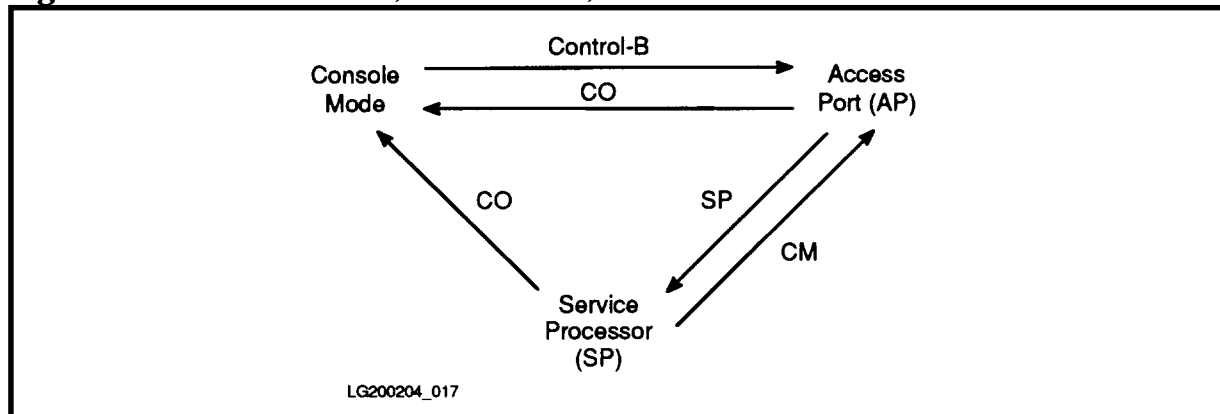
### Enter AP Console Mode

Used to leave the SP interface and enter console mode. In console mode, the user can interact with software running on the computer.

### Purpose

The CO command is one of several commands used to change modes:

**Figure 8-3 Console Mode, Access Port, and Service Processor**



## Example

```
SP> CO
```

## DA: Disable Activity Codes

### Disable SPU Activity Chassis Codes

Disables updates of the four-digit hexadecimal activity codes displayed at the bottom of the system console display. Only codes in the form FxxF or Exxx are disabled.

When the status line is displayed during console mode, the hex code is updated every few seconds to show operating system activity levels. These activity codes typically have the form FxxF or Exxx.

Other hex codes indicate conditions other than system activity. These hex codes are displayed when they occur even if activity codes have been disabled with the DA command.

Even when the DA command has disabled the display of activity codes, the activity LEDs on the control panel continue to display the same information.

To re-enable update of hexadecimal activity codes, enter the SP command EA.

(The hexadecimal codes are displayed on the system console when in Access Port control mode or in SP mode. The console enters these modes after the operator presses <Control>-B. Hexadecimal codes can also be displayed in console mode by using the Access Port's ES command.)

### Purpose

Used when remotely monitoring the system over a network. Minimizes the number of characters sent over the network. (With the activity codes enabled, the status/error code at the bottom of the system console is updated every few seconds.)

## Example

```
SP> DA
SPU Activity Chassis Codes Disabled

SP> EA
SPU Activity Chassis Codes Enabled
```

## DC: Display Converter

### Display Converter Status

Displays the status of a power converter in a particular slot. Status information includes:

- Type of converter in selected slot.
- Rail to which this converter is connected.

- Current voltage output from the converter.
- Operational status of the converter (not displayed for the MPM converter).

### Purpose

Monitor the status of the power system.

### Example

```
SP> DC

Main DC power is ON.

Show status for which power system converter slot?
Enter (1-14), (a = all present), (CR = exit): A

Power System Configuration

Slot      Rail_Name      Voltage Status
-         -
6         5.00v Batt      5.00v (0x1) Master; Normal Status
9         5.00v ProcX     4.98v (0x1) Master; Normal Status
12        MPM
          2.00v Clock     2.00v
          2.00v CBatt    2.00v
          3.00v PMBt     2.99v
          -2.50v PMBc   -2.49v
          -2.50v PMBb   -2.49v
13        5.00v Sys      5.00v (0x1) Master; Normal Status
14        24.00v Fan      23.09v (0x1) Master; Normal Status
```

## DL: Display Logs

### Display SP Logs

Displays messages stored in the logs maintained by the SP. The logs are stored in SP non-volatile memory (NVM). Four logs are maintained:

- **Activity Log:** records major changes in the state of the computer (for example, power-up and shutdown). The information in the Activity Log is useful for determining how far computer operation proceeded before a failure occurred. The Activity Log is circular (once the log is filled to capacity, subsequent entries cause the earliest entries to be deleted).
- **Earliest Error Log:** contains the earliest error entries.
- **Latest Error Log:** contains error entries recorded after the Earliest Error Log is full.
- **SPU Tombstones Log:** contains up to 16 tombstones. A tombstone consists of troubleshooting data generated by an HPMC, LPMC, or Transfer of Control.

The **Error Logs** contain entries for critical and non-critical errors. Critical errors are those which require immediate attention; they usually indicate a failure of hardware or software. Critical errors are highlighted in the SP log display.

When a critical error occurs, the yellow "Attention" LED on the front panel is lit to signal the operator. If the status line on system console is enabled, critical errors also cause a message to be displayed there. If the "Attention" LED is lit because of an unread critical-error entry, reading the SP error log will turn off the LED.

The time stamp for the entries is in Universal Time (Greenwich Mean Time).

**Purpose**

Log entries are used for troubleshooting the computer and for keeping a record of hardware activity.

**Caveats**

Interpreting entries in the SP logs may require a detailed knowledge of the computer.

Periodically clear the logs with the CL command to keep them to a manageable size.

**Example of Initial DL Screen**

```

SP> DL

Log Name          Entries  Earliest Entry          Latest Entry
-----
Activity          7        10/14/1995  00:54:17              10/14/1995  01:00:45
Earliest Errors   18        10/12/1995  18:01:27              10/14/1995  00:55:17
Latest Errors     0
SPU Tombstones    3        10/12/1995  18:58:52              10/12/1995  23:01:29

Activity Log:  Provides a history of SP activity.

Earliest Error and Latest Error Logs:  Contain error entries.
  Entries are stored in the Earliest Error Log until it is full.
  When the Earliest Error log is full, entries are stored in the
  Latest Error Log.

Enter CNTL-C to abort a Log Display          /* SEE NEXT PAGE */
  
```

## Example of Activity Log

Select the Log to be displayed :

```
Activity           = a
Earliest Errors   = e
Latest Errors     = l
SPU Tombstones    = t
```

Enter (a/e/l/t/CR = exit) : A

Select the Log entries to be displayed :

```
All entries       = a
Last 10 entries   = l
Block of entries  = b
```

Enter (a/l/b/CR = exit) : A

Activity Log

-----

Log	Type	Mos/Day/Yr	Hour:Min:Sec
----	----	-----	-----
1	1180	11/14/1992	00:54:17 UT
	Power has been disabled by using a SP command.		
2	1201	11/14/1992	00:55:25 UT
	New system status: TEST		
3	1201	11/14/1992	00:57:52 UT
	New system status: INIT		
4	1201	11/14/1992	00:58:15 UT
	New system status: TEST		
5	1201	11/14/1992	01:00:13 UT
	New system status: INIT		
		.	
		.	
		.	



## Example of Earliest Errors Log

Select the Log to be displayed :

```
Activity           = a
Earliest Errors    = e
Latest Errors      = l
SPU Tombstones     = t
```

Enter (a/e/l/t/CR = exit) : E

Select the Log entries to be displayed :

```
All entries        = a
Last 10 entries    = l
Block of entries   = b
```

Enter (a/l/b/CR = exit) : A

Earliest Error Log

```
-----
Log   Type   Mos/Day/Yr   Hour:Min:Sec
-----
  1   2240   11/12/1992   18:01:27 UT
      CRITICAL LOG
      All host processors failed self-test
  2   0084   11/12/1992   18:43:26 UT
      PSCM received abnormal status from PFC number 1
      AC undervoltage; AC operation; Not charging battery;
  3   0130   11/12/1992   18:43:26 UT
      AC Power has failed
  4   0084   11/12/1992   18:43:26 UT
      PSCM received abnormal status from PFC number 1
      AC undervoltage; Boost OFF; Bulk HVDC powerfail; AC operation;
      Charger undervoltage; Not charging battery;
  5   0084   11/12/1992   18:43:27 UT
      PSCM received abnormal status from PFC number 1
      AC undervoltage; Boost OFF; Bulk HVDC powerfail;
      Bulk HVDC undervoltage; AC operation; Charger undervoltage;
      Not charging battery;
  6   0204   11/12/1992   18:43:27 UT
      PSCM reduced PMB load due to a PFC Fault.
      This may be caused by turning off the SPU.
  7   2350   11/12/1992   18:58:52 UT
      CRITICAL LOG
      PDC stored a tombstone. See the SPU Tombstones log
      .
      .
```

## Example of Latest Errors Log

Select the Log to be displayed :

Activity	=	a
Earliest Errors	=	e
Latest Errors	=	l
SPU Tombstones	=	t

Enter (a/e/l/t/CR = exit) : L

This log is empty. See the Earliest Error log,

## Example of SPU Tombstones Log

Select the Log to be displayed :

```
Activity           = a
Earliest Errors    = e
Latest Errors      = l
SPU Tombstones     = t
```

Enter (a/e/l/t/CR = exit) : T

Tombstone #	Processor #	Mos/Day/Yr	Hour:Min:Sec
1	13	11/12/1992	18:58:52 UT
2	13	11/12/1992	22:58:57 UT
3	15	11/12/1992	23:01:29 UT

Enter tombstone # (tombstone #/CR = exit) : 1

```
----- Unexpected HPMC -----
01/21/97 15:35:16 PDC Version J526B Processor[15/0] Chassis Code:cefd
```

```
GR2 00000000 00000000 GR30 00000000 00000000
```

```
IPSW 00000000 00000000 IIR 00000000 IVA 00000000 00000000 Check Type 00000000
```

```
PC Queue:Front 00000000 00000000.00000000 00000000 (IIASQ.IIAOQ)
```

```
Back 00000000 00000000.00000000 00000000 (IIASQ.IIAOQ)
```

```
PCXU: DR2 00000000 00000000 Stat0 00000000 00000000 Stat1 00000000 00000000
```

```
PSBI: STATUS0 00000000 STATUS1 00000000 CONTROL0 00000000 CONTROL1 00000000
```

```
PMB: SADDLOG 00000000 VADDLOG 00000000 MADDLOG 00000000 MISCLOG 00000000
```

```
IO_DATA 00000000 IO_ARB 00000000 SLAVEADR 00000000
```

/\* CONTINUED ON NEXT SCREEN \*/

Service Processor (SP)  
SP Command Reference

```
Cache: L1DTLOG 00000000 L2TAGERR 00000000 L2ADDR 00000000 L2_OP 00000000

Syn: LMPC_0_3 00000000 LPMC_4_7 00000000 HPMC_0_3 00000000 HPMC_4_7 00000000

Runway: SADDLOG 00000000 VADDLOG 00000000 TRANSTYP 00000000

Memory: Slot IO_Stat Err_Resp Info+Req NbrBanks BankSize BLKIDs
00 00000000 00000000 00000000 0 00 00000000

PGIA: Slot Type IO HI/LO IO_Stat Err_Resp Info+Req Syn0_1 Syn2_3
0/0 PGIA 00000000 00000000 00000000 00000000 00000000 00000000
HP_HSC 00000000 00000000 00000000
HSC_UP 00000000 00000000 00000000 00000000
HSC_LO 00000000 00000000 00000000
0/0 PGIA 00000000 00000000 00000000 00000000 00000000 00000000
HP_HSC 00000000 00000000 00000000
HSC_UP 00000000 00000000 00000000 00000000
HSC_LO 00000000 00000000 00000000

/* SEE NEXT PAGE */
```

## **DN: Down**

### **Shut Down Main Power**

Shuts down main DC power on the computer. (Shuts down all DC-to-DC converters except the MPM bias. The High Voltage DC (HVDC) rail remains powered up.)

If the user enters the DN command while the SP is in the MAIN\_POWER\_UP access state, the SP turns off main DC power. The SP is then in the MAIN\_POWER\_DOWN state.

From the MAIN\_POWER\_DOWN state, the user can turn main DC power back on by entering the GO or UP command at the SP prompt.

### **Purpose**

Duplicates the function of the "Standby/Ready" switch on the front panel. With the DN command, you can shut down DC power from the local or remote console rather than having to go to the computer cabinet.

### **Caveats**

If the DN command is executed while the computer is running, processing is aborted and data will be lost.

---

**WARNING**      **Voltages are present inside the computer cabinet even after the DN command is executed. This command does not shut down the High Voltage DC (HVDC) or MPM bias voltages.**

**Do not use this command to replace any cards or power modules.**

**To completely turn off power to the computer cabinet, turn the "Standby-Ready" switch to the "Standby" position and turn off the circuit breaker switch on the bottom rear of the cabinet.**

---

## Example

```
SP> DN
```

```
This command will SHUT OFF the MAIN DC POWER of this computer system.
```

```
Continue (y/[n])? Y
```

```
Service Processor: Commanding PSCM to turn off Main DC.
```

```
The system is in the SPU Power Control state.  
The system power is down.
```

```
==> Type GO or UP to continue system initialization. %<==
```

```
(SPU Power Control) SP> UP
```

```
System initialization resumed...
```

```
Service Processor: Commanding PSCM to turn on Main DC.
```

```
The contents of the following PMB slots have changed since the last boot:  
(NONE)
```

```
The configuration of the following PMB modules changed since the last boot:  
(NONE)
```

```
The following PMB modules are present, but will be deconfigured for the  
upcoming boot:  
(NONE)
```

```
==> Press ANY key within 10 SEC to cancel boot with this configuration. %<==
```

```
No key was pressed. Continuing with system initialization...
```

```
Service Processor: Finished initialization. Starting PDC boot process...
```

```
Proc[13/0]: PDC Version 1.11 (HARDBOOT)
```

```
Proc[15/0]: PDC Version 1.11 (HARDBOOT)
```

```
.  
. .  
. . .
```

## EA: Enable Activity Codes

### Enable SPU Activity Chassis Codes

Enables updates of the four-digit hexadecimal status codes displayed at the bottom of the system console display. These codes have the form FxxF or Exxx.

When the status line is displayed during console mode, the hex code is updated every few seconds to show operating system activity levels. These activity codes typically have the form FxxF or Exxx.

Other hex codes indicate conditions other than system activity. These hex codes are displayed when they occur even if activity codes have been disabled with the DA command.

To disable the update of hexadecimal activity codes, enter the SP command DA.

(The hexadecimal codes are displayed on the system console when in Access Port control mode or in SP mode. The console enters these modes after the operator presses <Control>-B. Hexadecimal codes can also be displayed in console mode by using the Access Port's ES command.)

### Purpose

See the entry for DA (Disable Activity Codes).

### Example

```
SP> EA
SPU Activity Chassis Codes Enabled

SP> DA
SPU Activity Chassis Codes Disabled
```

## EN: ENvironmental

### Read Environmental Status

Displays environmental status information, including environmental information sensed by the Service Processor.

### Purpose

Indicates if a particular PMB card is overheating, if any fans are malfunctioning, or if the external HP-PB card cage is operating normally.

## Examples

```
SP> EN

Power System environmental data:

Enter (t = temps.), (f = fan speeds), or (i = internal HP-PB card cage): T

    PMB Slot      Temperature
    -----      -
        4          27.34 Deg. C
        9          26.86 Deg. C
       12          27.83 Deg. C
        .           .
        .           .

Ambient          26.86 Deg. C
Service Proc.    28.32 Deg. C

Ambient temperature ranges:
Normal < 33C < Warning < 43C < OS Shutdown < 48C < System Shutdown

Slot temperature ranges: (A = Ambient temperature)
Normal <(A+15C) <Warning < (A+25C) <OS Shutdown < (A+30C) <Ststem Shutdown
```

### Interpreting the display:

"Ambient" temperature is the air temperature measured at the top of the Service Processor card.

"Service Proc." and "PMB Slot" temperatures are the air temperatures measured at the bottom of the designated SP or PMB card.

"Ambient temperature ranges" shows how the system responds to over-temperature conditions. If the ambient temperature is:

- Above 33°C, a Warning occurs.
- Above 43°C, an operating system (OS) shutdown occurs.
- Above 48°C, a system (PSCM) shutdown occurs.

"Slot temperature ranges" shows how the system responds to differences in temperature between the slot temperature and the ambient temperature: If the slot temperature exceeds the ambient temperature:

- By more than 15°C, a Warning occurs.
- By more than 25°C, an operating system (OS) shutdown occurs.



- ❑ By more than 30°C, a system (PSCM) shutdown occurs.

```
SP> EN

Power System environmental data:

Enter (t = temps.), (f = fan speeds), or (i = internal HP-PB card cage): F

Fan #   Speed (should be > 1900 RPM)
-----
  0     3087 RPM
  1     3166 RPM
  2     3218 RPM
  3     3136 RPM
  4     3098 RPM
  5     3097 RPM
  6     3134 RPM
  7     3102 RPM
  8     3219 RPM
  9     3164 RPM
 10     3117 RPM
 11     3071 RPM
```

```
SP> EN

Power System environmental data:

Enter (t = temps.), (f = fan speeds), or (i = internal HP-PB card cage): I

Internal HP-PB card cage power supply status:
    No overtemperature; Power is ON; Battery is not charging
```

## FE: Front End

### Display ACFE Status

Displays the status of the AC Front End (ACFE). (The ACFE transforms the AC line voltage to 300 VDC when operating from the AC line. When operating on battery, the ACFE transforms the 48V battery voltage to 300 VDC.)

#### Purpose

Monitoring the AC power system.

## Example

```
SP> FE

AC Front End units present:

   1   AC Front End unit 1

Display information for which AC Front End unit? (CR = exit) 1

AC Front End #1
-----
Status = (0x1) :
    AC operation; Not charging battery;

Secondary Positive Bias = 0.00 Volts
Ambient Temperature = 29.36 Degrees Celsius
Main Inverter Temperature = 28.22 Degrees Celsius
Fan Current = 0.98 Amps
Fan Voltage = 13.04 Volts
Secondary Negative Bias = -10.24 Volts
HVDC Output Voltage = 287.19 Volts
HVDC Output Current = 2.63 Amps
Regulated Primary Bias = 17.88 Volts
PFC Boost Temperature = 33.85 Degrees Celsius
Bulk High Voltage = 337.02 Volts
AC Input Voltage = 197.18 Volts
PFC Boost Current = 2.91 Amps
Battery Charger Current = 0.02 Amps
Battery Charger Voltage = 55.07 Volts
Battery Voltage = 0.00 Volts
```

## FV: Firmware Version

### Display Version Information for PDC, SP and PSCM Firmware.

Displays the version information for firmware stored on the Service Processor (SP). Information on three kinds of firmware are displayed:

- Service Processor (SP) firmware.
- Power System Control and Montior (PSCM) firmware.
- Processor Dependent Code (PDC).

The "Active Firmware Versions" are the versions of firmware currently being used by the computer. The "Alternate Firmware Versions" are versions of firmware stored on an alternate bank located on the SP card. The "Alternate Firmware Versions" will become the current firmware versions after executing a firmware update from PDC.

FV reports if a firmware update has been corrupted.

### Purpose

Identifies the versions of firmware currently being used by the computer. Useful when updating the firmware by using the PDC Firmware menu.

### Example

```
SP> FV
Active Firmware Versions:
  SP Bank 1: SP 1.62, PSCM 1.5. Compiled 07/10/93 00:50 UT
  PDC Bank 0: 2.20
  PSCM Boot ROM: 2.2

Alternate Firmware Versions:
  SP Bank 0: SP 1.62, PSCM 1.5. Compiled 07/10/93 00:50 UT
  PDC Bank 1: MR202

Checking SP active bank checksum...
...SP active bank passes its checksum test!

Checking PDC active bank checksum...
...PDC active bank passes its checksum test!

Checking SP alternate bank checksum...
...SP alternate bank passes its checksum test!

Checking PDC alternate bank checksum...
...PDC alternate bank passes its checksum test!
```

## GO: GO

### Continue the Boot Process

Resumes the system initialization process. The system initialization can pause at the SP prompt on error or by user choice.

### Purpose

If system initialization has stopped, this command resumes it. For example, if system initialization has stopped because a processor or memory module is to be deconfigured, you can use GO to resume the initialization process. You can also use GO to bring up the power system after a DN command.

## Examples

```
SP> GO
```

```
Command aborted because the system is already initialized.
```

```
(SPU Power Control) SP> GO
```

```
System initialization resumed...
```

```
Service Processor: Commanding PSCM to turn on Main DC.
```

```
The contents of the following PMB slots have changed since the last boot:  
(NONE)
```

```
The configuration of the following PMB modules changed since the last boot:  
(NONE)
```

```
The following PMB modules are present, but will be deconfigured for the  
upcoming boot:  
(NONE)
```

```
==> Press ANY key within 10 SEC to cancel boot with this configuration. %<==
```

## HC: Host Configuration

### Display/Modify Hardware Configuration

Used to display and modify the computer hardware configuration. For each Processor Memory Bus (PMB) slot, the display tells:

- Whether the slot is occupied.
- Which module type resides in the slot.
- Whether the module is currently configured IN or OUT of the computer.
- Whether the module is scheduled to be configured at the next boot.

This command can be used to configure PMB modules IN or OUT of the computer. The new configuration status becomes effective during the next boot of the computer.

### Purpose

To view the configuration of the PMB card cage. Also, to de-configure and reconfigure PMB cards (useful in servicing the computer).

De-configuring a PMB module with an HC command electrically removes the module so it is no longer seen on the bus. Breaking the connection is done very close to the backplane, so a defective card that is jamming the bus can often be removed remotely in this way.

### **Caveats**

The HC command does not show the configuration of I/O interface cards in the HP-PB card cages.

De-configuring PMB cards by accident will interfere with computer operation (degraded performance or inability to boot-up).

### **Example**

Interpreting the display:

"Ports" correspond to modules. For example, a bus converter port 0 corresponds to BC module 0.

Memory ports are actually 64-Mbyte banks.

The bus converter does not use ports 1 and 3.

SP> HC

Host Hardware Configuration: (D = deconfigure; - = non-existent port)

PMB Slot	Board Type	Deconfigured Ports				Ports to be deconf at next boot			
		0	1	2	3	0	1	2	3
0	Bus Converter		-		-		-		-
6	Memory								
8	Memory		-	-	-		-	-	-
13	NITRO Processor			-	-		-	-	-
15	NITRO Processor			-	-		-	-	-

Enter the slot # of the module whose configuration is to be changed

(CR = exit): 6

Enter the port # of the module whose configuration is to be changed

(CR = exit): 0

Port 0 in slot 6 will now be configured OUT.

Host Hardware Configuration: (D = deconfigure; - = non-existent port)

PMB Slot	Board Type	Deconfigured Ports				Ports to be deconf at next boot			
		0	1	2	3	0	1	2	3
0	Bus Converter		-		-		-		-
6	Memory					D			
8	Memory		-	-	-		-	-	-
13	NITRO Processor			-	-		-	-	-
15	NITRO Processor			-	-		-	-	-

Enter the slot # of the module whose configuration is to be changed

(CR = exit): 6

Enter the port # of the module whose configuration is to be changed

(CR = exit): 0

Port 0 in slot 6 will now be configured IN.

## **HE: HElp**

### **Display Help Information**

Gives a brief description of all SP commands.

## Example

```
SP> HE

SP 1.16, PSCM 1.5. Regres Compiled 11/5/92 7:35pm

AF - Display/Modify Autostart Flag.
BA - Battery Enable/Disable.
CL - Clear the SP Logs.
CM - Enter AP Control Mode.
CN - Power Converter On/Off.
CO - Enter AP Console Mode.
DA - Disable SPU Activity Chassis Codes.
DC - Display Converter Status.
DL - Display the SP Logs.
DN - Shut Down Main DC Power.
EA - Enable SPU Activity Chassis Codes.
EN - Display Power System Environmental Status.
FE - Display AC Front End (ACFE) Status.
FV - Display PDC, SP and PSCM Firmware Versions.
GO - Continue the Host Initialization Process.
HC - Display/Modify Host Configuration.
HE - Help. Display This Screen.
ID - Display/Modify Service Processor ID Code.

JS - Display Service Processor Board Status.

MR - Margin a Power Rail.
PC - Display Power System Configuration.

PR - Display Processor Status.

PS - Display Power System Status.
RE - Restart the SP/PSCM and System.
RL - Power Rail On/Off.
RP - Display/Modify Revision Ports.
RS - Reset SPU (Hard Boot).
SM - Display/Modify Software Monitor Flag.
SW - Switch SP and PDC Firmware Banks.
TC - Initiate SPU Transfer of Control.
TH - Display/Modify Voltage Shutdown Thresholds.
TO - Turn on user-selected PFC unit.
UP - Bring Up Main DC Power.
```

The SP commands can be grouped by category:

```
SP / PDC commands      : AF,DA,EA,FV,SM, and SW.
Power System commands : BA,CN,DC,DN,EN,FE,MR,PC,PS,RL,PR,RS,TH, and UP.
System Reset commands : DN,UP,GO,RE,RS,TC.
AP Console command    : CO,CM,DA,EA.
System Status commands: EN,FE,HC,ID,JS,PC,PR,PS,RP.
SP Log commands       : CL,DL.
```



## JS: Processor Board Status

### Display Service Processor Board Status

Displays the current status of the Service Processor Circuit Board that is physically located next to Summit Bus slot zero.

#### Purpose

To display the status of:

- system clocks
- SP Bus
- SP 68000 Interrupts
- Power System Control and Monitor (PSCM)
- Host Initialization state

The JS command also indicates whether a SP Selftest has failed on power up.

#### Example

The following example shows the use of the JS command when the system has booted to PDC:

```
Sp> JS
```

```
                SERVICE PROCESSOR BOARD STATUS:
```

```
System Clock status:  Ready Internal_Source Sync_on
```

```
SP Bus state: (Note: The SP Bus is the H/W interface between the SP & PDC.)
```

```
    SP Bus Clock state:  ECL_On
```

```
    SP Bus Polling Algorithm:  2 procs./slot. Slots 8,9,10 or 12 occupied.
```

```
Service Processor Interrupt Status:
```

```
    Interrupts on:  PSCM GPPIO PDC GBR CCP SPP PPON
```

```
    Interrupts off:  None
```

```
Power System Control and Monitor (PSCM) state:
```

```
    Ready to receive commands from the SP.
```

```
Host initialization state:
```

```
    The SPU has booted to PDC.
```

```
SP Selftests which have failed:
```

```
    None
```

## Example

The next example shows SP Board status when Main DC is in the OFF state:

```
SP> DN

      This command will SHUT OFF the MAIN DC POWER of this computer syst
em.
      Continue (y/[n])? y

Service Processor: Commanding PSCM to turn off Main DC.
The system is in the SPU Power Control state.
The system power is down.

==> Type GO or UP to continue system initialization. %<==
```

```
(SPU Power Control) SP> JS

      SERVICE PROCESSOR BOARD STATUS:

System Clock state: Ready Internal_Source Sync_on

Sp Bus state: (Note: The SP Bus is the H/W interface between the SP & PDC.)
      SP Bus Clock state: TTL_Free_Run
      SP Bus Polling Algorithm: Not selected as yet.

Service Processor Interrupt Status:
      Interrupts on: PSCM GPIO PDC GBR CCP SPP PPON
      Interrupts off: None

Power System Control and Monitor(pscm) state:
      Ready to receive commands from the SP.

Host initialization state:
      Host initialization is pausing.

SP Selftests which have failed:
      None
```

The next example shows SP Board state at the "Boot Paused" prompt:

```
(SPU Power Control) SP> GO

System initialization resumed...

Service Processor: Commanding PSCM to turn on Main DC.

The contents of the following PMB slots have changed since the last
boot:
    (NONE)

The configuration of the following PMB modules has changed since the
last boot:
    (NONE)

The following PMB modules will be deconfigured for the upcoming boot:
TNT processor module 1 in slot 8

The following modules are missing from their PMB boards:
    (NONE)

Press ANY key within 10 SECONDS to cancel boot with this configuration.

Main DC power is up.  The processors have not been started.

BOOT PAUSED: Alter the configuration if desired using the HC command;
              then enter GO to continue system initialization.
```

```
(SPU Configuration) SP> JS

                SERVICE PROCESSOR BOARD STATUS:

System Clock state: Ready Internal_Source Sync_off

SP Bus state:      (Note: The SP Bus is the H/W interface between the SP & PDC.)
    SP Bus Clock state: ECL_On
    SP Bus Polling Algorithm: Not selected as yet.

Service Processor Interrupt State:
    Interrupts on: PSCM GPIO PDC GBR CCP SPP PPON
    Interrupts off: None

Power System Control and Monitor(PSCM) state
    Ready to receive commands from the SP.

Host initialization state:
    Host initialization is pausing.

SP Selftests which have failed:
    None
```

## Example

This example is similar to the first example in this section. It shows SP Board status after booting to PDC.

```
(SPU Configuration) SP> GO

System initialization resumed...

Service Processor: Finished initialization. Starting PDC boot process...
Proc[08/0]: 1 out of 1 Processors Passed Early Selftest

Proc[08/0]
Proc[08/0]: PDC Version 2.64 (HARDBOOT)
Proc[08/0]: PA7100 rev 3.3
Proc[08/0]: Early Selftest Bypassed
Proc[08/0]: Boot Init
```

```
SP> JS

SERVICE PROCESSOR BOARD STATUS:

System Clock state: Ready Internal Source Sync on

SP Bus state: (Note: The SP Bus is the H/W interface between the SP & PDC.)
  SP Bus Clock state: ECL_On
  SP Bus Polling Algorithm: 2 procs./slot. Slots 8,9,10 or 12 occupied.

Service Processor Interrupt Status:
  Interrupts on: PSCM GPIO PDC GBR CCP SPP PPON
  Interrupts off: None

Power System Control and Monitor(PSCM) state:
  Ready to receive commands from the SP.

Host initialization state:
  The SPU has booted to PDC.

SP Selftests which have failed:
  None
```

## PC: Power Configuration

### Display Power System Configuration

Displays the configuration of the power system, showing the power modules in the power system slots. Also shows the status of each power module.

#### Purpose

Monitoring and troubleshooting the power system.

**Caveats**

Understanding all the information displayed by the PC command requires a knowledge of the power system.

**Example**

```

SP> PC

Power System Configuration

Slot      Rail_Name      Voltage Status
----      -
6         5.00v Batt     5.00v (0x1) Master; Normal Status
9         5.00v ProcX    4.98v (0x1) Master; Normal Status
12        MPM
          2.00v Clock   2.00v
          2.00v CBatt  2.00v
          3.00v PMBt   2.99v
          -2.50v PMBc  -2.49v
          -2.50v PMBb  -2.49v
13        5.00v Sys      5.00v (0x1) Master; Normal Status
14        24.00v Fan     23.09v (0x1) Master; Normal Status
  
```

**PR: Processor Exception Status**

**Displays processors Exception Status**

Shows a count of machine checks for each processor in the system. The Summit Slot number is displayed along with the machine check count for each processor in the slot. To view more detail about a specific processor, enter the slot and module number of the processor.

**Purpose** Can be used to troubleshoot a processor. A high number of machine checks may indicate a problem with the processor.

## Example

The following example shows a system with no history of machine checks:

```
SP> PR

                          Processor's Status

Machine Checks              Note: '.' means non-applicable.
Slot      modl-0/modl-1
-----
 8          0/0
 9          .
10          .
11          .
12          .
13          .
14          .
15          .

Enter processor slot number? (8 - 15) (CR = exit) 8

Enter processor's module number? (0 - 1) (CR = exit) 1
```

The following structure (PDH\_ERROR\_LOG) displays a count of LPMC's and HPMC's which have been logged by PDC. Some processors do not use all of the elements of this structure.

```
slot/modl/unit :          GO-TAG  G1-TAG  GO-DATA  G1-DATA
 8/  1/ICACHE LPMC's :          0      0      0      0
          DCACHE LPMC's :          0      0      0      0

Slot/modl/unit :    Level-1  Level-2
 8/  1/ITLB LPMC's :    .      0
          DTLB LPMC's :    .      0
          ITLB HPMC's :    0      .
          DTLB HPMC's :    0      .

slot/modl/unit          = count
 8/  1/PMB LPMC's          = 0
          DUP TAG LPMC's    = 0
          ITLB's LOCKED    = 0
          DTLB's LOCKED    = 0
          NOERR CACHE LPMC's = 0
```

## PS: Power Status

### Display Power System Status

Displays status information for the power system. For example, it tells the state of the:

- Standby/Ready switch.

■ Internal power-on signals (PON).

■ AC and DC power.

■ Battery back-up.

**Purpose**

Monitoring and troubleshooting the power system.

**Caveats**

Understanding all the information displayed by the PS command requires a knowledge of the computer power system.

**Example**

```
SP> PS

      Power System Status
      -----
- AC power on
- DC power nominal
- PON on
- Secondary PON on
- Status of power system conditions that affect the Battery Backup system:
  - Standby/Ready switch in READY position
  - Battery presence DETECTED
  - SP Battery enable flag (BA) is SET

The combined state of these three conditions has ENABLED the
Battery Backup system.

SP> DN
      .
      .
      .
(SPU Power Control) SP> PS

- AC power on
- DC power not nominal
- PON off
- Secondary PON off
- Status of power system conditions that affect the Battery Backup system:
  - Standby/Ready switch in READY position
  - Battery presence DETECTED
  - SP Battery enable flag (BA) is SET

The combined state of these three conditions has ENABLED the
Battery Backup system.
```

## RE: REstart

### Restart the SPU (Computer)

Causes the Service Processor to perform a reset and hard boot on the computer. A hard boot tests memory destructively; some troubleshooting data may be lost.

Same as the RESTART command available at the PDC interface.

#### Purpose

To reset the system when you do not care about saving troubleshooting data and when you want a more thorough re-initialization than is provided by the RS or TC commands. The RE command performs both an SP and a PDC initialization; the RS and TC commands only perform an SP initialization.

#### Caveats

The RE command takes longer to execute than the RS or TC commands.

Do not perform an RS or RE command in preparation for a memory dump. Use the TC command instead.

#### Example

```
SP> RE

WARNING: This command will completely RESTART the System.
Execution of this command irrecoverably halts all system processing
and I/O activity and restarts the Service Processor.
The Service Processor will turn off Main DC power, run its selftest,
and then re-boot the System.

Type Y to confirm your intention to RESTART the system (y/[n]): Y

Now RESTARTing the System..

<SP, PDC and OS boot up messages>
```

## RS: ReSet

### Reset SPU (Computer).

Causes the Service Processor to perform a reset and hard boot on the computer. A hard boot tests memory destructively; some troubleshooting data may be lost. The computer performs PDC initialization. It does not perform SP initialization.

#### Purpose

To reset the system when you do not care about saving troubleshooting data. For example:

- When updating the operating system.



- After changing the console path.

### Caveats

Do not perform an RS or RE command in preparation for a memory dump. Use the TC command instead.

On 99x/T-Class Systems, the RS command is only available from the SP prompt. It is not available from the Access Port (CM>) prompt as on most other PA-RISC systems.

### Example

```
SP> RS

WARNING: Execution of this command irrecoverably halts all system processing
and I/O activity and restarts the computer system.  (Hard boot.)

Type Y to confirm your intention to restart the system (y/[n]):  N

Command aborted.
```

## SM: Software Monitor

### Display/Modify Software Monitor Flag.

If the software monitor (SM) flag is set, the SP reports an error if no OS activity is detected within any 10-second interval:

- The red "Stopped" LED on the front panel turns ON until the OS updates the chassis display.
- The yellow "Attention" LED on the front panel turns ON until the operator reads the SP error log with the DL command.
- The SP error log contains a stale system status entry (STALE\_SYS\_STAT\_LOG).

The SP monitors OS activity by checking whether the OS has updated the chassis display within any 10-second interval.

HP recommends that you NOT set the Software Monitor (SM) flag on HP-UX systems. With the SM flag set, HP-UX systems may display false warnings of no OS activity

### Purpose

To receive notification if the operating system is not functioning.

### Caveats

At times HP-UX may not update the chassis display every 10 seconds even though HP-UX is functioning properly.

## Example

```
SP> SM

The Service Processor software monitor flag is currently CLEARED
(monitor disabled).

Do you wish to SET the flag (y/[n])? Y

The Service Processor software monitor flag is now SET
(monitor enabled).

SP> SM

The Service Processor software monitor flag is currently SET
(monitor enabled).

Do you wish to CLEAR the flag (y/[n])? Y

The Service Processor software monitor flag is now CLEARED
(monitor disabled).
```

## TC: Transfer of Control

### Initiate SPU Transfer of Control (TOC)

Causes the computer to perform OS-specific tasks, then to perform a soft boot. A soft boot tests memory non-destructively, preserving troubleshooting data. The computer performs PDC initialization. It does not perform SP initialization.

The TC command causes the Service Processor to place the console terminals in console mode and request the processor designated by PDC as the TOC target to perform a transfer of control (TOC). The SP user interface is deactivated when the console terminals are placed in console mode.

The consoles enter console mode when PDC outputs its first message,

In a multiprocessor system, the TOC is directed to the "TOC target" processor, which is the same processor as the Monarch and the PMB configuration master.

### Purpose

To reset the system when you want to save troubleshooting data. For example:

- When the system is "hung" (does not respond to input) and you want to preserve troubleshooting data (for example in preparation for a memory dump on MPE/iX machines).
- After changing the console path.

### Example 1

```
SP> TC
```

```
WARNING: Execution of this command causes a Transfer of Control instruction  
(TOC) to be executed (Soft Boot). Depending upon the TOC handler that is  
configured by your system software, this may halt all system processing and  
reboot your system.
```

```
The Monarch Processor selected by PDC to be TOC'ed = [slot/port] : [8/0]  
Do you want to TOC the Processor selected by PDC? (y/[n]): (CR = exit) : Y
```

```
SPU Bus processor number = 1  
Toc Select Register = 0x1
```

```
Performing TOC on Processor (slot/port) 8/0
```

```
Entering AP Control Mode
```

```
.  
. .  
. .
```

```
<PDC and OS TOC screens>
```

## Example 2

```
SP> TC
```

WARNING: Execution of this command causes a Transfer of Control instruction (TOC) to be executed (Soft Boot). Depending upon the TOC handler that is configured by your system software, this may halt all system processing and reboot your system.

The Monarch Processor selected by PDC to be TOC'ed = [slot/port] : [12/0]  
 Do you want to TOC the Processor selected by PDC? (y/[n]): (CR = exit) : N

Host Hardware Configuration: (D = deconfigure; - = non-existent port)

Summ	Board Type	Deconfigured Ports				Ports to be deconf at next boot			
		0	1	2	3	0	1	2	3
0	GSC+ IOA		-		-		-		-
2	Memory (768 meg)				-				-
3	Memory (256 meg)								
12	PCX_U Processor			-	-			-	-
14	PCX_U Processor			-	-			-	-

WARNING: Use of this command option may cause this system to SOFTBOOT. And if this system SOFTBOOT's, it will SOFTBOOT single processor. This is to allow those operating systems, that dump after SOFTBOOT to get a dump if the Monarch has hung. Once the dump has finished, YOU MUST USE the SP's RS command to re-boot from this state.

```
Enter the slot # of the Processor to be TOC'ed
(CR = exit) : 14
Enter the port # if the Processor to be TOC'ed
(CR = exit) : 0
```

```
SPU Bus processor number = 7
Toc Select Register = 0x400
```

```
Performing TOC on Processor (slot/port) 14/0
```

```
Entering AP Control Mode
```

```
.
.
.
```

```
<PDC and OS TOC screens>
```

## TO: TO

### Turn On User-Selected PFC Unit

#### Purpose

To display the status (i.e., off, on, or not present) of all ACFE units, and turn on one which you select.

#### Caveats

None.

#### Example

```
SP>TO

AC Front End units :

 1   AC Front End unit 1 is off. status=0x1.
 2   AC Front End unit 2 is off. status=0x1.
 3   AC Front End unit 3 is not present. status=0x0.

Turn on which AC Front End unit? (CR = exit) 1

AC Front End units :

 1   AC Front End unit 1 is on. status=0x3.
 2   AC Front End unit 2 is off. status=0x1.
 3   AC Front End unit 3 is not present. status=0x0.

SP>
```

## UP: UP

### Bring Up Main DC Power

Brings up the main DC power for the computer system and causes SP initialization to continue.

#### Purpose

The UP command powers up and boots a computer system that had been powered down with the DN command.

#### Caveats

The UP command will not bring up power if the "Standby-Ready" switch on the front panel is in the "Standby/Battery Off" position.

This command is valid only if the computer system had been powered down with the DN command.

## Examples

```
SP> UP
```

```
Main DC power coming up...
```

```
<SP, PDC and OS boot up messages>
```

```
SP> DN
```

```
This command will SHUT OFF the MAIN DC POWER of this computer system.
```

```
Continue (y/[n])? Y
```

```
Service Processor: Commanding PSCM to turn off Main DC.
```

```
The system is in the SPU Power Control state.  
The system power is down.
```

```
==> Type GO or UP to continue system initialization. %<==
```

```
(SPU Power Control) SP> UP
```

```
System initialization resumed...
```

```
Service Processor: Commanding PSCM to turn on Main DC.
```

```
The contents of the following PMB slots have changed since the last boot:  
(NONE)
```

```
The configuration of the following PMB modules changed since the last boot:  
(NONE)
```

```
The following PMB modules are present, but will be deconfigured for the  
upcoming boot:  
(NONE)
```

```
==> Press ANY key within 10 SEC to cancel boot with this configuration. %<==
```

```
No key was pressed. Continuing with system initialization...
```

```
Service Processor: Finished initialization. Starting PDC boot process...
```

```
Proc[13/0]: PDC Version 1.11 (HARDBOOT)
```

```
Proc[15/0]: PDC Version 1.11 (HARDBOOT)
```

```
.  
. .  
. . .
```

# **A Glossary**

---

## **Introduction**

This appendix contains a glossary of terms and acronyms for operating 99x/T-Class Systems.



---

## Terms and Acronyms

- Access Port (AP)** The Access Port (AP) permits remote access to the system, primarily for diagnostic purposes. (A Remote Support modem is also required.) On 99x/T-Class Systems, the AP is implemented as circuitry on the Console/LAN card. You can access AP commands from the system console by entering <Contro>I-B.
- Alternate Boot Path** Hardware address of the device (typically a tape drive) used to load the operating system from the distribution media. See "Hardware Address," and "Primary Boot Path."
- Autoboot** An automatic boot of the operating system from the device on the primary boot path defined in Stable Storage. If the autoboot flag is set to TRUE, the system automatically boots when powered up. (More precisely, it loads the software on the primary boot device.) See "Stable Storage (SS)" and "Manual mode."
- Board** An assembly on which an electronic circuit or subsystem is implemented, typically a circuit card installed in a slot in a computer system. Also known as a "PCA" or a "card."
- Boot** The process of loading the operating system into main memory from a tape or disk drive (the boot device).
- Boot Device** The device (tape or disk drive) used to load the operating system. More precisely, the device from which PDC obtains the Initial Program Load (IPL).
- Boot Path** Hardware address of the device used to load the operating system. See "Hardware Address," "Primary Boot Path," and "Alternate Boot Path."
- Bus** Multiple lines in a computer, serving as a communication path between hardware modules (subsystems) such as processor, memory, and I/O. The bus carries data, address, and control signals. The two main buses in the 99x/890/T-Class system are the Processor Memory Bus (PMB) and the HP Precision Bus (HP-PB). The PMB connects to processors, main memory, and bus converters. The HP-PB is used for I/O.
- Bus Converter (BC)** A device connecting two buses. A bus converter consists of two bus converter port modules linked together by a bus converter link. On 99x/T-Class Systems, a bus converter connects a high-speed processor/memory bus (the PMB) to a lower-speed I/O bus (the HP-PB).
- Card** An assembly on which an electronic circuit or subsystem is implemented, typically a circuit card installed in a slot in a computer system. Also known as a "PCA" or a "board."
- Chassis Code** See "Hexadecimal Code."

- Console Device, Console** The terminal used to monitor and control system activity during boot-up, and for running diagnostics. During boot, the PDC uses the console as an I/O device to display messages to the operator and obtain responses from the operator. On 990DX, 991DX, 992DX, 995DX systems, and 996 and 997 Systems that have been ordered with one, the console is a Vectra OpenView workstation.
- Control Panel** Another term for the front panel on the 99x/T-Class Systems. See "Front Panel."
- Core Dump Pair** The two files copied by *savecore* from the dump device after a system panic:
- `hp-ux.n` (a copy of the original kernel, /hp- ux)
  - `hp-core.n` (a copy of the physical memory image).
- The *n* in the file names is a number assigned to a particular core dump pair.
- Core File** A snapshot of physical memory at the time of an HP-UX panic. The computer attempts to save this data to a dump device after a panic. If it becomes necessary, this core file can be analyzed using special tools to determine more about what caused the panic.
- Crash File** See "Core File."
- Device Adapter (DA)** Interface cards (such as HP-IB cards or MUX cards) installed in I/O slots to enable the computer to communicate with peripherals (terminals, printers, disk drives, etc.). On 99x/T-Class Systems, Device Adapter cards are also known as HP-PB cards.
- Device Address** The address which specifies a particular device attached to a device adapter. A device address is required since a device adapter (HP-PB card) can have several devices attached to it. On disk drives and magnetic tapes, the device address is the HP-IB (or HP-FL) address set on the device itself. On terminals, the device address is the port number.
- Device Path** See "Hardware Address."
- Dump Device** The device to which HP-UX attempts to write a core file after a panic. By default, the dump device is the primary swap device.
- Firmware** Memory storage that retains its contents even if power is lost. Typically refers to computer instructions stored in such a form. Firmware on PA-RISC systems includes Processor Dependent Code (PDC), Access Port (AP) firmware, and Service Processor (SP) firmware. On PA-RISC systems, Stable Storage (SS) and Non-Volatile Memory (NVM) refer to non-volatile memory storage containing system information (rather than computer instructions).
- Front Panel** The panel at the uppermost part of the front of the computer cabinet. Contains indicators and switches. Also known as the "Control Panel."
- Hang** See "System Hang."

- Hard Boot** A boot in which memory is tested destructively. A hard boot is initiated by a Reset (RS) command at the SP prompt or by cycling power to the computer. When recovering from a system interruption, do not perform a hard reset (RS) unless absolutely necessary. A hard reset invalidates the memory dump and destroys important troubleshooting information. See "Transfer of Control (TOC)."
- Hardware Address** An address specifying the location of a peripheral device on the system. For example a hardware address of 16/36.3 specifies a device path consisting of the Bus Converter (BC) card in PMB slot 4 ( $16/4 = 4$ ), then the I/O card in HP-PB slot 9 ( $36/4 = 9$ ), then the device itself with an ID of 3.
- Hardware Failure** A system interruption caused purely by hardware. It is catastrophic enough that the CPU cannot run.
- Hexadecimal Code (Hex Code)** A code composed of four hexadecimal digits containing status or troubleshooting information. On 99x/T-Class Systems, you can see the hexadecimal code by entering <Control>-B at the system console; the hexadecimal code is in the line of status information at the bottom of the screen. Also known as "hex code" or "chassis code."
- Hewlett-Packard Precision Bus (HP-PB)** A synchronous bus used on many PA-RISC systems (such as the 99x, 890, and T-Class systems). 99x/T-Class Systems use HP-PB to handle I/O. The HP-PB can be directly attached to device adapter cards.
- High Priority Machine Check (HPMC)** A type of system interruption on PA-RISC computers. An HPMC is an abnormal condition which has compromised the integrity of system processing. The CPU detects the HPMC and halts the system. Troubleshooting information for the HPMC is encoded in an HPMC tombstone display. On the 99x, an HPMC causes an error message to appear on the system console; you use PDC commands (TOMB and DISPLAY) to display the HPMC tombstone. On the T-Class Systems, an HPMC causes an HP-UX tombstone to display on the system console.
- HP-FL** Hewlett-Packard Fiber-Optic Link. A high-speed, full-duplex serial interface for point-to-point fiber optic data connection, and associated protocols. The HP-FL interface allows Hewlett-Packard fiber optic devices (such as HP-FL disk drives) to be connected to PA-RISC computers.
- HP-FL Card** A device adapter card for devices (such as HP-FL disk drives) that support a fiber-optic link.
- HP-IB** Hewlett-Packard Interface Bus. Hewlett-Packard's implementation of the IEEE Standard 488-1975 interface. Disk drives, tape drives, and HP-IB printers are connected to PA-RISC computers via HP-IB channels.
- HP-IB Card** A device adapter card for HP-IB devices such as disk drives, tape drives, and HP-IB printers.
- HPMC** See "High Priority Machine Check (HPMC)."
- HP-PA** Hewlett-Packard Precision Architecture. See "PA-RISC".

- HP-PB** See "Hewlett-Packard Precision Bus (HP-PB)."
- HP-UX** Hewlett-Packard's implementation of the UNIX operating system. (UNIX is a registered trademark of AT&T in the United States and other countries.) The T-Class Systems runs under HP-UX.
- Initial Program Load (IPL)** The general term for the first code loaded into memory from a boot device during boot. The specific code that is loaded into memory may vary. On HP-UX systems, IPL code is the Initial System Load (ISL). MPE/iX systems, on the other hand, may run MMSAVE as the IPL before loading ISL. See "Initial System Load (ISL)."
- Initial System Load (ISL)** A standard code module used during the startup of a PA-RISC operating system. ISL provides a standard user interface during boot, allowing the user to perform such functions as changing boot path information or setting a flag for autoboot. ISL is a specific program; IPL is the general term for any program brought into memory by PDC during boot. See "Initial Program Load (IPL)."
- I/O** Input/Output.
- I/O Configuration** Input/Output configuration. The location of I/O cards in the I/O slots, and the set of operating system device drivers assigned to those slots.
- IPL** See "Initial Program Load (IPL)."
- ISL** See "Initial Software Load (ISL)."
- LAN Card** A device adapter card for connecting a system to a Local Area Network (LAN). Also known as a LANIC card.
- LANIC Card** Local Area Network Interface Controller card. Another term for a LAN card.
- LED** Light-Emitting Diode. The colored lights on the front panel of 99x/T-Class Systems are LEDs. These LEDs indicate the status of the hardware. For example, the green ("RUN") LED indicates that the computer is running.
- LIF** See "Logical Interchange Format (LIF)."
- Local Area Network (LAN) card** See "LAN card."
- Logical Interchange Format (LIF)** A standard format for mass storage that makes it easier to transport information and media. Many Hewlett-Packard computers implement LIF. The Initial Program Load (IPL) code is stored in LIF format on the boot device.
- Low Priority Machine Check (LPMC)** An interruption indicating the occurrence of a hardware fault from which the system recovered without software intervention.
- Main Memory** Computer internal storage implemented as memory cards.
- Manual Mode** The state of the system when autoboot is disabled; the user can select the boot device from all the available peripheral devices that have bootable code (see "Initial Program Load").

- Memory** A device capable of storing information in binary form. The term "memory" typically refers to main memory.
- Monitor Halt** A cause of system interruptions on MPE/iX systems similar to a system halt on MPE V systems. A monitor halt can have its roots in either software or hardware.
- MPE/iX** One of the two operating systems run by PA-RISC computers (the other is HP-UX). The 99x runs MPE/iX.
- Multiplexer (MUX) Card** See "MUX Card."
- Multiprocessor** A computer system which supports more than one processor.
- MUX Card** A device adapter card for serial devices such as terminals, modems, and serial printers. MUX is short for multiplexer.
- Non-Volatile Memory (NVM)** Memory storage that is used to maintain system configuration parameters. NVM retains its contents even if power is lost. NVM is optional on PA-RISC systems; 99x/T-Class Systems contain NVM.
- Operating System (OS)** The supervisory software that controls user tasks and manages system resources. Two operating systems used in PA-RISC computers are HP-UX and MPE/iX.
- Panic** The response of HP-UX to a condition that it was unable to handle. In a panic, HP-UX halts the computer, attempts to save an image of physical memory (a core file), displays a panic message on the console, and attempts to reboot. A panic may be caused by a problem with a peripheral, an I/O card, the computer, the file system, LAN communication, etc.
- PA-RISC** Precision Architecture-Reduced Instruction Set Computing. A reduced complexity architecture which embodies and extends Reduced Instruction Set Computing (RISC) architectural principles. (Formerly referred to as HP-PA.)
- Path** Another term for hardware address. A path specifies the location of a peripheral device in the bus structure. See "Hardware Address."
- PCA** Printed Circuit Assembly. An assembly on which an electronic circuit or subsystem is implemented, typically a circuit card installed in a slot in a computer system. Also known as a "card" or a "board."
- PDC** See "Processor Dependent Code (PDC)."
- Performance Problem** With a performance problem, the system responds to one or more programs/users, but others just cannot seem to get things done (the system seems very SLOW...). If you suspect performance problems, contact your Customer Engineer (CE) or the HP Customer Response Center. See "System Interruption."
- PMB** See "Processor Memory Bus (PMB)."
- Powerfail Recovery** An attempt to restore the operating system to the state it was in before a power loss occurred.

**PowerTrust UPS** The PowerTrust Uninterruptible Power System (UPS) is an optional part of 99x/890/T-Class computer systems, providing power to the devices connected to it for approximately 15 minutes after an AC power failure.

**Precision Architecture** Another term for PA-RISC.

**Primary Boot Path** The hardware address of the device used to boot the operating system (usually the system disk). See "Hardware Address" and "Alternate Boot Path."

**Processor** A hardware module that executes the complete PA-RISC instruction set and can execute standard operating system software. A processor module contains the CPU, cache, and Translation Lookaside Buffer (TLB).

**Processor Dependent Code (PDC) Firmware** unique to each processor which contains special routines written in PA-RISC code. PDC can provide code to conduct the power-on selftest, to boot and reset the system, and to handle HPMCs. PA-RISC computers execute PDC before loading ISL and the operating system.

At the PDC interface, you can access several dozen commands. For example, there are commands to:

- Change boot paths.
- Change the autoboot flag.
- Update firmware.
- Service the system.

**Processor Internal Memory (PIM)** A storage area in a processor that is set at the time of an HPMC, LPMC, or TOC. Some of this information is displayed in a tombstone. See "Tombstone Display."

**Processor Memory Bus (PMB)** The central bus in 99x/T-Class Systems. Processor, memory, and bus converter (BC) cards attach to the PMB.

**RAM** See "Random Access Memory (RAM)."

**Random Access Memory (RAM)** Memory that allows access to any of its locations; data at any address in RAM can be read or written to. RAM typically loses its contents in the event of power failure. On the 990/992/890, main memory is protected by the Battery Back-Up Unit. See "Battery Back-up Unit (BBU)" and "Read Only Memory (ROM)."

**Read Only Memory (ROM)** Memory in which a fixed program is stored during manufacture. The stored program cannot be changed by the user or altered by programming.

**Real Time Clock (RTC)** A device that generates readable signals at regular intervals of time for calculating actual or elapsed time (time-of-day clock), as opposed to a system clock, which drives the CPU and other system circuitry.

Reduced Instruction Set Computing (RISC)	An architecture that features a simplified, hardwired instruction set to increase the speed of the processor. RISC is also used as the acronym for Reduced Instruction Set Computer.
Reset	To restart a computer that is already running. See "Hard Boot," "Soft Boot," and "Transfer of Control (TOC)."
RISC	See "Reduced Instruction Set Computing (RISC)."
ROM	See "Read Only Memory (ROM)."
RTC	See "Real time clock."
Selftest	The first portion of PDC code executed when the system is powered up. The selftest verifies that enough of the hardware is functional to load the Initial Program Load (IPL) from the boot path.
Service Processor (SP)	A card attaching to the PMB in 99x/T-Class Systems which performs important functions when the computer is first powered up. The SP also monitors the power system and provides commands for servicing the system. You can access SP commands from the system console by entering <Control>-B to get to the CM> prompt, and then entering "SP".
Slot	Connectors into which printed circuit cards are inserted to make connection with a bus (for example, the PMB or HP-PB).
Soft Boot	A boot in which memory is tested nondestructively to preserve as much of the system state as possible for later dump and analysis. On 99x/T-Class Systems, a soft boot is initiated by entering TC at the SP prompt. See "Transfer of Control (TOC)."
Stable Storage (SS)	Memory storage that is used to maintain critical system parameters during power failures (SS retains its contents even if power is lost). For example, Stable Storage contains the hardware address of the boot device and console.
System	The computer plus any attached expanders and peripherals. See "System Processor Unit (SPU)."
System Abort	A condition experienced by the MPE/iX operating system in which either system or data integrity may be compromised by continued operation. While the causes of system aborts are many, the result is always the same: the system immediately halts and displays system abort information on the physical console (Ldev #20)
System Disk	The disk drive used to load the operating system.
System Hang	A type of system interruption in which the machine is running (the green RUN light is lit), but no one can access the system.
System Interruption	With a system interruption, there is a total loss of CPU resources for ALL users/programs. See "Hardware Failure," "High Priority Machine Check (HPMC)," "Performance Problem," "System Abort," and "System Hang."

**System Panic** See "Panic."

**System Processor Unit (SPU)** The portion of a computer system that performs the main processing functions, typically consisting of the processor, I/O, and memory subsystems (and the associated power system), all enclosed in one cabinet. The SPU does not include expanders or peripherals. In this manual, the term "computer" is used rather than "SPU."

**Tombstone Display** A display of troubleshooting information available at the PDC prompt (TOMB and DISPLAY commands). Tombstones can report information on High Priority Machine Checks (HPMCs), Low Priority Machine Checks (LPMCs), and Transfers of Control (TOCs). Because 99x/T-Class Systems are multi-processor systems, tombstone information can be maintained for each processor.

**TOC** See "Transfer Of Control (TOC)."

**Transfer of Control (TOC)** The action which forces a processor to execute selected software immediately, regardless of the code that the processor is executing at the time of the TOC. TOC is typically used to free a "hung" processor, and allow memory contents to be dumped for later analysis. On 99x/T-Class Systems, a TOC can be initiated by entering TC at the SP prompt.

**Uninterruptible Power System (UPS)** A unit which provides power to those devices connected to it for a period of time after an AC power failure. The PowerTrust UPS is an optional part of 99x/890/T-Class computer systems, providing back-up power for approximately 15 minutes.



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