OpenVMS Systems Operations Guide: VAX 4000 and VAXstation 4000 Systems

February 1993

This document is a quick reference guide to basic system operations for VAX 4000 and VAXstation 4000 systems. It contains information from multiple sources covering such topics as: system physical characteristics, system power up, boot, backup procedures, and console command descriptions.

Revision/Update Information: Revision 1.0

This document was prepared using VAX DOCUMENT, Version 2.1.

Contents

2 System Physical Description

3 Console Commands

4   System Startup and Shutdown Procedures

5   System Boot Procedures

6   System Backup and Restore Procedures

Index

Examples

Figures

Tables

Preface

This document contains material from multiple sources and
provides a single, quick reference guide to information on a
variety of topics relative to the operation of VAX 4000 and
VAXstation 4000 systems.

**Intended
Audience**

This guide is designed primarily for:

- System software support personnel

- Digital Services personnel

- System managers

- Instructors and participants in certain OpenVMS operating
  system courses:

    OpenVMS Systems Troubleshooting
    OpenVMS System and Network Management I, II, and
    III

**Document
Structure**

The document organization is as follows:

Chapter 1	Presents overviews of the VAX 4000 and VAXstation 4000 system models
Chapter 2	Describes the system physical components
Chapter 3	Describes the console I/O mode commands
Chapter 4	Describes the system startup and shutdown procedures
Chapter 5	Describes the system boot procedures
Chapter 6	Describes the system backup procedures

Conventions   The following conventions are used in this manual:

Convention	Description
`monospace type`	Represents text displayed on the screen by the system.
boldface type	Indicates user input in examples or text.
italic type	Emphasizes important information or indicates a variable or manual title.
UPPERCASE	In examples, indicates a command.
lowercase	In examples, indicates parameters or arguments to be specified by the user.
|	In command syntax descriptions, a vertical bar | indicates options, one of which you can choose.
Note	A note contains information of special importance to the reader.
Ctrl/X	Indicates to hold down the Ctrl key while you press another key.
n	A lowercase italic *n* indicates the generic use of a number. For example, 19*nn* indicates a 4-digit number in which the last 2 digits are unknown.
{ }	In format descriptions, indicates required elements. You must choose one of the elements.
[ ]	In format descriptions, indicates optional elements. You can choose none, one, or all of the options.

1

System Overview

Introduction VAX 4000 and VAXstation 4000 systems are available in a variety of models from high performance, multi-user systems to entry level, desktop workstations. This chapter presents overviews of the systems. Topics include:

- System models
- VAX 4000 system enclosures
- VAXstation 4000 system enclosures
- System specifications
- System options
- Related documents

System Models

VAX 4000 Systems

All VAX 4000 systems except the VAX 4000 Model 100 are deskside systems. Model 100 is a desktop system. Table 1–1 lists the system models.

Table 1–1 VAX 4000 System Models

Model	Memory[1]	Disk[1]	Performance[2]
100	128 MB	28 GB	24 VUPS
200	64 MB	42 GB	5 VUPS
300	256 MB	56 GB	8 VUPS
400	512 MB	56 GB	16 VUPS
500	512 MB	56 GB	24 VUPS
600	512 MB	56 GB	32 VUPS

[1]Maximum on system.

[2]Performance relative to a VAX–11/780 system.

VAXstation 4000 Systems

All VAXstation 4000 systems are desktop workstations. Table 1–2 lists the system models.

Table 1–2 VAXstation 4000 System Models

Model	Memory[1]	Disk[1]	SPECmarks[2]
60	104 MB	8.7 GB	12.0
90	128 MB	8.7 GB	32.7
VLC	24 MB	6.1 GB	6.2

[1] Maximum on system.

[2] SPECmark is an industry standard measure of system performance.

VAX 4000 System Enclosures

Enclosure Types

VAX 4000 systems are available in four basic enclosures as shown in Table 1–3.

Table 1–3 VAX 4000 System Enclosures

Model(s)	Enclosure	Type
100	BA42B	Desktop
200	BA215	Deskside, small pedestal
	BA430	Deskside, large pedestal
300, 400, 500, 600	BA440	Deskside, large pedestal

The following sections show the enclosures.

Model 100 Enclosure   The VAX 4000 Model 100 system is housed in a BA42B enclosure, a desktop unit. Figure 1–1 shows the enclosure.

Figure 1–1   VAX 4000 Model 100 Enclosure
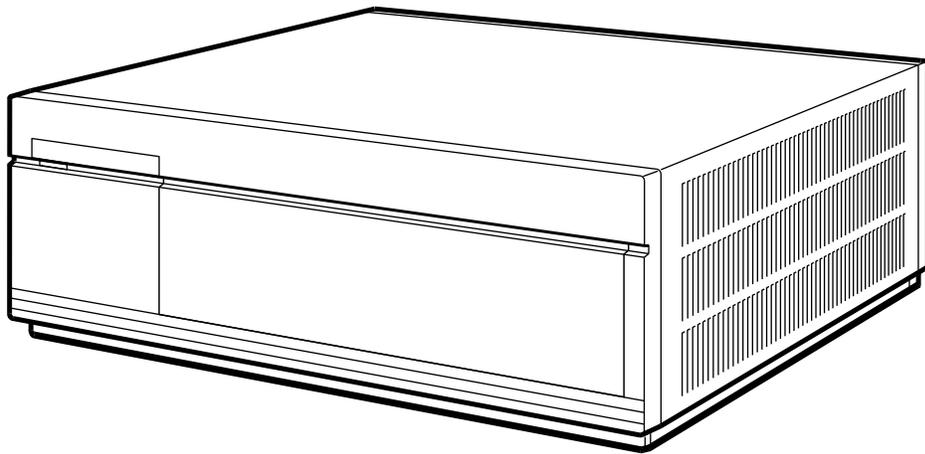
RE_EN06213A_91

Model 200, BA215 Enclosure

The BA215 enclosure is a small pedestal deskside cabinet with a 6 slot Q–bus backplane. Figure 1–2 shows the enclosure.

Figure 1–2   VAX 4000 Model 200, BA215 Enclosure
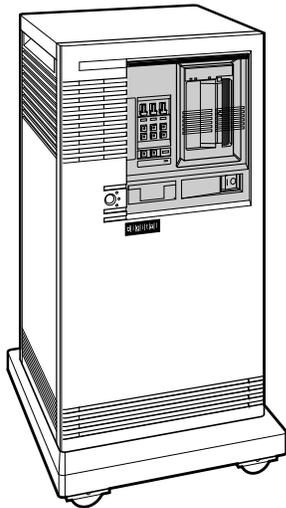
MLO-000670

**Model 200,
BA430
Enclosure**

The BA430 is a large pedestal deskside cabinet with a 12 slot Q–bus backplane. Figure 1–3 shows the enclosure.

Figure 1–3 VAX 4000 Model 200, BA430 Enclosure
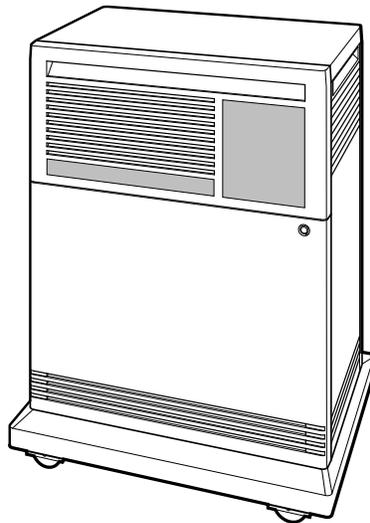
MLO-004032

**Model
300/400/500/600
BA440
Enclosure**

These models are all housed in a BA440 enclosure, a large pedestal, deskside cabinet with a 12 slot Q–bus backplane. The BA440 enclosure is similar to the BA430 enclosure. Figure 1–4 shows the enclosure.

Figure 1–4   VAX 4000 Model 300/400/500/600 BA440 Enclosure
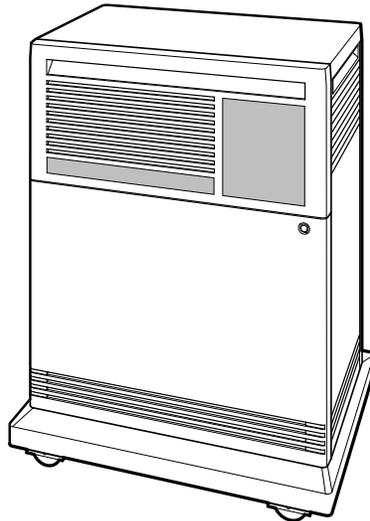
MLO-004032

VAXstation 4000 System Enclosures

Enclosure Types   All VAXstation 4000 systems consist of a desktop system unit, a monitor, a keyboard, and a mouse.

Model 60   Figure 1–5 shows the basic VAXstation 4000 Model 60 system.

Figure 1–5   VAXstation 4000 Model 60
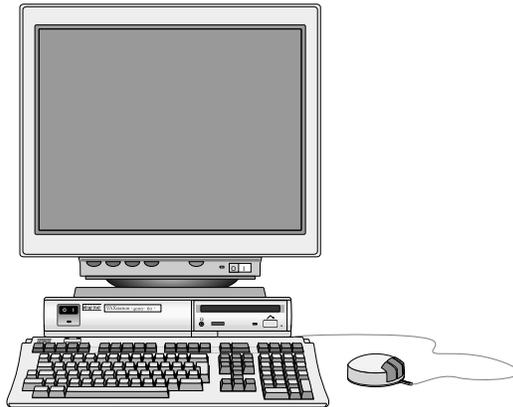
NUO-0535-01-MPS

Model 90   Figure 1–6 shows the basic VAXstation 4000 Model 90 system.

Figure 1–6   VAXstation 4000 Model 90
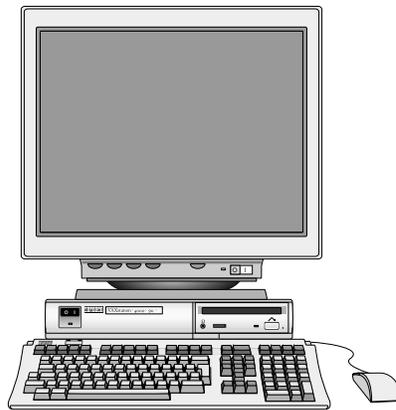
NUO-0535-02-MPS

Model VLC   Figure 1–7 shows the basic VAXstation 4000 Model VLC system.

Figure 1–7   VAXstation 4000 Model VLC
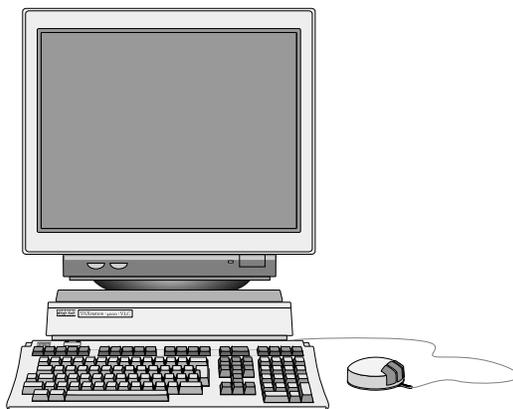
NUO-0535-03-MPS

System Specifications

VAX 4000 Systems   Table 1–4 lists selected specifications for VAX 4000 systems.

Table 1–4 VAX 4000 System Specifications

	Models 100, 200, 300	Models 400, 500, 600
Processor clock	Model 100: KA52 / 72 MHz Model 200: KA660 / 28 MHz Model 300: KA670 / 36 MHz	Model 400: KA675 / 63 MHz Model 500: KA680 / 72 MHz Model 600: KA690 / 83 MHz
Cache[1]	Model 100: 10 kB / 128 kB Model 200: 6 kB Model 300: 2 kB / 128 kB	Model 400: 10 kB / 128 kB Model 500: 10 kB / 128 kB Model 600: 10 kB / 512 kB
Memory[2]	Model 100: 16 MB / 128 MB Model 200: 8 MB[5] / 64 MB Model 300: 32 MB / 128 MB	64 MB/ 512 MB
Disk[3]	Model 100: 381 MB / 28 GB Model 200: 381 MB / 21 GB Model 300: 381 MB / 28 GB	381 MB / 56 GB
Interfaces	All support Q–bus, DSSI, and Ethernet. Model 100 also supports SCSI.	
OpenVMS[4]	Model 100: 5.5–1HN Model 200: 5.4–2 Model 300: 5.3–2	Model 400: 5.5–2 Model 500: 5.5 Model 600: 5.5

[1] On Chip/On Board

[2] Minimum/maximum

[3] Minimum/maximum

[4] OpenVMS operating system version that first supported system

[5] 16 MB on large pedestal (BA430 cabinet) systems

**VAXstation
4000 Systems**

Table 1–5 lists selected specifications for VAXstation 4000 systems.

Table 1–5 VAXstation 4000 System Specifications

	Model VLC	**Model 60**	**Model 90**
Processor clock	KA48 25 MHz	KA46 55.5 MHz	KA49 74.1 MHz
Cache	5 kB	256 kB	256 kB
Memory[1]	8 MB / 24 MB	8 MB / 104 MB	16 MB / 128 MB
Disk capacity	6.1 GB	8.7 GB	8.7 GB
Interfaces	All support SCSI and Ethernet. Models 60 and 90 also optionally support TURBOchannel and FDDI.		
Serial comm	All support 1 printer and 1 modem port.		
Monitor size	13/16/17/19	16/17/19	16/19
Resolution (Optional)	1024 x 768 1280 x 1024	1280 x 1024 Dual 1280 x 1024 Quad 1280 x 1024	1280 x 1024
Planes	8	4 or 8	8[2]
Graphics (Optional)	2D accelerator	2D accelerator[3] 3D accelerator	2D accelerator[3] 3D 8 or 24 plane
OpenVMS[4]	5.5	5.5–2	5.5

[1] Minimum/maximum

[2] 24 planes on Model 60 SPXg and Model 90 SPXgt systems

[3] 3D accelerator with Z and double buffering is standard on Model 60 SPXg and Model 90 SPXgt systems

[4] OpenVMS operating system version that first supported system

System Options

**VAX 4000
Systems**

Table 1–6 lists the options commonly installed on typical VAX 4000 system configurations. For a complete list of options, refer to the system documentation manuals.

Table 1–6   VAX 4000 System Options

Device	Description
Model 100	
B400X	Q–bus expansion cabinet
R400X	RF-series expansion cabinet
RF31T	381 MB ISE disk drive
RF35	852 MB ISE disk drive
RRD42	600 MB CDROM drive
RWZ01	Magneto-optical disk drive
RX26	2.8 MB diskette drive
TZ30	95 MB tape drive
TLZ06	4.0 GB tape drive
TZK10	320 MB or 525 MB tape drive
DHW42-AA	8-line asynchronous DEC423
DHW42-BA	16-line asynchronous DEC423
DHW42-CA	8-line asynchronous EIA-232
DSW42-AA	2-line synchronous EIA-232/V.24
Models 200/300/400/500/600	
B400X, R400X, RF31, RF35, RRD42 — See above	
TLZ04	1.2 GB tape drive
TSZ07	140 MB tape drive
RF72	1.0 GB ISE
RF73	2.0 GB ISE
TF85	2.6 GB tape drive
TK70	296 MB tape drive
TU81	140 MB tape drive
CXA16	16-line asynchronous
CXY08	8-line asynchronous
DSV11	2-line synchronous

VAXstation 4000 Systems

Table 1–7 lists the options commonly installed on typical VAXstation 4000 system configurations. For a complete list of options, refer to the system documentation manuals.

Table 1–7   VAXstation 4000 System Options

Device	Description
Models 60 and 90	
RZ23L	121 MB disk drive
RZ24L	245 MB disk drive
RZ25	426 MB disk drive
RZ26	1.05 GB disk drive
RZ56	665 MB disk drive
RZ58	1.3 GB disk drive
RX26	4.0 MB diskette drive
RRD42	600 MB CDROM drive
TLZ04	1.2 GB tape drive
TLZ06	4.0 GB tape drive
TZ30	95 MB tape drive
TZK10	320/525 MB tape drive
DSW21	1-line synchronous comm.
VSXXX-AB	Tablet
VSXXX-GA	3-button mouse
VSXXX-JA	Audio headset
SZ03, SZ12, SZ16 — expansion boxes	
Model VLC	
RRD42, RX26L, RZ23L, RZ24L, RZ25, RZ56, RZ58, TZ30, TZK10, TLZ06, SZ03, SZ12, SZ16 — See above	

Related Documents

**VAX 4000
System
Documents**

Table 1–8 lists the documents available for the VAX 4000 series.

Table 1–8 VAX 4000 System Documentation

Order Number	Title
Model 100 Documents	
EK-467AA-TI	VAX 4000 Model 100 Customer Technical Information
EK-465AA-IN	VAX 4000 Model 100 Installation Information
EK-466AA-OP	VAX 4000 Model 100 Operator Information
EK-468AA-TS	VAX 4000 Model 100 Troubleshooting and Diagnostics
Model 200 Documents	
EK-432AB-IN	VAX 4000 Model 200 (BA215) Installation
EK-433AA-OM	VAX 4000 Model 200 (BA215) Operation
EK-436AB-IN	VAX 4000 Model 200 (BA430) Installation
EK-395AB-OM	VAX 4000 Model 200 (BA430) Operation
EK-396AB-TM	VAX 4000 Model 200 Technical Information
EK-437AB-TS	VAX 4000 Model 200 Troubleshooting and Diagnostics
Model 300 Documents	
EK-335AC-IN	VAX 4000 Model 300 Installation
EK-336AC-OP	VAX 4000 Model 300 Operation
EK-337AB-TI	VAX 4000 Model 300 Technical Information
EK-386AB-TS	VAX 4000 Model 300 Troubleshooting

Table 1–8 (Cont.) VAX 4000 System Documentation

Order Number	Title
Model 400/500/600 Documents	
EK-K42AA-DK	VAX 4000 Model 400/500/600 Documentation Kit
EK-448AD-IN	VAX 4000 Model 400/500/600 Installation
EK-450AD-OP	VAX 4000 Model 400/500/600 Operation
EK-452AD-TI	VAX 4000 Model 400/500/600 Technical Information
EK-451AD-TS	VAX 4000 Model 400/500/600 Troubleshooting and Diagnostics

VAXstation 4000 System Documents

VAXstation 4000 documents are available in documentation kits. Table 1–9 lists the kits.

Table 1–9 VAXstation 4000 System Documentation

Order Number	Title
EK-PMARI-DK	VAXstation 4000 Model 60 Documentation Kit
EK-VAXOG-DK	VAXstation 4000 Model 90 Documentation Kit
EK-VXVLC-DK	VAXstation 4000 VLC Documentation Kit

2

System Physical Description

Introduction

This chapter describes the controls, indicators, connectors, and other physical components of the VAX 4000 and VAXstation 4000 systems.

Topics include:

- VAX 4000 model 100 system unit
- VAX 4000 model 200 system, BA215 enclosure
- VAX 4000 model 200 system, BA430 enclosure
- VAX 4000 model 300/400/500/600 enclosure — BA440
- VAXstation 4000 models 60 and 90 system unit
- VAXstation 4000 model VLC

VAX 4000 Model 100 System Unit

**Front Panel
Access Cover**

The system unit provides access to removable media internal
devices by way of an access cover on the front panel. Figure 2–1
shows the access cover.

Figure 2–1   VAX 4000 Model 100: Front Panel Access Cover
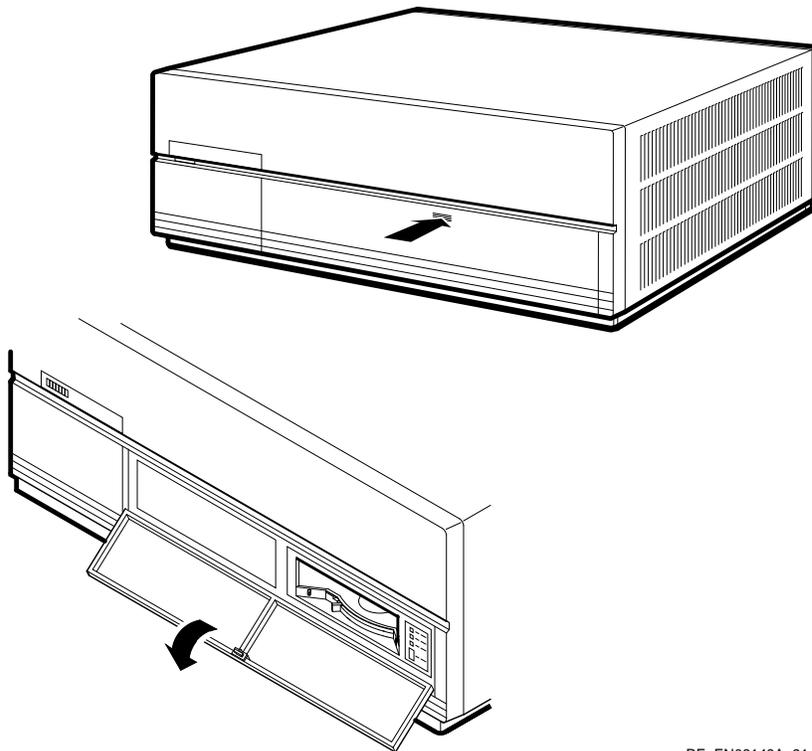
RE_EN06149A_91

Rear Panel

The rear panel of the system unit contains several connectors, controls, and indicators. Figure 2–2 shows the rear panel.

Figure 2–2 VAX 4000 Model 100: Rear Panel
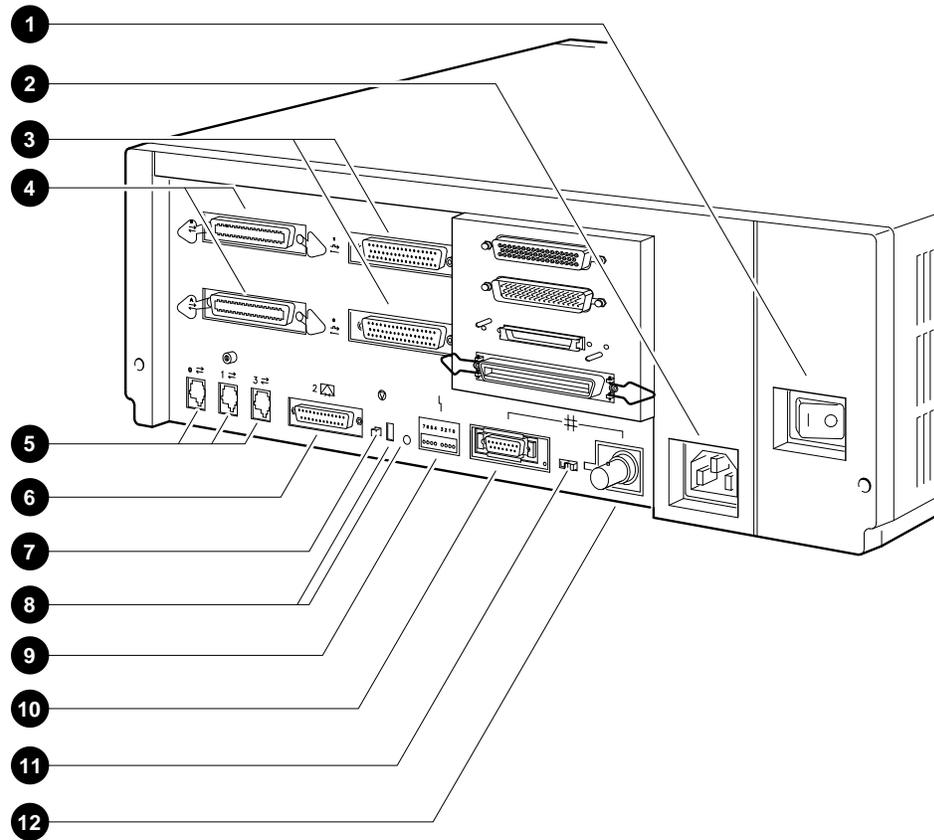
MLO-009279

**Rear Panel
Description**

The following list keyed to Figure 2–2 describes the rear panel components.

❶ Power On/Off switch — turns the system unit on and off.

❷ AC power connector — receptacle for the ac power cord.

❸ Synchronous communications ports 0 (bottom) and 1 — for connecting devices that use synchronous communications.

❹ Asynchronous communications ports A (bottom) and B — for connecting devices that use asynchronous communications.

❺ Modified modular jack (MMJ) ports 0, 1, and 3 — for connecting the user terminal, printer, or other devices that require an asynchronous DEC423 data-line-only port.

The console terminal is always connected to port 3.

❻ Asynchronous modem control port (port 2) — for connecting a modem, terminal, printer, or other devices that require an EIA-232 port.

❼ Halt button — halts the system and returns it from program I/O mode to console mode.

❽ Break/Enable switch and LED — when in the up position, causes the system to halt when the keyboard break key is pressed. The LED is on when the switch is in the up position and off when the switch is in the down position.

❾ Diagnostic LEDs — indicate system and test status, and error conditions.

❿ Standard Ethernet port — for connecting the system to the Ethernet by way of a standard connector.

⓫ Network Select switch — enables either the ThinWire or standard Ethernet connection. Standard Ethernet is selected when the switch is in the left-hand position.

⓬ ThinWire Ethernet port — for connecting the system to the Ethernet by way of a ThinWire connector.

**Console
Terminal Port
Settings**

If installed, the console terminal is always connected to port
3. The terminal settings shown in Table 2–1 are required to
communicate with the system unit by way of the console port.

Table 2–1 VAX 4000 Model 100: Console Terminal Settings

Parameter	Setting
Mode	VTxxx-7-bit
Speed	9600 baud; receive = transmit
Format	8 bits, no parity, 1 stop bit
Comm 1 port	DEC423, data-leads-only

Expansion Ports

The system unit provides additional ports for system expansion. Figure 2–3 shows the port locations.

Figure 2–3   VAX 4000 Model 100: Expansion Ports
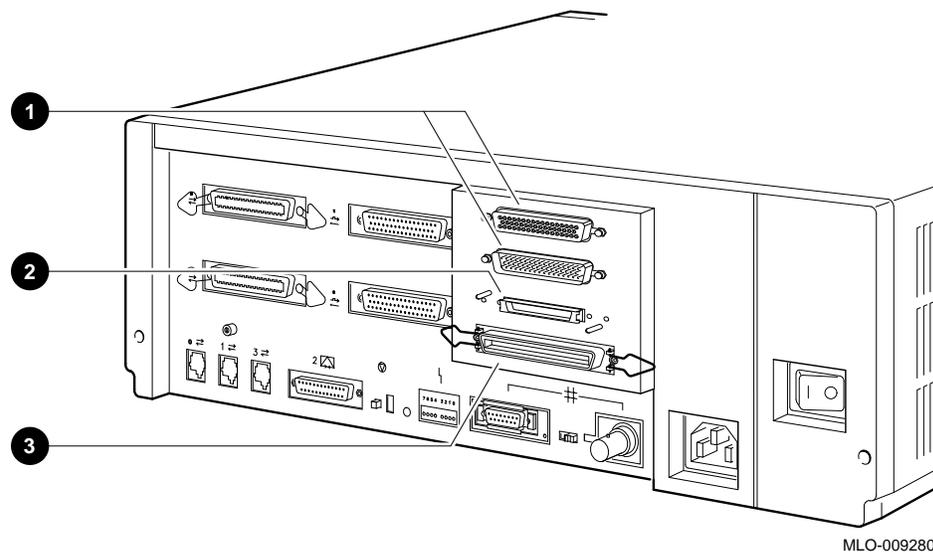
MLO-009280

❶ Q–bus ports — for connecting an external Q–bus expander.

❷ DSSI port — for connecting external DSSI devices and building a DSSI based VAXcluster system.

❸ SCSI port — for connecting small computer system interface (SCSI) storage devices. An SCSI terminator is installed on this port when the unit is shipped.

VAX 4000 Model 200 System, BA215 Enclosure

Front Panel Window

The BA215 enclosure has a removable front panel with a sliding window that provides access to certain system controls. The window is controlled by a rotary lock that allows the window to be locked in one of three positions.

Figure 2–4 shows the rotary lock and indicates which controls are accessible in each key position.

Figure 2–4 BA215 Cabinet: Front Panel Window and Keylock

Rotary Key Lock

Key Position 1:
No Access to Controls

Key Position 2:
Access to Tape Drive and
Operator Control Panel

Key Position 3:
Access to Power Switch
and Front Panel
Release Latch
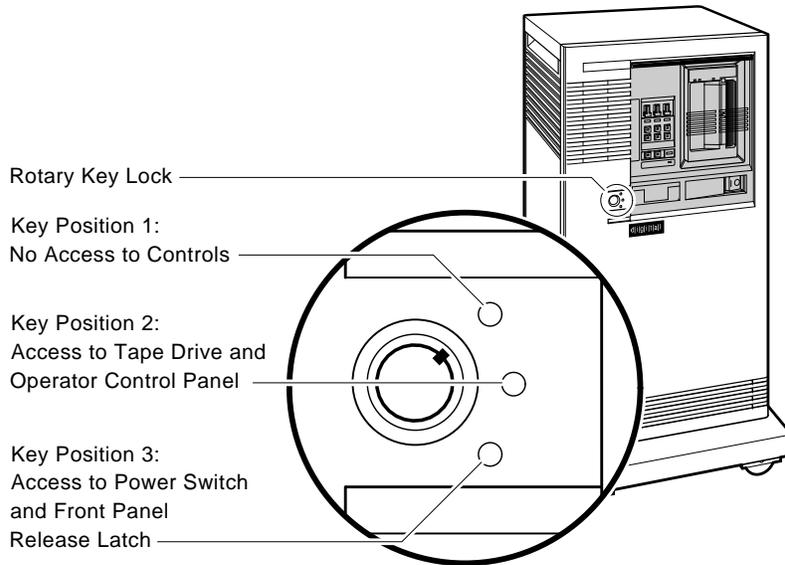
MLO-000671

**Enclosure
Front View**

Figure 2–5 shows a typical BA215 cabinet with the front panel removed.

Figure 2–5   BA215 Cabinet: Front View

ISE
Controls and
Indicators

Mass
Storage
Shelf

Tape
Drive

Card
Cage

CPU Cover
Panel

Power
Supply

Fans
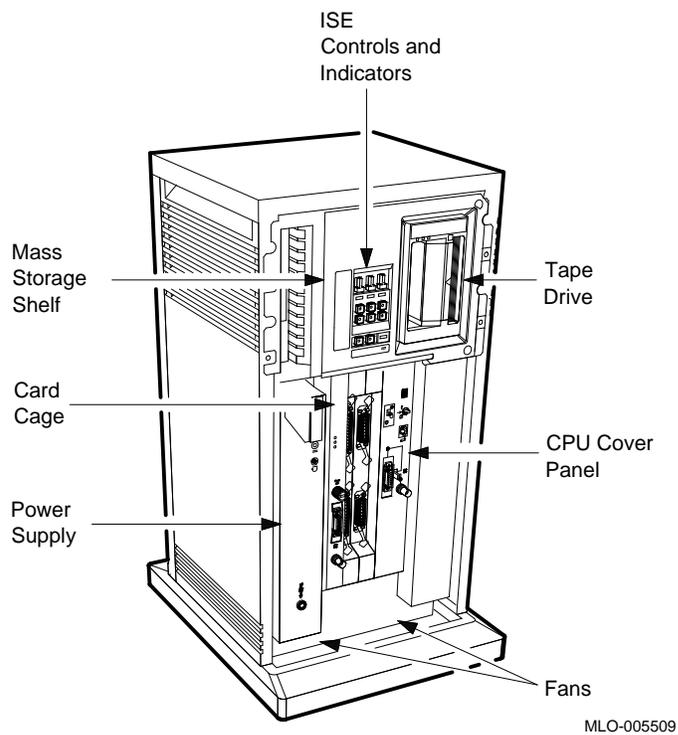
MLO-005509

Mass Storage Shelf

Figure 2–6 shows the mass storage shelf that extends across the top of the enclosure. The shelf may contain a TK series tape drive and up to two RF-series integrated storage elements (ISEs).

Figure 2–6 BA215 Cabinet: Mass Storage Shelf
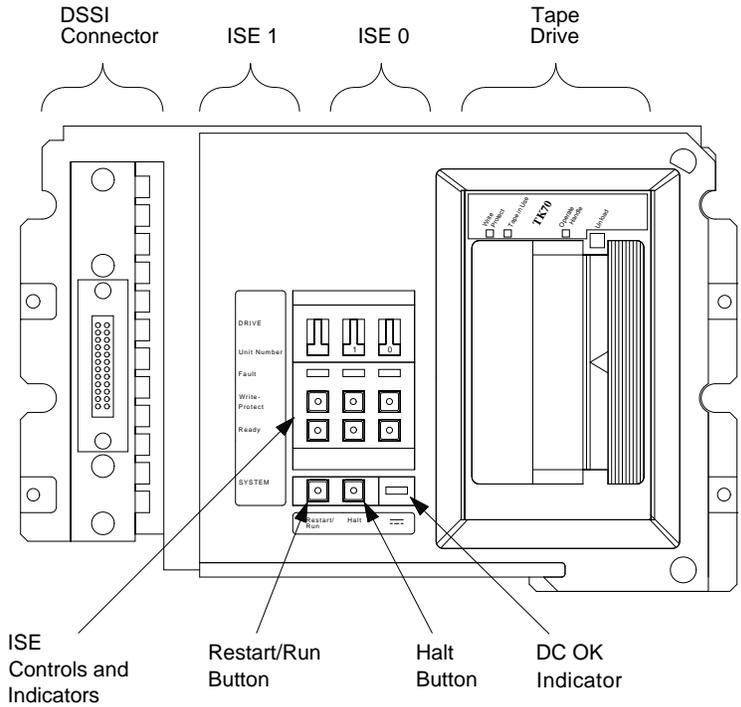
MLO-005510

Mass Storage Shelf Description

Table 2–2 describes the components in the mass storage shelf.

Table 2–2   BA215 Cabinet: Mass Storage Shelf Components

Component	Description
ISE controls	Each ISE drive has its own set of controls and indicators. When the system is turned on, the indicator lights indicate the state of the ISEs.
DC OK indicator	Illuminates (green) if the power supply voltages are within operating range.
Halt button	The Halt button is a two-position switch that controls the running state of the system.
	Pressing the button in halts the system and illuminates the red indicator on the button. When pressed a second time, the button is returned to the out position.
	When the Halt button is in the out position, the console mode prompt (>>>) is displayed and commands can be entered on the console. If you inadvertently press Halt, enter CONTINUE $\boxed{\text{Return}}$ on the console to continue.
	CAUTION: Pressing the Halt button halts the system regardless of the setting of the Break Enable /Disable switch.
Restart/Run button	Pressing the Restart/Run button causes the system to return to its power-up state and execute self-tests. If a boot device has been specified, and the Break Enable/Disable switch is set to disable, the system will reboot the system software. The button has a green indicator.
DSSI connector	Allows additional RF-series ISEs to be added to the system by way of a connection to an expansion cabinet.

ISE Control Panel

Figure 2–7 shows the ISE control panel.

Figure 2–7   BA215 Cabinet: ISE Control Panel
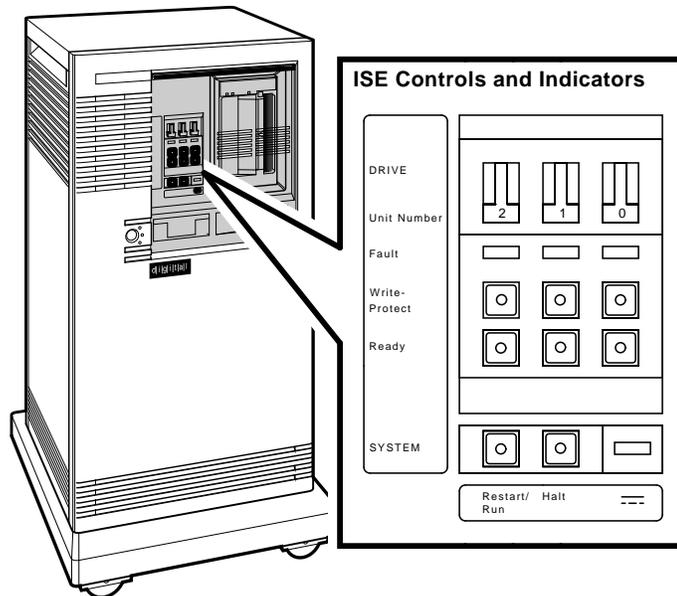
MLO-005512

_____ **Note** _____

The ISE control panel is designed to operate on several system platforms and can service up to three ISE drives. A maximum of two ISE drives can be installed in a BA215 cabinet.

ISE Control Panel Description

Table 2–3 describes the ISE control panel.

Table 2–3 BA215 Cabinet: ISE Control Panel

Component	Function
Bus Node ID plug	Identifies the bus node number of the ISE.
	Bus node numbers are factory-configured in consecutive order from right to left with the rightmost ISE being node 0. If the plug is missing, the bus node number is undefined and the fault indicator lights.
Fault light	Illuminates if an error condition exists in the ISE. The light is on temporarily during the power-up sequence.
Write-Protect button	Determines if the ISE is to be write-protected.
	Pressing the button in write-protects the ISE and illuminates the (amber) indicator light.
Ready button	Determines if the ISE is to be placed on-line or off-line.
	Releasing the button (out position) places the ISE on-line and illuminates the (green) indicator light. Under normal operation the green indicator flashes as seek operations are performed. Pressing the button in places the ISE off-line and extinguishes the indicator light.

CPU Cover Panel

The CPU cover panel contains certain system controls, indicators, and connectors. Figure 2–8 shows the panel.

Figure 2–8   BA215 Cabinet: CPU Cover Panel
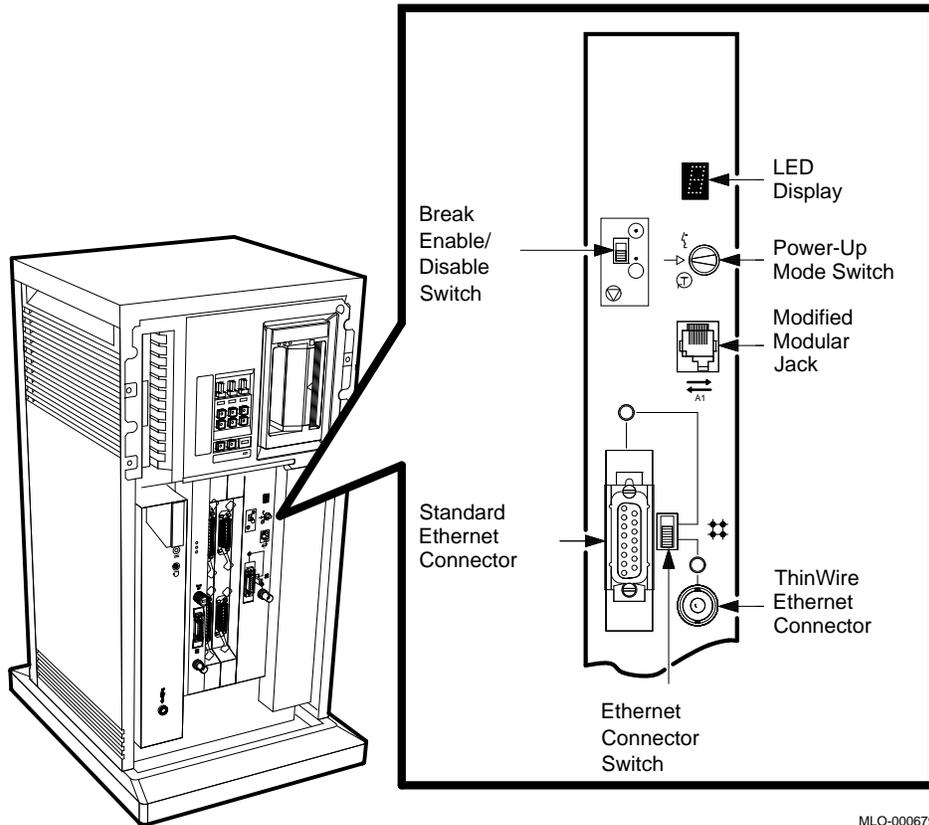
MLO-000679

CPU Cover Panel Description

Table 2–4 describes the components on the CPU cover panel.

Table 2–4   BA215 Cabinet: CPU Cover Panel Components

Component	Function
Power-Up Mode switch	Determines the system response at power up: • Language Inquiry Mode (top position, indicated by a profile of a face): Causes the system to display a language selection menu at power up if the console terminal supports multiple languages. Also, if a default boot device has not been selected, this mode causes the system to prompt for a boot device from a list of bootable devices. Once a device is selected, the system will autoboot from that device on power up. • Run Mode (middle position, indicated by an arrow): This position is the normal operating setting. • Loop Back Test Mode (bottom position, indicated by a T in a circle): Causes the system to run loopback tests on the console serial line at power up. This setting requires special loopback connectors and is for Digital Services use only.
Modified modular jack (MMJ)	Provides the connection for the console terminal.
LED display	Shows the testing sequence during power up.

Table 2–4 (Cont.)   BA215 Cabinet: CPU Cover Panel Components

Component	Function
Break Enable /Disable switch	Determines if the system will respond to a break signal from the console. If the switch is down, breaks are disabled. If the switch is up, breaks are enabled.
	When breaks are enabled, pressing Break on the console halts the processor and transfers control to the console program. Use the console command SET CONTROLP if you wish to specify Ctrl/P rather than Break to initiate a break.
	The Break Enable/Disable switch also controls the system power-up response. When breaks are disabled, the system autoboots at power up. When breaks are enabled, the system enters console mode (indicated by the (>>>) prompt) at power up.
	The console commands SET HALT REBOOT and SET HALT RESTART_REBOOT allow you to override the Break Enable/Disable switch and automatically boot software after an error halt or power up, even if breaks are enabled.
Ethernet connectors	Provide for connecting to either ThinWire Ethernet or standard Ethernet.
	The position of the Ethernet connector switch determines which connector is active. Setting the switch to the up position selects standard Ethernet. Setting the switch to the down position selects ThinWire Ethernet. A green LED for each connector indicates the active connection.

VAX 4000 Model 200 System, BA215 Enclosure

Power Supply Controls

The power supply provides power to the mass storage devices, the modules in the card cage, and the cabinet fans. Figure 2–9 shows the power supply controls and indicators.

Figure 2–9 BA215 Cabinet: Power Supply Controls

MLO-000680
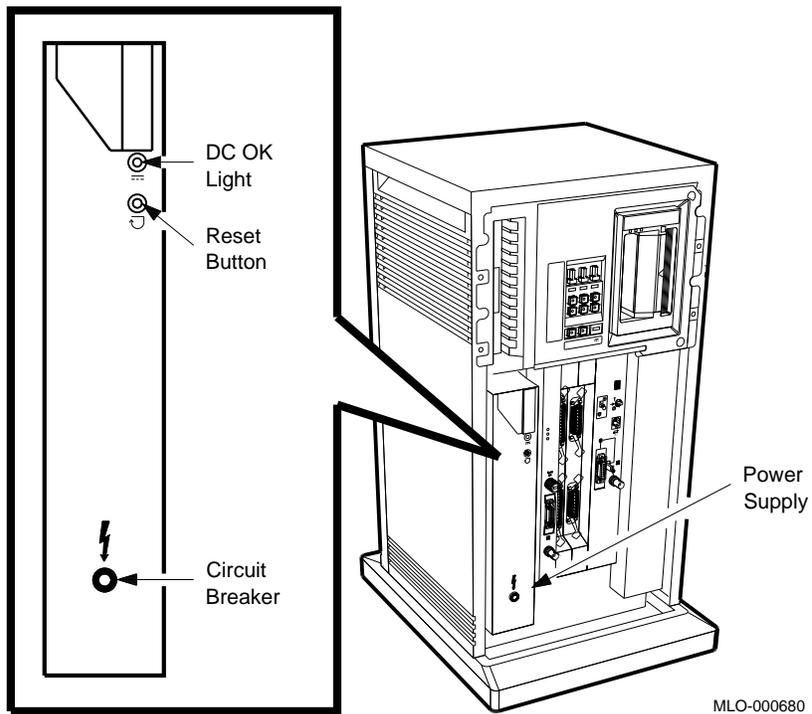
Power Supply Control Descriptions

Table 2–5 describes the power supply controls and indicators.

Table 2–5 BA215 Cabinet: Power Supply Controls and Indicators

Component	Function
DC OK	Illuminates (green) if the power supply voltages are within the correct operating range.
Reset button	When pressed, resets the system to the power-up state. The button is recessed to prevent inadvertent resetting of the system.
Circuit breaker	Protects the system from power surges. When tripped, the circuit breaker is in the out position. To reset the breaker, press the circuit breaker to the in position.

VAX 4000 Model 200 System, BA430 Enclosure

Front Door Access

The BA430 enclosure has hinge mounted upper and lower doors that provide access to the system controls. The doors are controlled by a three-position rotary lock that allows you to open both doors or the upper door only.

Figure 2–10 shows the rotary lock and indicates which controls are accessible in each key position.

Figure 2–10 BA430 Cabinet: Front Door Access

Door Handle

Rotary Key Lock

Top Key Position:
Access to SCP, ISEs, and
Tape Drive Controls and
Indicators (Upper Part Open)

Middle Key Position:
No Access to Controls
(Both Parts Locked)

Bottom Key Position:
Access to Power Switch;
All Controls and Indicators
(Both Parts Open)
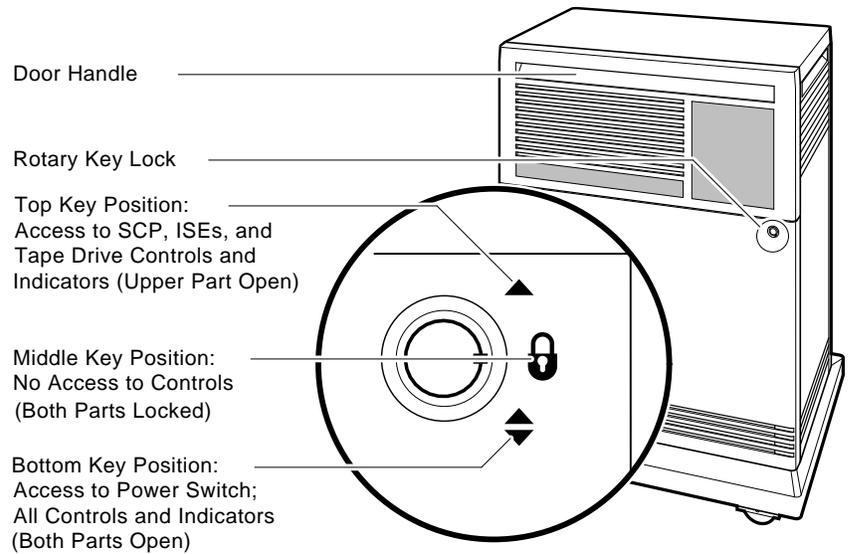
MLO-006033

**Enclosure
Front View**

Figure 2–11 shows a typical BA430 cabinet with both doors open.

Figure 2–11   BA430 Cabinet: Front View with Doors Open

Integrated Storage Elements (ISEs)

Tape Drive

System Control Panel (SCP)

Power Supply

CPU Cover Panel

Fans

Card Cage
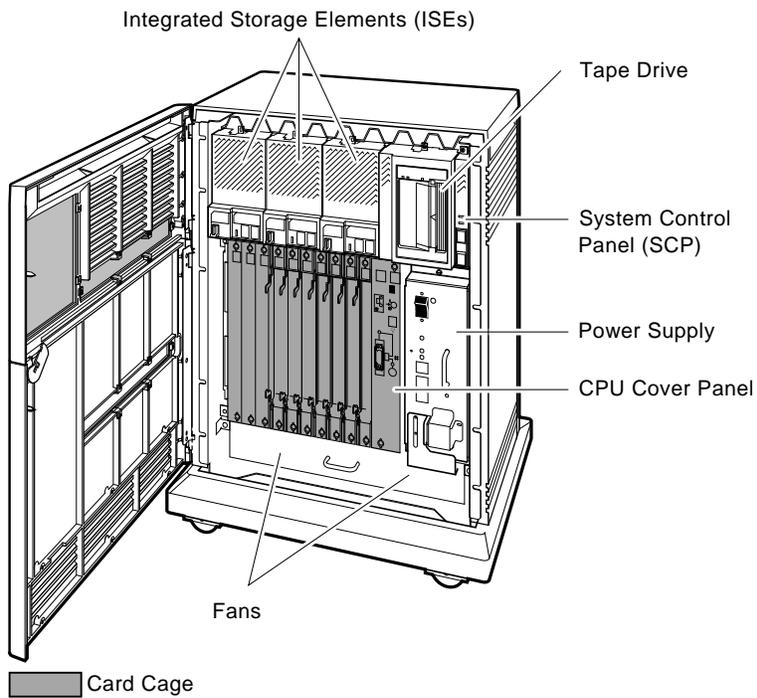
MLO-005502

Mass Storage Shelf

The mass storage shelf extends across the top of the enclosure. The shelf contains a system control panel (SCP), up to three RF-series integrated storage elements (ISEs), and a TF85, TK70, or TLZ04 tape drive. Tapeless systems can have up to four RF-series ISEs.

Figure 2–12 shows the mass storage shelf.

Figure 2–12 BA430 Cabinet: Mass Storage Shelf
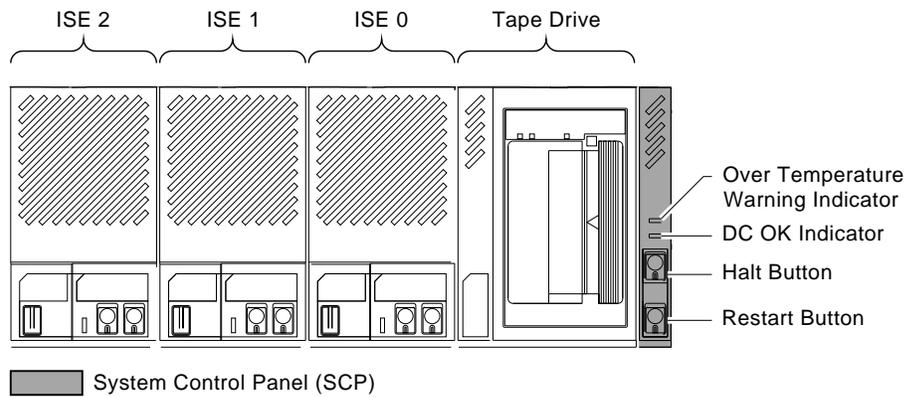
MLO-005386

Mass Storage Shelf Description

Table 2–6 describes the mass storage shelf components.

Table 2–6   BA430 Cabinet: Mass Storage Shelf Components

Component	Description
ISE units	Up to three ISEs can be installed in the BA430 cabinet (four ISEs on a tapeless system). Each ISE drive has its own set of controls and indicators. When the system is powered on, the indicator lights indicate the state of the ISEs.
Tape drive	A TF85, TK70, or TLZ04 tape drive can be installed in this position. If no tape is installed, a fourth ISE drive can be installed in the cabinet.

System Control Panel	
Over Temperature Warning indicator (red)	Flashes red if the internal system temperature approaches a level that may cause system component overheating. If the internal temperature reaches a certain threshold, the system automatically shuts down.
	In addition to the indicator, an audible alarm also provides warning of a possible over temperature condition.
DC OK indicator (green)	Illuminates if the power supply voltages are within operating limits.

**Table 2–6 (Cont.)   BA430 Cabinet: Mass Storage Shelf
Components**

Component	Description
System Control Panel	
Halt button	Controls the running state of the system.
	Pressing the button in halts the system and illuminates the red indicator on the button. When pressed a second time, the button returns to the out position.
	When the Halt button is out, the console mode prompt (>>>) is displayed and commands can be entered on the console. If you inadvertently press Halt, enter CONTINUE Return to continue.
	CAUTION: Pressing the Halt button halts the system regardless of the setting of the Break Enable/Disable switch.
Restart button	Pressing the Restart button causes the system to return to its power-up state and execute self-tests. If a boot device has been specified, and the Break Enable/Disable switch is set to disable, the system will reboot the system software. The button has a green indicator.

_____ **Note** _____

The Halt and Restart buttons can be disabled to prevent accidental activation. Contact the Digital Services representative if you want to disable the controls on the SCP.

_____

ISE Controls   Up to three ISEs can be installed in a BA430 enclosure (four
on tapeless systems). Figure 2–13 shows the ISE controls and
indicators.

Figure 2–13   BA430 Cabinet: ISE Controls
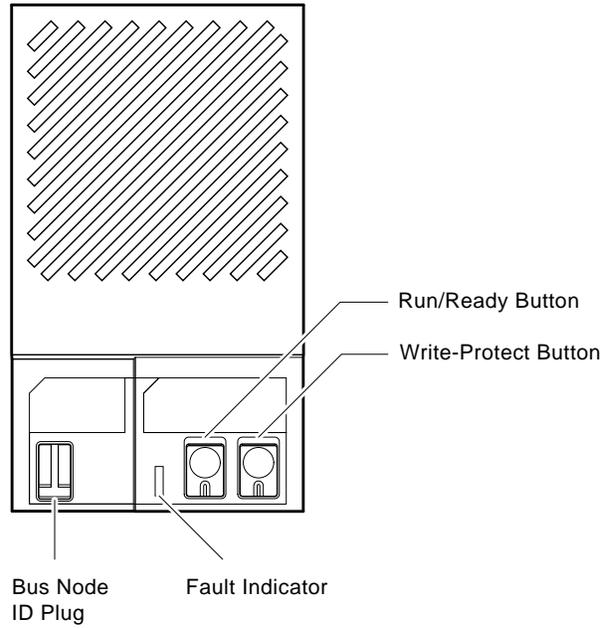
MLO-004044

**ISE Control
Descriptions**

Table 2–7 describes the ISE control panel.

Table 2–7 BA430 Cabinet: ISE Control Panel

Component	Function
Bus Node ID plug	Identifies the bus node number of the ISE.
	Bus node numbers are factory-configured in consecutive order from right to left with the rightmost ISE being node 0. If the plug is missing, the bus node number is undefined and the fault indicator lights.
Fault light	Illuminates if an error condition exists in the ISE. The light is on temporarily during the power-up sequence.
Ready button	Determines if the ISE is to be placed on-line or off-line.
	Pressing the button in places the ISE on-line and illuminates the green indicator light. Under normal operation, the indicator flashes as seek operations are performed. Setting the button out places the ISE off-line and extinguishes the indicator light.
Write-Protect button	Determines if the ISE is to be write-protected.
	Pressing the button in write-protects the ISE and illuminates the (amber) indicator light.

**CPU Cover
Panel**

The CPU cover panel contains certain system controls,
indicators, and connectors. Figure 2–14 shows the panel.

Figure 2–14 BA430 Cabinet: CPU Cover Panel
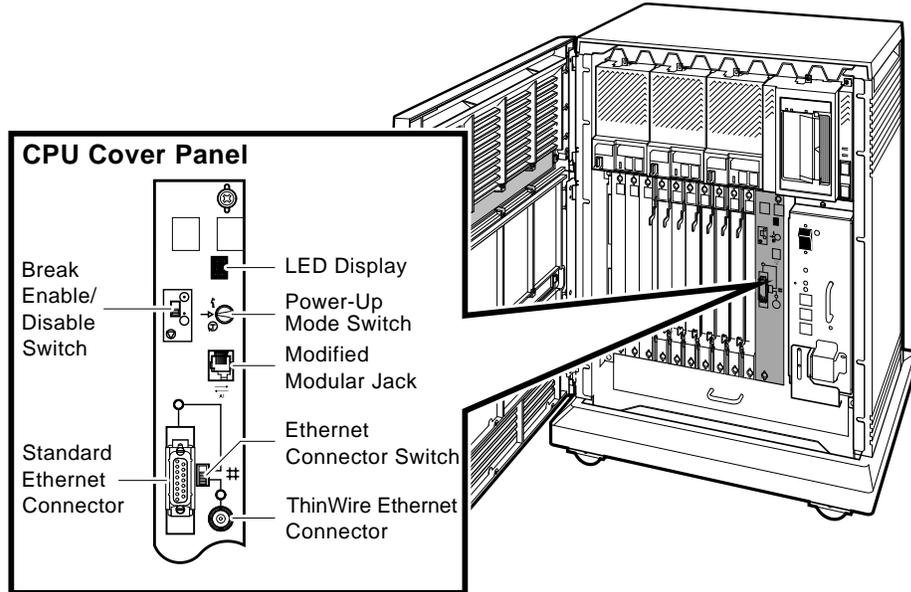
MLO-005504

CPU Cover Panel Description

Table 2–8 describes the CPU cover panel components.

Table 2–8   BA430 Cabinet: CPU Cover Panel Components

Component	Function
Power-Up Mode switch	Determines the system response at power up:
	• Language Inquiry Mode (top position, indicated by a profile of a face):
	Causes the system to display a language selection menu at power up if the console terminal supports multiple languages. Also, if a default boot device has not been selected, this mode causes the system to prompt for a boot device from a list of bootable devices. Once a device is selected, the system autoboots from that device each time it is powered on.
	• Run Mode (middle position, indicated by an arrow):
	This position is the normal operating setting.
	• Loop Back Test Mode (bottom position, indicated by a T in a circle):
	Causes the system to run loopback tests on the console serial line at power up. This setting requires special loopback connectors and is for Digital Services use only.
Modified modular jack (MMJ)	Provides the connection for the console terminal.
LED display	Shows the testing sequence during power up.

Table 2–8 (Cont.) BA430 Cabinet: CPU Cover Panel Components

Component	Function
Break Enable /Disable switch	Determines if the system will respond to a break signal from the console. If the switch is down, breaks are disabled. If the switch is up, breaks are enabled.
	When breaks are enabled, pressing Break on the console halts the processor and transfers control to the console program. Use the console command SET CONTROLP to specify Ctrl/P rather than Break to initiate a break if desired.
	The Break Enable/Disable switch also controls the system power-up response. When breaks are disabled, the system autoboots at power up. When breaks are enabled, the system enters console mode (indicated by the (>>>) prompt) at power-up.
	Use the console commands SET HALT REBOOT and SET HALT RESTART_REBOOT, if desired, to override the Break Enable/Disable switch setting. These commands will cause an autoboot after an error halt or power up, even if breaks are enabled.
Ethernet connectors	Provide for connecting to either ThinWire Ethernet or standard Ethernet.
	The position of the Ethernet connector switch determines which connector is active. Setting the switch to the up position selects standard Ethernet. Setting the switch to the down position selects ThinWire Ethernet. A green LED for each connector indicates the active connection.

Power Supply Controls

The power supply provides power to the mass storage devices, the modules in the card cage, and to the cabinet fans. Figure 2–15 shows the power supply controls and indicators.

Figure 2–15 BA430 Cabinet: Power Supply Controls and Indicators

Power Supply

Power Switch

AC Present Indicator

DC OK Indicator

Fan Failure Indicator

Over Temperature Condition Indicator

Power Bus Connectors

Power Cable Connector
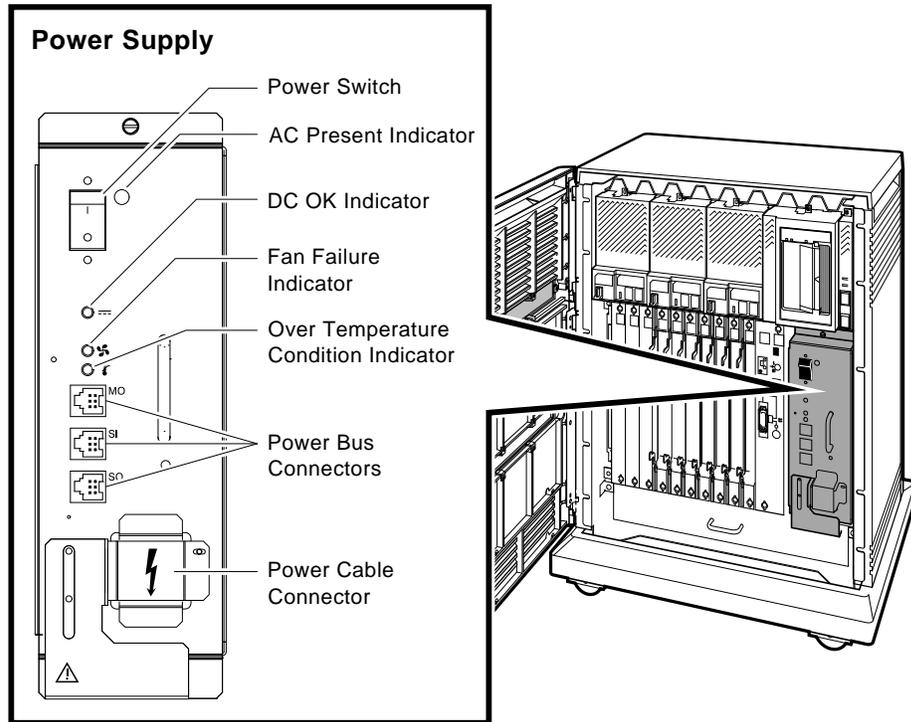
MLO-005506

**Power Supply
Control
Descriptions**

Table 2–9 describes the power supply controls and indicators.

**Table 2–9 BA430 Cabinet: Power Supply Controls and
Indicators**

Component	Function
Power switch	Turns system power on and off.
	The power switch also functions as the system circuit breaker. In the event of a power surge, the breaker will trip, causing the power switch to return to the off position. Turning the system on resets the circuit breaker. If the circuit breaker trips, wait one minute before turning the system back on.
AC Present indicator	Illuminates (orange) when the power switch is on and voltage is present at the input of the power supply.
DC OK indicator	Illuminates (green) if the power supply voltages are within operating limits.
Fan Failure indicator	Illuminates (amber) if either of the two cooling fans stops working. The power supply will automatically shut down the system as a precautionary measure when a fan failure is detected.
Over Temperature Condition indicator	Illuminates (amber) if the system shuts down due to an over temperature condition.
Power bus connectors	Provides a means for the system cabinet to control power sequencing in expansion cabinets. This allows one power switch to control power for an entire expanded system.

_____ **CAUTION** _____

Dual-host systems should not be configured with a
power bus. Inadvertently shutting off a host system and
bringing down the cluster defeats the reliability of a
dual-host system.

_____

VAX 4000 Model 300/400/500/600 Enclosure — BA440

The BA440 enclosure is the main system cabinet for VAX 4000 Model 300, 400, 500, and 600 systems. This section describes the main features of the enclosure.

Front Door Access

The BA440 enclosure has hinge-mounted upper and lower doors that provide access to the system controls. The doors are controlled by a three-position rotary lock that allows you to open both doors or the upper door only.

Figure 2–16 shows the rotary lock and indicates which controls are accessible in each key position.

Figure 2–16 BA440 Cabinet: Front Door Access

Door Handle

Rotary Key Lock

Top Key Position:
Access to SCP, ISEs, and
Tape Drive Controls and
Indicators (Upper Part Open)

Middle Key Position:
No Access to Controls
(Both Parts Locked)

Bottom Key Position:
Access to Power Switch;
All Controls and Indicators
(Both Parts Open)

MLO-006033
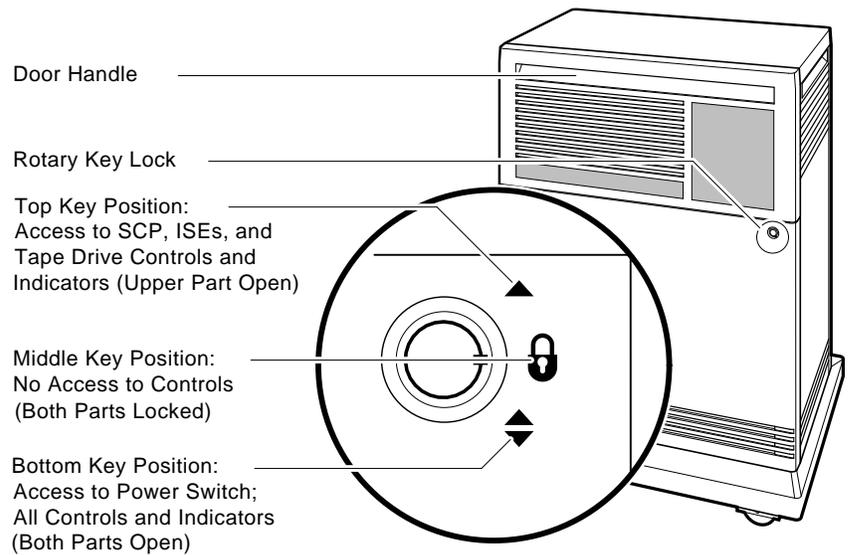
**Enclosure
Front View**

Figure 2–17 shows a typical BA440 cabinet with both doors open.

Figure 2–17   BA440 Cabinet: Front View with Doors Open

Integrated Storage Elements (ISEs)

Tape Drive

System Control Panel (SCP)

Power Supply

Console Module

Fans

Card Cage
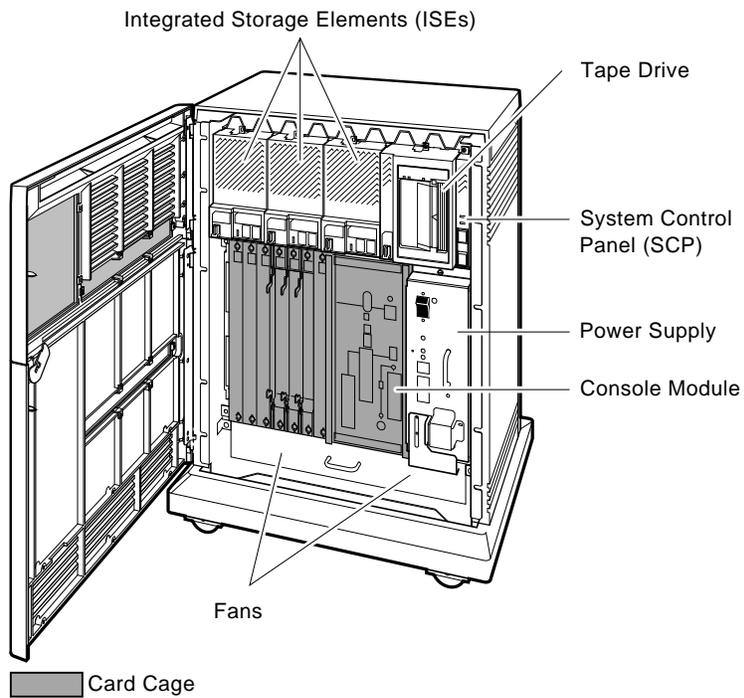
MLO-004016

Mass Storage Shelf

The mass storage shelf extends across the top of the enclosure. The shelf contains a system control panel (SCP), up to three RF-series ISEs, and a tape drive. Tapeless systems can have up to four RF-series ISEs.

Figure 2–18 shows the mass storage shelf.

Figure 2–18 BA440 Cabinet: Mass Storage Shelf
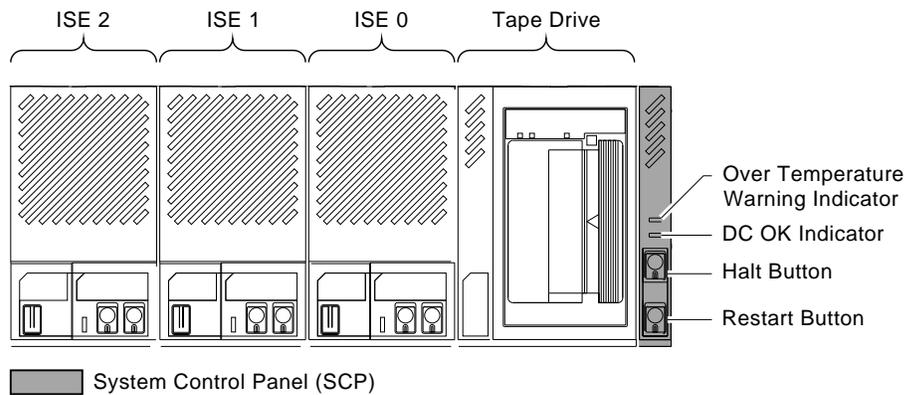
MLO-005386

_____ **Note** _____

With RF35 ISE drives, up to six ISEs and a tape drive can be installed in the BA440 cabinet. On tapeless systems, seven ISEs can be installed.

The RF35 ISE has a dual-disk capability; two separate ISEs share the same mass storage cavity and control panel.

Mass Storage Shelf Description

Table 2–10 describes the mass storage shelf components.

Table 2–10   BA440 Cabinet: Mass Storage Shelf Components

Component	Description
ISE units	Each ISE drive has its own set of controls and indicators (shared controls for RF35 drives). When the system is powered on, the indicator lights indicate the state of the ISEs.
Tape drive	A TK70, TLZ04, or TF-series tape drive can be installed in this position. If no tape is installed, a fourth ISE drive can be installed in the cabinet.

System Control Panel	
Over Temperature Warning indicator (red)	Flashes red if the internal system temperature approaches a level that may cause system component overheating. If the internal temperature reaches a certain threshold, the system automatically shuts down.
	In addition to the indicator, an audible alarm also provides warning of a possible over temperature condition.
DC OK indicator (green)	Illuminates if the power supply voltages are within operating limits.

Table 2–10 (Cont.)   BA440 Cabinet: Mass Storage Shelf Components

Component	Description
System Control Panel	
Halt button	Controls the running state of the system.
	Pressing the button in halts the system and illuminates the red indicator on the button. When pressed a second time, the button is returned to the out position.
	When the Halt button is out, the console mode prompt (>>>) is displayed and commands can be entered on the console. If you inadvertently press Halt, enter CONTINUE Return to continue.
	CAUTION: Pressing the Halt button halts the system regardless of the setting of the Break Enable/Disable switch.
Restart button	Pressing the Restart button causes the system to return to its power-up state and execute self-tests. If a boot device has been specified, and the Break Enable/Disable switch is set to disable, the system will reboot the system software. The button has a green indicator.

Note

The Halt and Restart buttons can be disabled to prevent accidental activation. Contact the Digital Services representative if you want to disable the controls on the SCP.

ISE Controls With dual-disk, RF35 ISE devices, up to seven ISEs or up to six RF-series ISEs and a tape drive can be installed in the cabinet.

Figure 2–19 shows the ISE controls and indicators for the two styles of RF-series ISE devices: single disk per cavity, and dual disk per cavity.

Figure 2–19 BA440 Cabinet: ISE Controls

MLO-007175
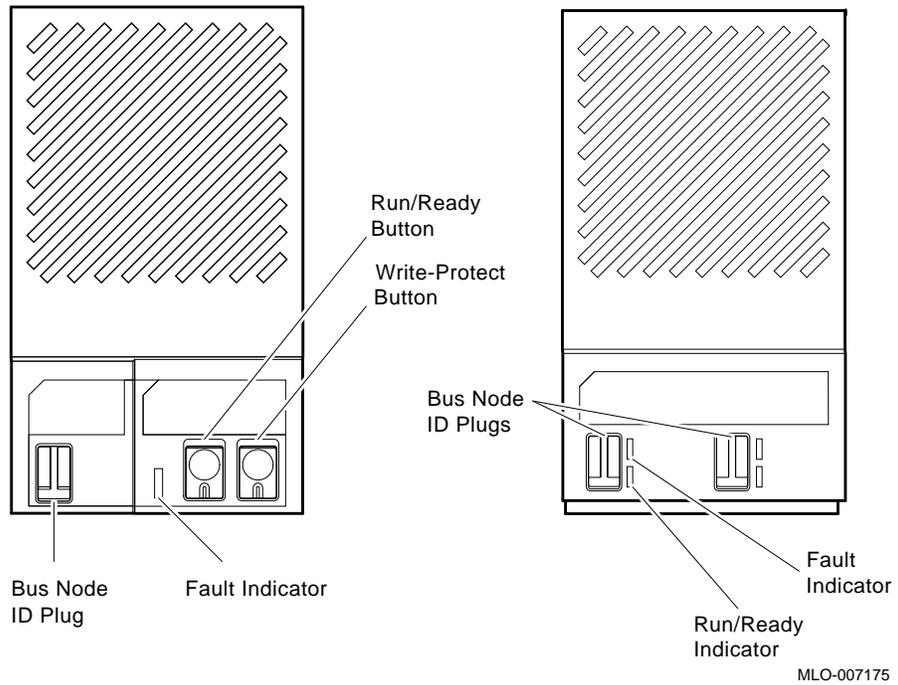
ISE Control Descriptions

Table 2–11 describes the controls and indicators for the two types of RF-series ISE devices: single disk per cavity, and dual disk per cavity (RF35 ISE).

Table 2–11 BA440 Cabinet: ISE Controls

Component	Function
Bus Node ID plug	Identifies the bus node number of the ISE.
	Bus node numbers are factory-configured in consecutive order from right to left with the rightmost ISE being node 0. If the plug is missing, the bus node number is undefined and the fault indicator lights.
	If the system has an RF35 with only one disk, one set of controls will have a blank bus node ID plug and its indicators will not light.
Fault light	Illuminates if an error condition exists in the ISE. The light is on temporarily during the power-up sequence.
Run/Ready button	Determines if the ISE is to be placed on-line or off-line.
	Pushing the button in places the ISE on-line and illuminates the green indicator light. Under normal operation, the indicator flashes as seek operations are performed. Setting the button out places the ISE off-line and extinguishes the indicator light.
Write-Protect button	Determines if the ISE is to be write-protected.
	Pressing the button in write-protects the ISE and illuminates the (amber) indicator light.
	The RF35 ISE has no Write-Protect button. Write-protecting the RF35 is by way of commands issued by the operating system or firmware commands in console mode.

**Console
Module**

The console module contains several system controls, indicators,
and connectors. Figure 2–20 shows the module.

Figure 2–20   BA440 Cabinet: Console Module
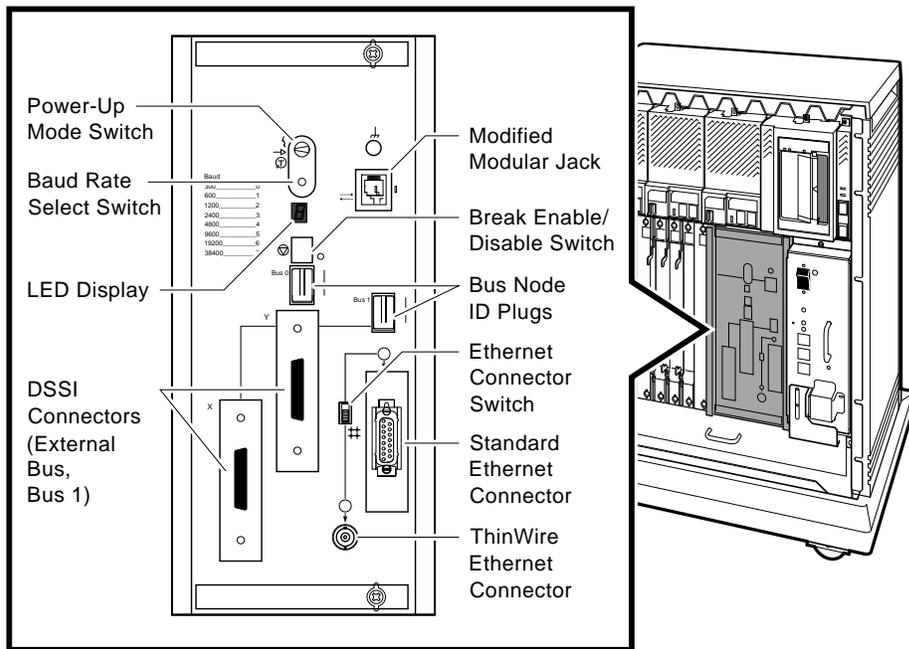
MLO-004038

**Console
Module
Description**

Table 2–12 describes the console module components.

Table 2–12 BA440 Cabinet: Console Module Components

Component	Function
Power-Up Mode switch	Determines the system response at power up:
	• Language Inquiry Mode (top position, indicated by a profile of a face):
	Causes the system to display a language selection menu at power up if the console terminal supports multiple languages. Also, if a default boot device has not been selected, this mode causes the system to prompt for a boot device from a list of bootable devices. Once a device is selected, the system autoboots from that device each time it is powered on.
	• Run Mode (middle position, indicated by an arrow):
	This position is the normal operating setting.
	• Loop Back Test Mode (bottom position, indicated by a T in a circle):
	Causes the system to run loopback tests on the console serial line at power up. This setting requires special loopback connectors and is for Digital Services use only.
Baud Rate Select switch	Set to match the baud rate of the console terminal. The factory setting is position 5 (9600).
Modified modular jack (MMJ)	Provides the connection for the console terminal.
LED display	Shows the testing sequence during power up.

Table 2–12 (Cont.)   BA440 Cabinet: Console Module Components

Component	Function
Break Enable /Disable switch	Determines if the system will respond to a break signal from the console. If the switch is down, breaks are disabled. If the switch is up, breaks are enabled.
	When breaks are enabled, pressing Break on the console halts the processor and transfers control to the console program. Use the console command SET CONTROLP to specify Ctrl/P rather than Break to initiate a break if desired.
	The Break Enable/Disable switch also controls the system power-up response. When breaks are disabled, the system autoboots at power up. When breaks are enabled, the system enters console mode (indicated by the (>>>) prompt) at power up.
	Use the console commands SET HALT REBOOT and SET HALT RESTART_REBOOT, if desired, to override the Break Enable/Disable switch setting. These commands will cause an autoboot after an error halt or power up, even if breaks are enabled.
Bus Node ID plugs	Identifies the bus nodes of DSSI adapters in the CPU. The system has two separate DSSI buses. One plug identifies an internal DSSI bus (Bus 0) and the other plug identifies an external DSSI bus (Bus 1). Both plugs are factory-configured.
DSSI Bus 1 connectors	(Labeled X and Y)
	Provides a means for expanding the system by connecting additional mass storage devices to the second DSSI bus.

Table 2–12 (Cont.)   BA440 Cabinet: Console Module Components

Component	Function
Ethernet connectors	Provide for connecting to either ThinWire Ethernet or standard Ethernet.
	The position of the Ethernet connector switch determines which connector is active. Setting the switch to the up position selects standard Ethernet. Setting the switch to the down position selects ThinWire Ethernet. A green LED for each connector indicates the active connection.

Power Supply Controls

The power supply provides power to the mass storage devices, the modules in the card cage, and the cabinet fans. Figure 2–21 shows the controls and indicators.

Figure 2–21 BA440 Cabinet: Power Supply Controls and Indicators
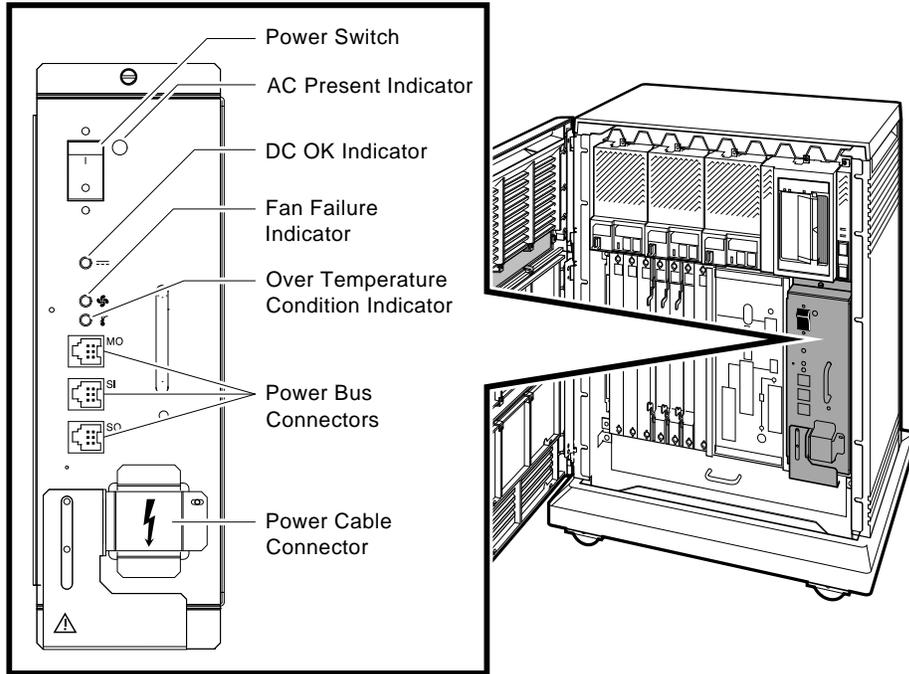
MLO-004040

Power Supply Control Descriptions

Table 2–13 describes the power supply controls and indicators.

Table 2–13 BA440 Cabinet: Power Supply Controls and Indicators

Component	Function
Power switch	Turns system power on and off.
	The power switch also functions as the system circuit breaker. In the event of a power surge, the breaker will trip, causing the power switch to return to the off (0) position. Turning the system on resets the circuit breaker. If the circuit breaker trips, wait one minute before turning the system back on.
AC Present indicator	Illuminates (orange) when the power switch is on and voltage is present at the input of the power supply.
DC OK indicator	Illuminates (green) if the power supply voltages are within operating limits.
Fan Failure indicator	Illuminates (amber) if either of the two cooling fans stops working. The power supply automatically shuts down the system as a precautionary measure when a fan failure is detected.
Over Temperature Condition indicator	Illuminates (amber) if the system shuts down due to an over temperature condition.
Power bus connectors	Provides a means for the system cabinet to control power sequencing in expansion cabinets. This allows one power switch to control power for an entire expanded system.

_____ **CAUTION** _____

Dual-host systems should not be configured with a power bus. Inadvertently shutting off a host system and bringing down the cluster defeats the reliability of a dual-host system.

_____

VAXstation 4000 Models 60 and 90 System Unit

The VAXstation 4000 Models 60 and 90 system units are similar. This section describes the physical characteristics of the system units.

Front Panel View

Figure 2–22 shows the ports, switches, and indicators on the front of the system unit.

Figure 2–22   VAXstation 4000 Models 60 and 90: Front Panel
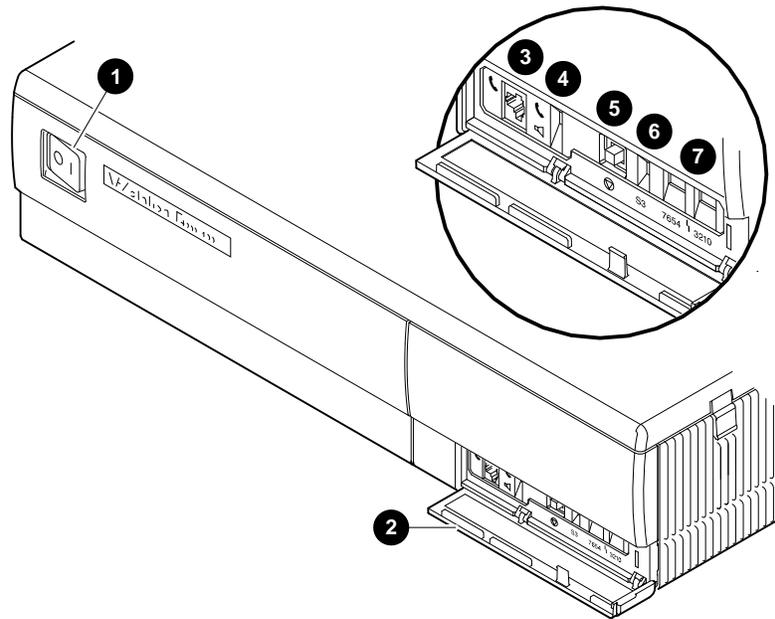
MLO-008072

Front Panel Components

Table 2–14 describes the front panel components.

Table 2–14 VAXstation 4000 Models 60 and 90: Front Panel Components

Item	Component	Function
❶	On/Off switch	Power switch for system unit.
❷	Front door	Protects switches.
❸	Headset jack	For audio output to a headset (software controlled).
❹	Audio speaker switch	Turns speaker on (down) and off (up).
❺	Halt button	Used to put the system into console mode.
❻	Alternate console switch	Set to the up position to select a terminal as an alternate console for testing purposes, or to the down position to return to normal use of the workstation monitor.
❼	Diagnostic lights	Show status of the system during diagnostic tests.

Rear Panel   Figure 2–23 shows the ports, switches, and indicators on the
back of the system unit.

Figure 2–23 VAXstation 4000 Models 60 and 90: Rear Panel

MLO-008073
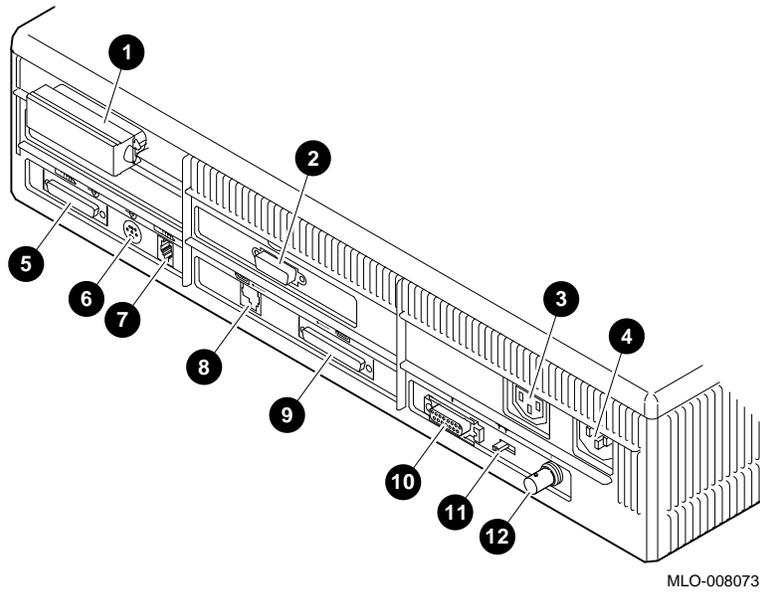
**Rear Panel
Description**

Table 2–15 describes the rear panel components.

**Table 2–15 VAXstation 4000 Models 60 and 90: Rear Panel
Components**

Item	Component	Function
❶	SCSI port	Connects small computer system interface (SCSI) peripheral devices to the system unit. The system comes with a SCSI terminator preinstalled. Remove this terminator to attach external options to the system unit or expansion boxes.
❷	Monitor video port	Connects the monitor video cable.
❸	Monitor power port	Connects the monitor power cord.
❹	System power port	Connects the system unit power cord.
❺	Remote mouse/ keyboard port	Connects the remote mouse and keyboard cable.
❻	Mouse port	Connects the mouse cable.
❼	Keyboard port	Connects the keyboard cable.
❽	Printer/ communications port (TTA3)	Primarily for connecting a printer or hardcopy terminal through an RS423 cable. OpenVMS does not support modems on this port.
❾	Communications/ printer port (TTA2)	Primarily for connecting an asynchronous communications device such as a modem, through an RS232 cable. The secondary use is to attach a printer or hardcopy terminal.
❿	Standard Ethernet port	Connects to a standard Ethernet network.

Table 2–15 (Cont.)   VAXstation 4000 Models 60 and 90: Rear Panel Components

Item	Component	Function
⓫	Network switch	Selects either ThinWire Ethernet or standard Ethernet. Move the switch to the left for standard Ethernet or to the right for ThinWire Ethernet.
⓬	ThinWire Ethernet port	Connects to a ThinWire Ethernet network.

VAXstation 4000 Model VLC

Side Panel   Figure 2–24 shows the ports and controls on the side of the system unit.

Figure 2–24 VAXstation 4000 Model VLC: Side Panel

Keyboard Port
Alternate Console Switch   Mouse Port
Halt Button
Headset Jack
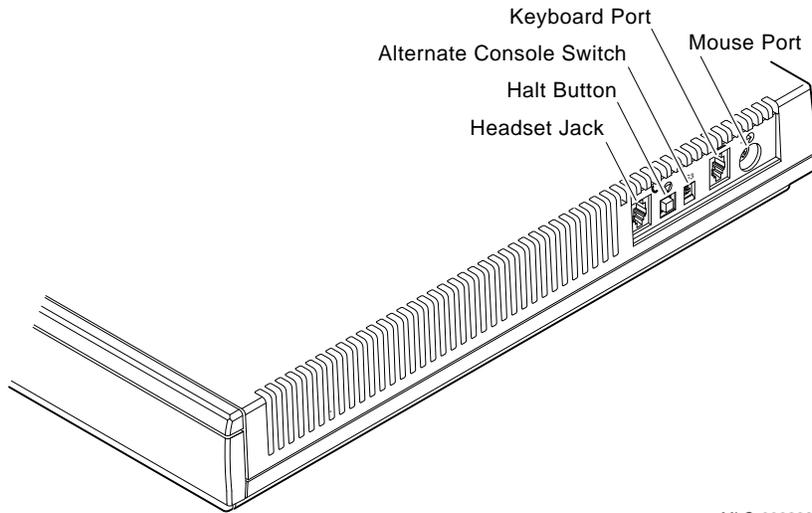
MLO-009238

Side Panel Description

Table 2–16 describes the side panel components.

Table 2–16 VAXstation 4000 Model VLC: Side Panel

Component	Function
Headset jack	Connects an optional headset for audio input and output.
Halt button	Halts the system and puts it into console mode.
Alternate console switch	Connects a terminal as an alternate display device for testing purposes.
Keyboard port	Connects the keyboard cable.
Mouse port	Connects the mouse or an alternate pointing device.

Rear Panel

Figure 2–25 shows the ports and controls on the back of the system unit.

Figure 2–25 VAXstation 4000 Model VLC: Rear Panel
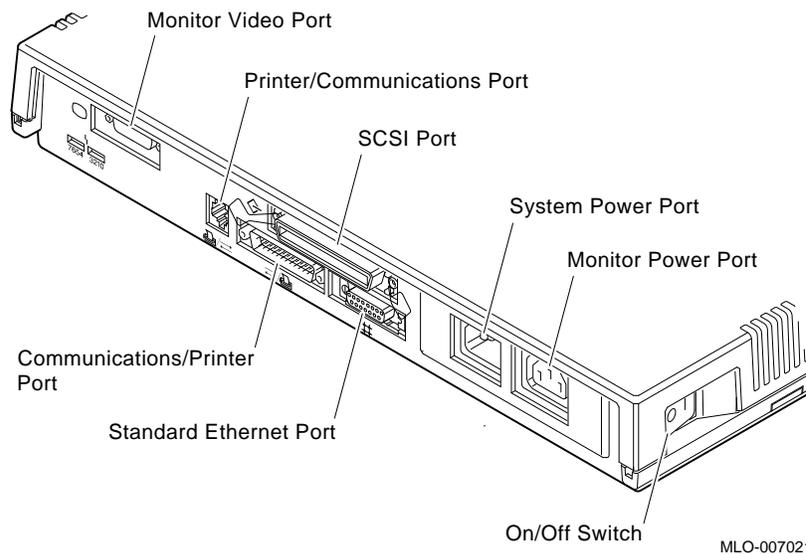
**Rear Panel
Description**

Table 2–17 describes the rear panel components.

Table 2–17   VAXstation 4000 Model VLC: Rear Panel

Component	Function
Monitor video port	Connects the monitor video cable.
Printer/communications port	For connecting a DEC423 — DECconnect cable-compatible printer or hardcopy terminal, or for connecting a communications device.
Communications/printer port	For connecting an asynchronous communications device such as a modem, or for connecting a printer or hardcopy terminal.
SCSI port	Connects small computer system interface (SCSI) peripheral devices.
Standard Ethernet port	Connects to a standard Ethernet network.
Monitor power port	Connects the monitor power cord.
System power port	Connects the system power cord.
On/Off switch	Turns the system power on and off.

3
Console Commands

Introduction　　　The console subsystem provides the means to control and
monitor systems operations. When the console control program
is in the console I/O mode of operation, you can enter commands
to display information about the system and to set various
system parameters.

This chapter describes the console I/O mode of operation,
summarizes all console commands, and describes the more
commonly used commands.

Topics include:

- Console I/O mode

- Changing the console language

- Console security feature: VAX 4000 model 100 and
  VAXstation 4000 systems

- Console command descriptions

Console I/O Mode

**How the
System Enters
Console I/O
Mode**

The console control program enters console I/O mode when the
system is powered on for the first time. The action taken on a
subsequent power up depends on the settings of certain system
hardware or software controls.

VAX 4000 systems

On these systems, the action taken on a subsequent power up
depends on the position of the Break Enable/Disable switch and
the setting of the halt action flag.

The console control program will enter console I/O mode on
power up if:

- The Break Enable/Disable switch is set to enable, OR

- The switch is set to disable and the default halt action was
  set to HALT by the last SET HALT console command.

VAXstation 4000 systems

On these systems, the console program will enter console I/O
mode if the halt action was set to HALT by the last SET HALT
console command. VAXstation 4000 systems do not have a Break
Enable/Disable switch.

Console I/O Mode Control Characters

Table 3–1 lists the keyboard control characters that have special meaning in console I/O mode.

Table 3–1 Console I/O Mode Control Characters

Character	Function
Return	Ends a command line. No action is taken on a command until it is terminated by a carriage return.
⊠ (rubout)	Deletes the previously typed character.
	On a **video** terminal, the previous character is erased and the cursor is restored to its previous position.
	On a **hardcopy** terminal, each time the ⊠ key is pressed, the console echoes a backslash (\) followed by the character deleted. If you type a non-rubout character, the console echoes another backslash, followed by the character typed. The result is to echo the characters deleted, surrounded by backslashes.
Ctrl/A or F14	Toggles insertion/overstrike mode for command line editing. By default, the console powers up to overstrike mode.
Ctrl/C	Aborts processing of a command. Has no effect as part of a binary load data stream. Clears Ctrl/S and reenables output stopped by Ctrl/O.
Ctrl/D or ←	Moves the cursor one position to the left.
Ctrl/E	Moves the cursor to the end of the line.
Ctrl/F or →	Moves the cursor one position to the right.
Ctrl/B, ⇑, or ⇓	Recalls previous commands.
Ctrl/H or F12	Same as ⊠ (rubout), above.

(continued on next page)

Table 3–1 (Cont.)   Console I/O Mode Control Characters

Character	Function
Ctrl/O	Suspends output to the console until you enter Ctrl/O again. Output stream data continues to be sent to the console but is not displayed. Output display is resumed if the console prints an error message or when the end of the output stream is reached (console prompts for the next command). Output is also resumed by entering Maintenance mode: Break or Ctrl/C.
Ctrl/Q	Resumes the display of an output stream that was suspended by Ctrl/S. On pressing Ctrl/Q, output stream data is resumed from the point where it was suspended.
Ctrl/R	Echoes the current command line. Useful for improving command line readability on edited command lines.
Ctrl/S	Suspends output to the console terminal until you enter Ctrl/Q. On pressing Ctrl/Q, output stream data is resumed from the point where it was suspended.
Ctrl/U	Echoes ^U<CR>. Entered, but otherwise ignored if typed on an empty line.

**Entering
Console
Commands**

Command line length

Console commands can be up to 80-characters long. Longer
commands produce error messages. The character count does not
include rubouts, rubbed-out characters, or the ⌑Return⌑ at the end
of the command.

Spaces and tabs

Multiple spaces and tabs are treated as a single space. Leading
and trailing spaces and tabs are ignored.

Numerics

Enter all numbers (addresses, data, counts) in hexadecimal
except for symbolic register names. Enter the numeric portion
of the register name in decimal. Hexadecimal digits include the
numbers 0 through 9 and the alpha characters A through F.

Command line case

You can enter commands in uppercase or lowercase letters,
including hexadecimal digits (A through F).

Qualifiers

You can place command qualifiers after the command keyword or
after any symbol or number in the command.

The following symbols denote qualifier and argument
conventions:

[ ]   Optional qualifier or argument

{}   Required qualifier or argument

Console Command Summary

Table 3–2 is a summary of VAX 4000 and VAXstation 4000 console I/O mode commands. Some of the commands in the table may not apply to your system. To display a list of supported commands, enter the following command at the console prompt:

>>> **HELP**

Table 3–2   Console I/O Mode Command Summary

Command	Function
BOOT	Initializes the processor and transfers execution to the VMB, the primary bootstrap program.
CONFIGURE	Invokes an interactive mode that allows you to enter Q22–bus device names, then generates a table of Q22–bus I/O page device CSR addresses and interrupt vectors.
CONTINUE	Resumes instruction execution at the point where a halt occurred. Does not initialize the processor.
DEPOSIT	Deposits data into the address you specify. If you do not specify an address space or data size qualifier, the console uses the last address space and data size used in a DEPOSIT, EXAMINE, MOVE, or SEARCH command.
EXAMINE	Examines the contents of the memory location or register of the address you specify.
FIND	Searches main memory starting at address 0 (zero) for a page-aligned 128 kB segment of good memory, or a restart parameter block (RPB).
HALT	Has no effect. Is included for compatibility with other VAX consoles.
HELP	Displays the correct syntax for all console commands.
INITIALIZE	Performs a processor initialization.

Table 3–2 (Cont.)   Console I/O Mode Command Summary

Command	Function
LOGIN[1]	Places the console in privileged console mode.
	When the console security feature is enabled and you put the system in console mode, the system operates in unprivileged console mode. You can access only a subset of the console commands. To access the full range of console commands, use the LOGIN command. This command may only be executed in secure console mode.
MOVE	Copies a block of memory starting at the source address to a block beginning at the destination address.
NEXT	Executes the number of macroinstructions you specify. If you do not specify a number, 1 (one) is assumed.
REPEAT	Repeatedly displays and executes the command you specify. Press Ctrl/C to stop the command. You can specify any valid console command except the REPEAT command.
SEARCH	Finds all occurrences of a pattern and reports the addresses where the pattern was found. If you include the /NOT qualifier, the command reports all addresses for which the pattern did not match.
SET BFLAG	Sets the default R5 boot flags. The value must be a hexadecimal number of up to eight digits.
SET BOOT	Sets the default boot device. The value must be a valid device name.
SET CONTROLP	Sets Ctrl/P as the console halt condition, instead of a BREAK.

[1]VAX 4000 Model 100 and VAXstation 4000 systems.

Table 3–2 (Cont.) Console I/O Mode Command Summary

Command	Function
SET DIAGENV[1]	Determines the default diagnostic environment for the system. The values are: 1 for customer (default), 2 for Digital Services, and 3 for manufacturing.
SET FBOOT[1]	Defines the system tests to be run at startup. The values are: 0 to test all components (default), 1 to test all components except memory. Excluding memory tests can reduce startup time.
SET HALT	Sets the default halt action. You can enter a keyword: default, restart, reboot, halt, restart_reboot, or a number in the range 0 to 4.
SET HOST	Connects to the DUP or MAINTENANCE driver on the node or device you specify.
SET LANGUAGE	Sets the console language and keyboard type.
SET PSE[1]	Enables or disables the console security feature. The command accepts the following values: 0 — Disables console security 1 — Enables console security When the console security feature is enabled, only a subset of the console commands are available to the user. To enable the complete set of console commands once the console security feature is enabled, use the LOGIN command.
SET PSWD[1]	Allows you to set or change the console security password.
SET RECALL	Sets command recall state to either ENABLED (1) or DISABLED (0).

[1]VAX 4000 Model 100 and VAXstation 4000 systems.

(continued on next page)

Table 3–2 (Cont.) Console I/O Mode Command Summary

Command	Function
SET SCSI_ID[1]	Sets the SCSI ID of the SCSI controller to a number in the range 0 to 7. The SCSI ID of the SCSI controller is set to 6 by default.
SHOW BFLAG	Displays the default R5 boot flags.
SHOW BOOT	Displays the default boot device.
SHOW CONFIG	Displays the system configuration and information about the devices the firmware has tested. Also displays the most recent errors detected by device tests.
SHOW CONTROLP	Shows the current state of Control-P halt recognition, either ENABLED or DISABLED.
SHOW DEVICE	Displays all devices on the system.
SHOW DSSI	Displays the status of all nodes that can be found on the DSSI bus. For each node on the DSSI bus, the firmware displays the node number, node name, boot name, and device type, if available. Does not indicate whether the device contains a bootable image.
SHOW ETHERNET	Displays the hardware Ethernet address for all Ethernet adapters that can be found, both on-board and on the Q22–bus.
SHOW HALT	Displays the halt action. Keywords include: default, restart, reboot, halt, restart_reboot, or a number in the range 0 to 4.
SHOW LANGUAGE	Displays console language and keyboard type.
SHOW MEMORY	Displays main memory configuration, board by board.
SHOW PSE[1]	Displays the state of the console security feature.

[1]VAX 4000 Model 100 and VAXstation 4000 systems.

(continued on next page)

Table 3–2 (Cont.) Console I/O Mode Command Summary

Command	Function
SHOW QBUS	Displays all Q22–bus I/O addresses that respond to an aligned word read, plus vector and device name information. For each address, the console displays the address in the VAX I/O space in hexadecimal, the address as it would appear in the Q22–bus I/O space in octal, and the word that was read in hexadecimal. Also displays the vector that you should set up, and device name or names that could be associated with the CSR.
SHOW RECALL	Displays the current state of command recall, either ENABLED or DISABLED.
SHOW RLV12	Displays all RL01 and RL02 disks that appear on the Q22–bus.
SHOW SCSI[1]	Shows any SCSI devices in the system.
SHOW TRANSLATION	Shows any virtual addresses that map to the specified physical address.
SHOW UQSSP	Displays the status of all disks and tapes found on the Q22–bus that support the UQSSP protocol. For each such disk or tape on the Q22–bus, the firmware displays the controller number, the controller CSR address, and the boot name and type of each device connected to the controller. The command does not indicate whether the device contains a bootable image.
SHOW VERSION	Displays the current firmware version.

[1]VAX 4000 Model 100 and VAXstation 4000 systems.

Table 3–2 (Cont.)   Console I/O Mode Command Summary

Command	Function
START	Starts instruction execution at the address you specify. If you do not give an address, the current program counter is used. If memory mapping is enabled, macroinstructions are executed from virtual memory, and the address is treated as a virtual address. Equivalent to a DEPOSIT to PC, followed by a CONTINUE. Does not perform a processor initialization.
TEST	Invokes a diagnostic test program specified by the test number you enter. If you enter a test number of 0 (zero), all tests allowed to be executed from the console terminal are executed. The console accepts an optional list of up to five additional hexadecimal arguments.
UNJAM	Performs an I/O bus reset by writing a 1 (one) to IPR 55 (decimal).
X	Loads or unloads (writes to, or reads from memory) the specified number of data bytes through the console serial line (regardless of console type), starting at the specified address. For use by automatic systems communicating with the console.
!	Character can be used to document command sequences. The comment character can appear anywhere on the command line. All characters following the comment character are ignored.

Changing the Console Language

**Entering
Language
Inquiry Mode**

VAX 4000 and VAXstation 4000 systems all support a feature that allows you to change the language used by the console program. When the console is in Language Inquiry Mode, you select the language of your choice from a menu of languages displayed on the console terminal.

The manner in which the console enters Language Inquiry Mode depends on the system, as follows:

System	How to Enter Language Inquiry Mode
VAX 4000 systems (except Model 100)	Set the Power-Up Mode switch to the Language Inquiry Mode position before you power on the system. This position is indicated by the profile of a face on the switch.
VAX 4000 Model 100	Issue the console command: >>> **SET LANGUAGE**
VAXstation 4000	Issue the console command: >>> **SET KBD**

Sample Language Selection Menu, VAX 4000 Systems

Figure 3–1 shows the language selection menu displayed on a VAX 4000 system.

Figure 3–1 Language Selection Menu, VAX 4000 System

```
KA6nn-A Vn.n VMB n.n

 1) Dansk
 2) Deutsch (Deutschland/Osterreich)
 3) Deutsch (Schweiz)
 4) English (United Kingdom)
 5) English (United States/Canada)
 6) Español
 7) Français (Canada)
 8) Français (France/Belgique)
 9) Français (Suisse)
10) Italiano
11) Nederlands
12) Norsk
13) Português
14) Suomi
15) Svenska
 (1..15):
```

Select a language by entering the number listed next to the language. Save the language by rotating the Power-Up Mode switch to run mode, indicated by an arrow. The new language will be the default on subsequent reboots of the system.

_____ **Note** _____

If you do not select a language within 30 seconds, the system defaults to English (United States/Canada).

_____

Sample Language Selection Menu, VAXstation 4000 Systems

Figure 3–2 shows the language selection menu for a VAXstation 4000 system.

Figure 3–2 Language Selection Menu, VAXstation 4000 System

```
>>> SET KBD

0) Dansk                       8) Français (Suisse Romande)
1) Deutsch                     9) Italiano
2) Deutsch (Schweiz)          10) Nederlands
3) English                    11) Norsk
4) English (British/Irish)    12) Português
5) Español                    13) Suomi
6) Français                   14) Svenska
7) Français (Canadien)        15) Vlaams

3 >>>
```

Select the language from the menu by entering its number. The new language will be the default on subsequent system reboots.

Console Security Feature: VAX 4000 Model 100 and VAXstation 4000 Systems

Overview

VAX 4000 Model 100 and VAXstation 4000 systems support a console security feature that allows you to disable most of the console commands.

When the security feature is enabled, only privileged users (those who know the security password) can use the full range of console commands. When the console is in privileged mode, only the following commands can be entered:

LOGIN	Allows a privileged user to gain entry to the privileged state.
BOOT	Allows a nonprivileged user to boot from default boot device. The command can only be issued without parameters.
CONTINUE	Allows a nonprivileged user to continue operations if the Halt button is accidentally pressed.

Setting the Security Password

The console security feature is disabled when the system is installed. To set the security password, follow the sample procedure shown in Example 3–1.

Example 3–1 Setting the Console Security Feature

```
>>> SET PSWD ❶
>>> PSWD1 : {password} ❷
>>> PSWD2 : {password} ❸
>>>  ! Next console command ❹
```

❶ Request the set password dialog.

❷ Enter the password in response to the system prompt (the prompt displayed is system dependent).

The password must be a string of **exactly** 16 hexadecimal characters (0 to 9 and A to F). The system does not echo the password on the console.

❸ Verify the password by entering it a second time.

❹ If you enter the same password both times, the system saves the password in non-volatile memory.

If you enter a different password, the system displays an error message. Repeat steps ❶ through ❸ if you receive an error message.

Once you set the password, write it down and store it in a safe place. If you forget the password, you must call Digital Services to disable the console security feature.

Enabling the Console Security Feature

After setting the security password, you must enable the console security feature, by entering the following command at the console prompt:

```
>>>  SET PSE 1
```

**Logging in
to Privileged
Console Mode**

When the console security feature is enabled, you must enter
the security password to log in to privileged console mode. In
privileged console mode you can use the full range of console
commands.

To log in to privileged console mode, follow the sample procedure
shown in Example 3–2. The procedure is specific to VAX 4000
Model 100 systems, but is similar for VAXstation 4000 systems.
You must have previously set the security password (SET PSWD
command).

Example 3–2 Logging in to Privileged Console Mode

```
>>> LOGIN ❶
>>> Password: {password} ❷
>>> ! Privileged console command ❸
```

❶ Request entry to privileged mode.

❷ Enter the security password in response to the system
prompt (the prompt displayed is system-dependent).

❸ If you enter the correct password, the system returns the
console prompt and you become a privileged user.

If you enter the wrong password, the system displays an
error message before returning the console prompt. Repeat
steps ❶ and ❷ if you receive an error message.

**Changing
the Security
Password**

You must be a privileged user to change the security password.

To change the password, follow the sample procedure shown in
Example 3–3. The procedure is specific to VAX 4000 Model 100
systems, but is similar for VAXstation 4000 systems.

Example 3–3 Changing the Console Security Password

```
>>> LOGIN ❶
>>> Password: {old password} ❷
>>> SET PSWD  ❸
>>> PSWD1 : {new password}  ❹
>>> PSWD2 : {new password} ❺
>>>  ! Next console command ❻
```

❶ Log in as a privileged user.

❷ Enter the old password in response to the system prompt.

❸ Enter the command to set a new password.

❹ Enter the new password in response to the system prompt.

   The password must be a string of **exactly** 16 hexadecimal
   characters (0 to 9 and A to F). The system does not echo the
   password on the console.

❺ Verify the new password by entering it a second time.

❻ If you enter the same password both times, the system saves
   the new password in non-volatile memory and returns the
   console prompt.

   If you enter the wrong password, the system displays an
   error message before returning the console prompt. Repeat
   steps ❶ through ❺ if you receive an error message.

After you set the new password, write it down and store it in a
safe place. If you forget the password, you must call a Digital
Services representative to disable the console security feature.

Disabling the Console Security Feature

When you disable the console security feature, all users can use the full range of console commands. To disable the console security feature, follow the sample procedure below.

Example 3–4 Disabling the Console Security Feature

```
>>> LOGIN ❶
Password: {password}
>>> SET PSE 0 ❷
>>> ! Next console command
```

❶ Log in as a privileged user.

❷ Entering a value of 0 disables the security feature.

Exiting from Privileged Console Mode

To exit from privileged console mode, enter one of the following commands:

- BOOT

- CONTINUE

- HALT

- START

When you exit from privileged mode, privileged users must enter the LOGIN command with the correct password before they can use the full range of console commands.

Console Command Descriptions

This section describes the more common console commands. Some commands may not apply to your system. For a list of commands supported on your system, enter the command:

>>> **HELP**

BOOT *Format:*

BOOT [qualifier-list] [{boot_device},{boot_device},...]

Function:

Initializes the processor and transfers execution to VMB, the primary bootstrap loader. VMB attempts to boot the operating system from the specified device or list of devices, or from the default boot device if none is specified. The console passes a boot flag bitmap (if any) to VMB in R5.

If you do not enter either the qualifier or the device name, the default value is used. Entering boot flags or a boot device overrides, but does not permanently change, the corresponding default value.

When specifying a list of boot devices (up to 32 characters, with devices separated by commas and no spaces), the system checks the devices in the order specified and boots from the first one that contains bootable software.

_____ **Note** _____

If included in a string of boot devices, the Ethernet device (for example, EZA0), should be the last device of the string. The system will continuously attempt to boot from EZA0.

_____

Qualifiers:

/R5:{boot_flags}	A 32-bit hex value passed to VMB in R5. Use the SET BFLAG command to specify a default boot flags longword. Use the SHOW BFLAG command to display the longword.
/{boot_flags}	Same as /R5:{boot_flags}
[device_name]	Character string of up to 32 characters. When specifying a list of boot devices, separate the device names by commas and no spaces. The factory default device is the Ethernet device.

Examples:

```
>>> SHOW BOOT
DKA300
>>> SHOW BFLAG
00000000
>>> B  !Boot using default boot flags and device.
(BOOT/R5:0 DKA300)

  2..
-DKA300
```

CONTINUE

Format:

CONTINUE

Function:

Causes the processor to begin instruction execution at the address currently contained in the program counter (PC). This address is the address stored in the PC when the system entered console mode or an address that the user specifies using the DEPOSIT command. The CONTINUE command does not perform a processor initialization. The console enters program I/O mode.

Example:

```
>>> CONTINUE
$                   !VMS DCL prompt
```

DEPOSIT

Format:

DEPOSIT [qualifier-list] {address} {data} [data...]

Function:

Deposits data into the address specified. If you do not specify an address space or data size qualifier, the console uses the last address space and data size used in a DEPOSIT, EXAMINE, MOVE, or SEARCH command. After processor initialization, the default address space is physical memory and the default data size is longword. If you specify conflicting address space or data sizes, the console ignores the command and issues an error message.

Qualifiers:

Data control: /B, /W, /L, /Q, /N:{count}, /STEP:{size}, /WRONG

Address space control: /G, /I, /M, /P, /V, /U

Arguments:

{address}	A longword address that specifies the first location into which data is deposited. The address can be an actual address or a symbolic address.
{data}	The data to be deposited. If the specified data is larger than the deposit data size, the firmware ignores the command and issues an error response. If the specified data is smaller than the deposit data size, it is extended on the left with zeros.
[{data}]	Additional data to be deposited (as many as can fit on the command line).

Examples:

```
>>> D/P/B/N:1FF 0 0          ! Clear first 512 bytes of
                             ! physical memory.

>>> D/V/L/N:3 1234 5         ! Deposit 5 into four longwords
                             ! starting at virtual memory address
                             ! 1234.
>>> D/N:8 R0 FFFFFFFF        ! Loads GPRs R0 through R8 with -1.

>>> D/L/P/N:10/ST:200 0 8    ! Deposit 8 in the first longword of
                             ! the first 17 pages in physical
                             ! memory.

>>> D/N:200 - 0              ! Starting at previous address, clear
                             ! 513 longwords or 2052 bytes.
```

EXAMINE

Format:

EXAMINE [qualifier-list] [address]

Function:

Examines the contents of the memory location or register specified by the address. If no address is specified, + is assumed. The display line consists of a single character address specifier, the physical address to be examined, and the examined data.

EXAMINE uses the same qualifiers as DEPOSIT. However, the /WRONG qualifier causes EXAMINE to ignore ECC errors on reads from physical memory. The EXAMINE command also supports an /INSTRUCTION qualifier, which will disassemble the instructions at the current address.

Qualifiers:

Data control: /B, /W, /L, /Q, /N:{count}, /STEP:{size}, /WRONG

Address space control: /G, /I, /M, /P, /V, /U

Command-specific:

/INSTRUCTION   Disassembles and displays the VAX MACRO–32 instruction at the specified address.

Argument:

[{address}]   A longword address that specifies the first location to be examined. The address can be an actual or a symbolic address. If no address is specified, + is assumed.

Examples:

```
>>> EX PC                     ! Examine the PC.
  G 0000000F FFFFFFFC
>>> EX SP                     ! Examine the SP.
  G 0000000E 00000200
>>> EX PSL                    ! Examine the PSL.
  M 00000000 041F0000
>>> E/M                       ! Examine PSL another way.
  M 00000000 041F0000
>>> E R4/N:5                  ! Examine R4 through R9.
  G 00000004 00000000
  G 00000005 00000000
  G 00000006 00000000
  G 00000007 00000000
  G 00000008 00000000
  G 00000009 801D9000

>>> EX PR$_SCBB               ! Examine the SCBB, IPR 17
  I 00000011 2004A000         ! (decimal).

>>> E/P 0                     ! Examine local memory 0.
  P 00000000 00000000

>>> EX /INS 20040000          ! Examine 1st byte of ROM.
  P 20040000   11 BRB    20040019

>>> EX /INS/N:5 20040019      ! Disassemble from branch.
  P 20040019   D0 MOVL   I^#20140000,@#20140000
  P 20040024   D2 MCOML  @#20140030,@#20140502
  P 2004002F   D2 MCOML  S^#0E,@#20140030
  P 20040036   7D MOVQ   R0,@#201404B2
  P 2004003D   D0 MOVL   I^#201404B2,R1
  P 20040044   DB MFPR   S^#2A,B^44(R1)

>>> E/INS                     ! Look at next instruction.
  P 20040048   DB MFPR   S^#2B,B^48(R1)


>>>
```

FIND

Format:

FIND [qualifier-list]

Function:

Searches main memory, starting at address zero, for a page-aligned 128 kB segment of good memory, or a restart parameter block (RPB). If the command finds the segment or RPB, its address plus 512 is left in SP (R14). If it does not find the segment or RPB, the console issues an error message and preserves the contents of SP. If you do not specify a qualifier, /RPB is assumed.

Qualifiers:

/MEMORY   Searches memory for a page-aligned block of good memory, 128 kB in length. The search looks only at memory that is deemed usable by the bitmap. This command leaves the contents of memory unchanged.

/RPB   Searches all physical memory for an RPB. The search does not use the bitmap to qualify which pages are looked at. The command leaves the contents of memory unchanged.

Examples:

```
>>> EX SP                  ! Check the SP.
  G 0000000E 00000000
>>> FIND /MEM              ! Look for a valid 128 kB.
>>> EX SP                  ! Note where it was found.
  G 0000000E 00000200
>>> FIND /RPB              ! Check for valid RPB.
?2C FND ERR 00C00004       ! None to be found here.
>>>
```

HALT

Format:

HALT

Function:

Command has no effect; included only for compatibility with other VAX system consoles.

HELP

Format:

HELP

Function:

Provides information about command syntax and usage.

Example:

The HELP screen display is system-dependent.

INITIALIZE

Format:

INITIALIZE

Function:

Initializes the processor. The hardware components initialized are system-dependent.

Example:

```
>>> INIT
```

LOGIN

Format:

LOGIN

Function:

Allows you to put the system in privileged console mode.

If console security is enabled when you put the system in console mode, the system operates in unprivileged console mode. You can access only a subset of the console commands.

To access the full range of console commands, you must use the LOGIN command. The command may only be executed in secure console mode. When you enter LOGIN, the system prompts for a password as follows:

```
Password:
```

You must enter the current console security password. If you do not enter the correct password, the system displays an error message.

When you enter the console security password, the system operates in privileged console mode. The system exits from privileged console mode when you enter one of the following console commands:

- BOOT
- CONTINUE
- HALT
- START

MOVE

Format:

MOVE [qualifier-list] {src_address} {dest_address}

Function:

Copies a block of memory starting at the source address to a block beginning at the destination address. Typically, this command has an /N qualifier so that more than one datum is transferred.

The MOVE command performs byte, word, longword, and quadword reads and writes as needed to move the data. Moves are supported only for the physical and virtual address spaces.

Qualifiers:

Data control: /B, /W, /L, /Q, /N:{count}, /STEP:{size}, /WRONG

Address space control: /V, /U, /P

Arguments:

{src_address}	A longword address that specifies the first location of the source data to be copied.
{dest_address}	A longword address that specifies the destination of the first byte of data. These addresses may be an actual address or a symbolic address. If no address is specified, + is assumed.

Example:

```
>>> EX/N:3 0            ! Observe destination.
P 00000000 00000000
P 00000004 00000000
P 00000008 00000000
P 0000000C 00000000
>>> EX/N:3 200          ! Observe source data.
P 00000200 58DD0520
P 00000204 585E04C1
P 00000208 00FF8FBB
P 0000020C 5208A8D0
>>> MOV/N:3 200 0       ! Move the data.
>>> EX/N:4 0            ! Observe moved data.
P 00000000 58DD0520
P 00000004 585E04C1
P 00000008 00FF8FBB
P 0000000C 5208A8D0
>>>
```

NEXT

Format:

NEXT {count}

Function:

Executes the specified number of macroinstructions. If no count is specified, 1 is assumed. After the last macroinstruction is executed, the console re-enters console I/O mode.

The console enters Spacebar Step Mode. In this mode, subsequent spacebar strokes initiate single steps and a carriage return forces a return to the console prompt.

The following restrictions apply:

- If memory management is enabled, the NEXT command works only if the first page in SSC RAM is mapped in S0 (system) space.

- Overhead associated with the NEXT command affects execution time of an instruction.

- The NEXT command elevates the IPL to 31 for long periods of time (milliseconds) while single-stepping over several commands.

- Unpredictable results occur if the macroinstruction being stepped over modifies either the SCBB or the trace trap entry. This means that you cannot use the NEXT command in conjunction with other debuggers.

Argument:

{count}   A value representing the number of macroinstructions to execute.

Examples:

```
>>> DEP 1000 50D650D4            ! Create a simple program.
>>> DEP 1004 125005D1
>>> DEP 1008 00FE11F9
>>> EX /INSTRUCTION /N:5 1000    ! List it.
 P 00001000   D4 CLRL    R0
 P 00001002   D6 INCL    R0
 P 00001004   D1 CMPL    S^#05,R0
 P 00001007   12 BNEQ    00001002
 P 00001009   11 BRB     00001009
 P 0000100B   00 HALT
>>> DEP PR$_SCBB 200             ! Set up a user SCBB...
>>> DEP PC 1000                  ! ...and the PC.
>>>
>>> N                           ! Single step...
 P 00001002   D6 INCL    R0       ! SPACEBAR
 P 00001004   D1 CMPL    S^#05,R0 ! SPACEBAR
 P 00001007   12 BNEQ    00001002 ! SPACEBAR
 P 00001002   D6 INCL    R0       ! CR
>>> N 5                         ! ...or multiple step the program.
 P 00001004   D1 CMPL    S^#05,R0
 P 00001007   12 BNEQ    00001002
 P 00001002   D6 INCL    R0
 P 00001004   D1 CMPL    S^#05,R0
 P 00001007   12 BNEQ    00001002
>>> N 7
 P 00001002   D6 INCL    R0
 P 00001004   D1 CMPL    S^#05,R0
 P 00001007   12 BNEQ    00001002
 P 00001002   D6 INCL    R0
 P 00001004   D1 CMPL    S^#05,R0
 P 00001007   12 BNEQ    00001002
 P 00001009   11 BRB     00001009
>>> N
 P 00001009   11 BRB     00001009
>>>
```

REPEAT

Format:

REPEAT {command}

Function:

Repeatedly displays and executes the specified command. Press
Ctrl/C to stop the command. You can specify any valid console
command except the REPEAT command.

Argument:

{command}   A valid console command other than REPEAT.

Example:

```
>>> REPEAT EX PR$_TODR   !Watch the clock.
  I 0000001B 5AFE78CE
  I 0000001B 5AFE78D1
  I 0000001B 5AFE78FD
  I 0000001B 5AFE7900
  I 0000001B 5AFE7903
  I 0000001B 5AFE7907
  I 0000001B 5AFE790A
  I 0000001B 5AFE790D
  I 0000001B 5AFE7910
  I 0000001B 5AFE793C
  I 0000001B 5AFE793F
  I 0000001B 5AFE7942
  I 0000001B 5AFE7946
  I 0000001B 5AFE7949
  I 0000001B 5AFE794C
  I 0000001B 5AFE794F
  I 0000001B 5^C
>>>
```

SEARCH

Format:

SEARCH [qualifier-list] {address} {pattern} [{mask}]

Function:

Finds all occurrences of a pattern and reports the addresses where the pattern was found. If the /NOT qualifier is present, the command reports all addresses in which the pattern did not match.

SEARCH accepts an optional mask that indicates bits to be ignored (*don't care* bits). For example, to ignore bit 0 in the comparison, specify a mask of 1. The mask, if not present, defaults to 0.

A match occurs if (pattern and not mask) = (data and not mask), where:

> Pattern is the target data
> Mask is the optional don't care bitmask (which defaults to 0)
> Data is the data at the current address

SEARCH reports the address under the following conditions:

/NOT Qualifier	Match Condition	Action
Absent	True	Report address
Absent	False	No report
Present	True	No report
Present	False	Report address

The address is advanced by the size of the pattern (byte, word, longword, or quadword), unless overridden by the /STEP qualifier.

Qualifiers:

Data control: /B, /W, /L, /Q, /N:{count}, /STEP:{size}, /WRONG

Address space control: /P, /V, /U

Command specific:

/NOT   Inverts the sense of the match.

Arguments:

{start_address}	A longword address that specifies the first location subject to the search. This address can be an actual address or a symbolic address. If no address is specified, + is assumed.
{pattern}	The target data.
[{mask}]	A mask of the bits desired in the comparison.

Examples:

```
>>> DEP /P/L/N:1000 0 0          ! Clear some memory.
>>>
>>> DEP 300 12345678             ! Deposit some search data.
>>> DEP 401 12345678
>>> DEP 502 87654321
>>>
>>> SEARCH /N:1000 /ST:1 0 12345678   ! Search for all occurrences
 P 00000300 12345678             ! of 12345678 on any byte
 P 00000401 12345678             ! boundary.  Then try on
>>> SEARCH /N:1000 0 12345678    ! longword boundaries.
 P 00000300 12345678             ! Search for all non-zero
>>> SEARCH /N:1000 /NOT 0 0      ! longwords.
 P 00000300 12345678
 P 00000400 34567800
 P 00000404 00000012
 P 00000500 43210000
 P 00000504 00008765
>>> SEARCH /N:1000 /ST:1 0 1 FFFFFFFE ! Search for odd-numbered
                                 ! longwords on any boundary.
 P 00000502 87654321
 P 00000503 00876543
 P 00000504 00008765
 P 00000505 00000087
>>> SEARCH /N:1000 /B 0 12       ! Search for all occurrences
 P 00000303 12                   ! of the byte 12.
 P 00000404 12
>>> SEARCH /N:1000 /ST:1 /w 0 FE11   ! Search for all words that
>>>                              ! could be interpreted as
>>>                              ! a spin (10$: brb 10$).
>>>                              ! Note that none were found.
```

SET

Format:

SET {parameter} {value}

Function:

Sets the parameter to the value you specify.

Parameters:

BFLAG
: Sets the default R5 boot flags. The value must be a hex number of up to eight digits.

BOOT
: Sets the default boot device. The value must be a valid device name or list of device names as specified in the BOOT command description in BOOT.

HALT
: Sets the user-defined halt action. Acceptable values are the keywords "default," "restart," "reboot," "halt," "restart_reboot," or a number in the range 0 to 4 inclusive.

HOST
: Makes a DUP connection to a DSSI device.

LANGUAGE
: Sets console language and keyboard type. If the current console terminal does not support the multinational character set (MCS), then this command has no effect and the console message appears in English. Values are 1 through 15.

PSE
: Allows you to enable or disable the console security feature of the system. The SET PSE command accepts the following values:

> 0 — Disable console security
> 1 — Enable console security

When console security is enabled, only a subset of the console commands is available to the user. To enable the complete set of console commands once the console security feature is enabled, you must use the LOGIN command.

PSWD	Allows you to set or change the console security password.
RECALL	Sets command recall state to either ENABLED (1) or DISABLED (0).
SCSI_ID	Sets the SCSI ID of the SCSI controller to a number in the range 0 to 7. The SCSI ID of the SCSI controller is set to 6 by default.

Examples:

```
>>> SET BFLAG 220
>>> SET BOOT DUA0
>>> SET LANGUAGE 5
>>> SET HALT RESTART
```

SHOW

Format:

SHOW {parameter}

Function: Displays the console parameter you specify.

Parameters:

BFLAG	Displays the default R5 boot flags.
BOOT	Displays the default boot device.
CONFIG	Displays the system configuration. The command displays information about the devices that the firmware has tested. It also displays the device errors that the most recent device test detected.
DEVICE	Displays all devices in the system.
HALT	Shows the user-defined halt action.
DSSI	Shows the status of all nodes that are on the DSSI bus. For each node on the DSSI bus, the console displays the node number, the node name, and the boot name and type of the device, if available. The command does not indicate the "bootability" of the device.
	The node that issues the command reports a node name of "*".
	The device information is obtained from the media type field of the MSCP command GET UNIT STATUS. In the case where the node is not running or is not capable of running an MSCP server, no device information is displayed.
ETHERNET	Displays hardware Ethernet address for all Ethernet adapters that can be found. Displays as blank if no Ethernet adapter is present.
LANGUAGE	Displays console language and keyboard type. Refer to the corresponding SET LANGUAGE command for the definition.
MEMORY	Displays main memory configuration.

MEMORY/FULL	Additionally, displays the normally inaccessible areas of memory, such as the PFN bitmap pages, the console scratch memory pages, the Q22–bus scatter-gather map pages. Also reports the addresses of bad pages, as defined by the bitmap.
PSE	Displays the condition of the console security feature of the system.
QBUS	Displays all Q22–bus I/O addresses that respond to an aligned word read, and speculative device name information. For each address, the console displays the address in the VAX I/O space in hex, the address as it would appear in the Q22–bus I/O space in octal, and the word data that was read in hex.
	This command may take several minutes to complete. Press Ctrl/C to terminate the command. During execution, the command disables the scatter-gather map.
RECALL	Shows the current state of command recall, either ENABLED or DISABLED.
RLV12	Displays all RL01 and RL02 disks that appear on the Q22–bus.
UQSSP	Displays the status of all disks and tapes that can be found on the Q22–bus that support the UQSSP protocol. For each such disk or tape on the Q22–bus, the firmware displays the controller number, the controller CSR address, and the boot name and type of each device connected to the controller. The command does not indicate whether the device contains a bootable image.
	This information is obtained from the media type field of the MSCP command GET UNIT STATUS. The console does not display device information if a node is not running (or cannot run) an MSCP server.
SCSI	Shows any SCSI devices in the system.

TRANSLATION   Shows any virtual addresses that map to
                the specified physical address. The firmware
                uses the current values of page table base
                and length registers to perform its search;
                it is assumed that page tables have been
                properly built.

VERSION   Displays the current firmware version.

Examples:

```
>>> SHOW BFLAG
00000220
>>> SHOW BOOT
DUA0
>>> SHOW HALT
restart
>>>
>>> SHOW LANGUAGE
English (United States/Canada)
>>>
>>> SHOW TRANSLATION 1000
 V 80001000
>>>
>>> SHOW VERSION
KA52 Vn.n VMBn.n
>>>
>>>
>>> SHOW ETHERNET
Ethernet Adapter
-EZA0 (08-00-2B-0B-29-14)
>>>
>>> SHOW SCSI
SCSI Adapter 0 (761300), SCSI ID 7
-DKA100 (DEC TLZ04)
>>>
>>> SHOW DEVICE
DSSI Bus 0 Node 0 (SYSDSK)
-DIA10  (RF31)
DSSI Bus 0 Node 1 (R7EB3C)
-DIA11 (RF31)
DSSI Bus 0 Node 5 (TFDR1)
-MIA5 (TF85)
DSSI Bus 0 Node 6 (*)
```

Console Command Descriptions

```
DSSI Bus 1 Node 0 (SNEEZY)
-DIB0 (RF71)
DSSI Bus 1 Node 1 (DOPEY)
-DIB1 (RF71)
DSSI Bus 1 Node 7 (*) UQSSP Tape Controller 0 (774500)
-MUA0 (TK70)
Ethernet Adapter
-EZA0 (08-00-2B-06-10-42)
```

>>> **SHOW QBUS**
```
Scan of Qbus I/O Space
-20001920 (774440) = FF08 DELQA/DESQA
-20001922 (774442) = FF00
-20001924 (774444) = FF2B
-20001926 (774446) = FF08
-20001928 (774450) = FFD7
-2000192A (774452) = FF41
-2000192C (774454) = 0000
-2000192E (774456) = 1030
-20001F40 (777500) = 0020 IPCR

Scan of Qbus Memory Space
>>>
```

>>> **SHOW MEM/FULL**

```
16 MB RAM, SIMM Set (0A,0B,0C,0D) present
Memory Set 0: 00000000 to 00FFFFFF, 16 MB, 32768 good pages, 0 bad pages

Total of 16 MB, 32768 good pages, 0 bad pages, 104 reserved pages

Memory Bitmap
-00FF3000 to 00FF3FFF, 8 pages

Console Scratch Area
-00FF4000 to 00FF7FFF, 32 pages

Scan of Bad Pages
```

START

Format:

START [{address}]

Function:

Starts instruction execution at the address you specify. If no address is given, the current PC is used. If memory mapping is enabled, macroinstructions are executed from virtual memory, and the address is treated as a virtual address. The START command is equivalent to a DEPOSIT to PC, followed by a CONTINUE. It does not perform a processor initialization.

Argument:

[address]   The address at which to begin execution. This address is loaded into the user's PC.

Example:

```
>>> START 1000
```

TEST

Format:

TEST [{test_number} [{test_arguments}]]

Function:

Invokes a diagnostic test program specified by the test number. If you enter a test number of 0 (zero), the power-up diagnostics are executed. The console accepts an optional list of up to five additional hexadecimal arguments.

Arguments:

{test_number}   A two-digit hex number specifying the test to be executed.

{test_arguments}   Up to five additional test arguments. These arguments are accepted, but they have no meaning to the console.

Example:

```
>>> TEST 0
72..71..70..69..68..67..66..65..64..63..62..61..60..59..58..57..
56..55..54..53..52..51..50..49..48..47..46..45..44..43..42..41..
40..39..38..37..36..35..34..33..32..31..30..29..28..27..26..25..
24..23..22..21..20..19..18..17..16..15..14..13..12..11..10..09..
08..07..06..05..04..03..
Tests completed.
>>>
```

UNJAM

Format:

UNJAM

Function:

Performs an I/O bus reset. Resultant action is system-dependent.

Example:

```
>>> UNJAM
>>>
```

X — Binary Load and Unload

Format:

X {address} {count} CR {line_checksum} {data} {data_ checksum}

Function:

Loads or unloads (writes to, or reads from memory) the specified number of data bytes through the console serial line (regardless of console type) starting at the specified address.

The X command is for use by automatic systems communicating with the console.

! (Comment)

Format:

! (exclamation point)

Function:

Useful in documenting command sequences. The comment character can appear anywhere on the command line. All characters following the comment character are ignored.

Example:

```
>>> ! The console ignores this line.
>>>
```

4

System Startup and Shutdown Procedures

Introduction

This chapter describes the basic system startup and shutdown procedures. It is assumed that the system hardware and software were properly installed and the diagnostic software ran successfully.

Topics include:

- System startup
- System shutdown
- Other system operations

System Startup

**Startup
Procedure**

To start up the system, use the following procedure:

Step	User Action or System Response
1.	Power on the console terminal and wait for it to complete self-tests.
2.	On VAXstation 4000 and VAX 4000 Model 100 systems, power on the disk, tape, and compact disc drives, if so configured. On VAX 4000 systems, if expansion cabinets are connected to the system, power on the cabinets. **Note:** If a power control bus cable is connected between the system cabinet and the expansion cabinets, the expansion cabinets will not power on until the system cabinet is powered on.
3.	On VAX 4000 systems, if you want the console to use a language other than English, set the Power-Up Mode switch to Language Inquiry Mode (indicated by the profile of a face on the switch).
4.	Power on the system cabinet (or system unit) by setting the power switch to the 1 position.

Startup Display, VAX 4000 Systems

Figure 4–1 shows a typical startup display for a VAX 4000 system.

Figure 4–1 VAX 4000 System Startup Display

```
KAxx-A Vn.n, VMB n.n  ❶

Performing normal system tests.
66..65..64..63..62..61..60..59..58..57..56..55..54..53..52..51..
50..49..48..47..46..45..44..43..42..41..40..39..38..37..36..35..  ❷
34..33..32..31..30..29..28..27..26..25..24..23..22..21..20..19..
18..17..16..15..14..13..12..11..10..09..08..07..06..05..04..03..
Tests completed.

>>>  ❸
```

❶ CPU name, firmware version number, and VMB version number

❷ ROM based diagnostics countdown

❸ Console mode prompt

Startup Display, VAXstation 4000 Systems

Figure 4–2 shows a typical startup display for a VAXstation 4000 system.

Figure 4–2 VAXstation 4000 System Startup Display

```
KA49–A Vn.n  ❶
08–00–2B–04–03–12  ❷
32MB  ❸

                                        ❹

OK
>>>   ❺
```

NUO−0535−04−GRA

❶ CPU type and firmware version number

❷ Ethernet hardware address

❸ Memory size

❹ Status bar — increases in size as self-tests run

❺ Console mode prompt

**Startup Display
with Error, VAX
4000 Systems**

On VAX 4000 systems, errors during self-tests are indicated
by one or more error summaries, depending on the type of
error being displayed on the console terminal. A sample error
summary is shown in Figure 4–3.

Figure 4–3 VAX 4000 Startup Display, with Error

```
KA6nn-A  Vn.n  VMB n.n

Performing normal system tests.
95..94..93..92..91..90..89..88..87..86..85..84..83..82..81..80..
79..78..77..76..75..74..73..72..71..70..69..68..67..66..65..64..
63..62..61..60..59..58..57..56..55..54..53..52..51..50..49..48..
47..46..45..44..43..42..41..40..39..38..37..36..35..34..33..32..
31..30..29..28..27..26..25..24..23..22..21..20..19..18..17..16..
15..14..13..12..11..10..09..08..07..

?58 2 02 FE 0004 0000 02     ; SUBTEST_58_02, DE_SHAC_RESET.LIS

P1=00000001  P2=00000000  P3=0000000F  P4=00000000  P5=00000000
P6=00000000  P7=00000000  P8=00000000  P9=00000000 P10=00000000
r0=90000026  r1=00000000  r2=00000000  r3=00004200  r4=00000000
r5=00000000  r6=00004018  r7=20004000  r8=00004000 EPC=200618BC
Normal operation not possible.

>>>
```

Startup Display with Error, VAXstation 4000 Systems

On VAXstation 4000 systems, errors during self-tests are indicated by a double question mark followed by an error ID. A sample error message is shown in Figure 4–4.

Figure 4–4 VAXstation 4000 Startup Display with Error Message

```
KA49–A Vn.n
08–00–2B–04–03–12
32MB


??001   9   NI    0172
 ❶      ❷   ❸     ❹

?84 FAIL

>>>
```
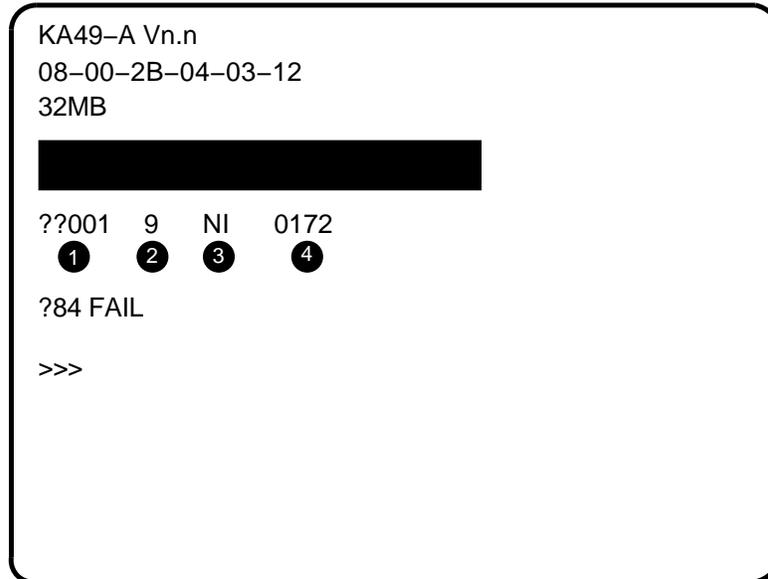
NUO−0535−05−GRA

❶ ID number

❷ Component number

❸ Component mnemonic

❹ Error message number

After You Start Up the System

After you start up the system, you need to decide if you want the system to reboot or enter console mode on a subsequent startup, after a system shutdown, or in response to a power-fail or error halt.

On VAX 4000 systems, the Break Enable/Disable switch determines the system response on startup. On VAXstation 4000 systems, the setting of the halt action determines the response.

The following table indicates how to specify the action the system is to take on startup or after a shutdown.

If you want the system to . . .	Then . . .
VAX 4000 systems	
Reboot	Set the Break Enable/Disable switch to disable
Enter console mode	Set the switch to enable
VAXstation 4000 systems	
Reboot	Issue either of the following commands:
	`>>> SET HALT REBOOT` `>>> SET HALT RESTART`
Enter console mode	Issue the command:
	`>>> SET HALT HALT`

System Shutdown

Precautions on Shutting Down the System

In the shutdown procedures that follow, you will be asked to halt the system. You should be aware that:

- Halting the system interrupts all processes.

- Halting the system may result in loss of data if the shutdown procedure is not followed properly.

- The system will halt if breaks are enabled and you press the console Break (F5) key or if you shut off the console while breaks are enabled (the system interprets the action as a break and halts).

- If the system is part of a VAXcluster, halting, restarting, or turning the system off will interrupt other processes on the cluster. Do not perform any of these activities without consulting the cluster manager.

Three Ways to Shut Down the System

Table 4–1 describes three methods for system shutdown.

Table 4–1 System Shutdown Methods

Method	System shutdown performed by...
Orderly, under program control	Executing the command procedure: SYS$SYSTEM:SHUTDOWN.COM
Emergency, under program control	Executing the program: SYS$SYSTEM:OPCCRASH.EXE
Emergency, under console control	Issuing console commands that result in a fatal machine check exception.

It is recommended that you first attempt an orderly shutdown. If that fails, attempt an emergency shutdown under program control. If that fails, issue console commands to force a machine check exception condition. For detailed information about SHUTDOWN.COM and OPCCRASH.EXE, see the *Guide to Setting Up a VMS System*.

**Orderly
Shutdown
Under Program
Control**

The procedure SYS$SYSTEM:SHUTDOWN.COM shuts down the system in an orderly manner, performing maintenance functions such as disabling future logins, stopping the batch and printer queues, dismounting volumes, and stopping user processes.

To shut down the system using SHUTDOWN.COM, use the following procedure:

Step	Action
1.	Log in to the SYSTEM account.
2.	Enter the following command: $ **@SYS$SYSTEM:SHUTDOWN**
3.	When the procedure terminates, halt the system by pressing the Halt button twice. Make sure the light on the button goes off. If the system does not have a Halt button, press the Break (F5) key.

**Emergency
Shutdown
Under Program
Control**

If you cannot perform an orderly shutdown with SHUTDOWN.COM, you can attempt an emergency shutdown by executing the program SYS$SYSTEM:OPCCRASH.EXE.

To perform an emergency shutdown with the OPCRASH program, use the following procedure:

Step	Action
1.	Log in to the SYSTEM account.
2.	Enter the following command: $ **RUN SYS$SYSTEM:OPCCRASH**
3.	When the program exits, halt the system by pressing the Halt button twice. Make sure the light on the button goes off. If the system does not have a Halt button, press the Break (F5) key.

Emergency Shutdown Under Console Control

If the operating system is in a hung state, and you cannot log in to the SYSTEM account to use SHUTDOWN or OPCCRASH, you can halt the system and enter console commands to force a system failure. This results in an immediate shutdown.

CAUTION: Use this method only if the system is in a hung state.

To force a system failure, use the following procedure:

Step	User Action or System Response
1.	On VAX 4000 systems, set the Break Enable/Disable switch to the Enable position.
2.	Stop the system. If the system has a Halt button, press it twice. Make sure the light on the button goes off. If your system does not have a Halt button, press the Break (F5) key.
3.	Examine key processor registers by issuing the following console commands:

Command	Register Contents Displayed
>>> **E PC**	Program counter
>>> **E PSL**	Processor status longword
>>> **E/I 0**	Kernel stack pointer
>>> **E +**	Executive stack pointer
>>> **E +**	Supervisor stack pointer
>>> **E +**	User stack pointer
>>> **E +**	Interrupt stack pointer
>>> **E/N:F R0**	General purpose registers

Record the register contents for later analysis.

Step	User Action or System Response
4.	Enter the following commands:

>>> **D PC FFFFFFFF**
>>> **D PSL 041F0000**

These commands will force a fatal machine check exception condition when attempting to CONTINUE program execution.

| 5. | Enter the following command: |

>>> **CONTINUE**

Step	User Action or System Response
6.	The system detects the fatal machine check condition and enters an exception handler routine.
7.	The exception handler sends the contents of memory to a dump file on the system disk. You can analyze the dump file later to determine the cause of the system hang.
8.	The system attempts a reboot.
	If reboot fails (for example, boot device not defined), reboot the system manually.
9.	After the system reboots, you can examine the dump file by:

- Logging in to the SYSTEM account

- Entering the following commands:

```
$ ANALYZE/CRASH SYS$SYSTEM:SYSDUMP.DMP
SDA> SHOW CRASH
```

For more information about the system dump analyzer (SDA), see the *VMS System Dump Analyzer Utility Manual*.

Powering Off the System

Once you complete the recommended shutdown procedure, you can turn off the system by setting the power switch to off (0).

Note: On VAX 4000 systems with expansion cabinets linked to the system cabinet by a power bus cable, you need only turn off the system unit. The expansion cabinets will power down when you set the system power switch to off. Note that the ac indicator on the expansion cabinet power supply should remain lit even though the system cabinet power is off.

Other System Operations

Restarting the System

Restarting the system returns it to the power-up state. All current and pending operations are aborted and power-up selt-tests are run.

To restart the system, press the Restart/Run button on the operator control panel. The Halt button must be out (not lit) to effect a restart operation.

CAUTION: Restarting the system aborts all current and pending operations. To prevent loss of data, warn all users to log off before restarting the system. Follow the recommended shutdown procedure before restarting the system.

Recovering from an Over Temperature Condition

If the system cabinet internal temperature reaches a certain threshold, an audible alarm will sound and the Over Temperature Warning indicator will flash. If the temperature continues to increase, the system will automatically shut down.

When the system shuts down due to overheating, the Over Temperature Warning indicator remains lit. To recover from a shutdown, set the power switch to off (0) and wait five minutes before turning on the system.

5

System Boot Procedures

Introduction

Booting is the process of loading system software into main memory. VAX 4000 and VAXstation 4000 systems include an internal ROM that contains the code necessary to boot the operating system from the default system disk or an alternate device.

This chapter overviews the boot process and describes the various boot methods and associated console commands.

Topics include:

- Boot overview
- Autobooting the system
- Manually booting the system
- Optional boot procedures
- Defining default boot actions

Boot Overview

Steps in the Boot Process

Table 5–1 describes the steps in the boot process.

Table 5–1   Boot Process

Step	Action
1.	System initiates the boot sequence, either automatically or in response to a BOOT command issued from the console.
2.	Boot procedure deposits boot control data in the CPU general-purpose registers.
3.	System loads VMB into memory from the system ROMs. VMB is the primary bootstrap program that allows access to the system disk (or alternate device).
4.	VMB locates SYS$SYSTEM:SYSBOOT.EXE on the system disk (or alternate device) and loads it into memory.
5.	SYSBOOT.EXE loads the SYSGEN parameters stored in the file SYS$SYSTEM:VAXVMSSYS.PAR and checks the state of the conversational boot flag.
6.	If the conversational boot flag is set, SYSBOOT.EXE stops and displays the SYSBOOT> prompt. If the flag is not set, SYSBOOT.EXE loads the operating system executive into memory and transfers control to the executive.
7.	When the executive finishes, it executes the SWAPPER process.
8.	The SWAPPER creates the SYSINIT process.
9.	SYSINIT creates the STARTUP process.
10.	STARTUP executes SYS$SYSTEM:STARTUP.COM (unless another file was specified at the SYSBOOT> prompt) and SYSTARTUP_V5.COM. The current values of SYSGEN parameters are written back to VAXVMSSYS.PAR.
11.	The boot process finishes, and you can log in to the operating system.

Boot Device Names

VAX 4000 and VAXstation 4000 systems support booting from a variety of devices, including disk drives, tape drives, PROM, or from another system by way of the Ethernet.

Table 5–2 lists the device names of the more commonly used boot devices.

Table 5–2 Boot Device Names

Device Type	Controller/Adapter	Device Logical Name
VAX 4000 Model 100 System		
RF-series disk	On-board DSSI adapter	DIAu
Compact disk	On-board SCSI controller	DKAxnn
Tape drive	On-board SCSI controller	MKAxnn
Ethernet	On-board adapter	EZA0
VAX 4000 Models 200/300/400/500/600		
RF-series disk	On-board DSSI adapter	DImu
	KFQSA DSSI adapter	DUcu
RRD4x drive	KZQSA adapter	DKAu
	KRQ50 controller	DUcu
TF-series tape	On-board DSSI adapter	MImu
TF85 tape	On-board DSSI adapter	MIAu
	KFQSA DSSI adapter	MUcu
TK70 tape	TQK70	MUcu

Key to device logical names

- m — DSSI bus adapter: A = bus 0; B = bus 1

  When under operating system control, DIBu devices are recognized as DIAu devices.
- c — Disk or tape controller designator: A = first, B = second, and so on
- u — unit number
- x — SCSI ID of device, (except ID 6 — reserved for SCSI controller)
- nn — SCSI logical unit number; usually 00.

Table 5–2 (Cont.)   Boot Device Names

Device Type	Controller/Adapter	Device Logical Name
VAX 4000 Models 200/300/400/500/600		
TLZ04 tape	KZQSA adapter	MKAu
Ethernet	On-board adapter	EZA0
	DESQA Ethernet controller	XQAu
PROM	MRV11 module	PRAu
VAXstation 4000 Systems		
Fixed disk	SCSI controller (in system unit or expansion box)	DKAxnn
Tape	SCSI controller (in system unit or expansion box)	MKAxnn
Ethernet	On-board adapter	ESA0

Key to device logical names

- m — DSSI bus adapter: A = bus 0; B = bus 1

  When under operating system control, DIBu devices are recognized as DIAu devices.
- c — Disk or tape controller designator: A = first, B = second, and so on
- u — unit number
- x — SCSI ID of device, (except ID 6 — reserved for SCSI controller)
- nn — SCSI logical unit number; usually 00.

**Listing
Possible Boot
Devices**

To obtain a list of boot devices available on the system, issue the
console command SHOW DEVICE.

Example 5–1 is a sample SHOW DEVICE listing for a VAX 4000
system. The system displays the device logical name preceded by
a dash (–) for each device.

Example 5–1 Sample SHOW DEVICE Display

```
>>>SHOW DEVICE
DSSI Bus 0 Node 0 (CLYDE)
-DIA0 (RF73)
DSSI Bus 0 Node 1 (BONNIE)
-DIA1 (RF73)
DSSI Bus 0 Node 5 (TFDR1)
-MIA5 (TF85)
DSSI Bus 0 Node 6 (*)
DSSI Bus 1 Node 7 (*)
UQSSP Tape Controller 0 (774500)
-MUA0 (TK70)
SCSI Adaptor 0 (761400), SCSI ID 7
-MKA0 (DEC TLZ04 1991(c)DEC)
Ethernet Adapter
-EZA0 (08-00-2B-06-10-42)
```

Boot Methods

VAX 4000 and VAXstation 4000 systems support two basic boot
methods, listed in Table 5–3.

Table 5–3 Boot Methods

Method	Description
Autoboot	The system automatically attempts to boot the operating system software on power-up or after a power-fail or error halt.
Manual boot	The system exits to console mode on power-up or after a power-fail or error halt. The user then issues a BOOT command to boot the system.

The following sections describe the boot methods.

Autobooting the System

**Boot
Conditions**

The system tests the following conditions during the boot process
to determine if an autoboot should be performed:

1. Position of the Break Enable/Disable switch (normally set to
   the disable position)

   Note:
   VAXstation 4000 systems do not have a Break Enable
   /Disable switch.

2. Halt action setting (SET HALT command)

3. Whether or not a boot device is defined (SET BOOT
   command)

Depending on the conditions, the system will autoboot from
a default device, prompt for a device and then boot, or exit to
console mode.

**System
Response
to Boot
Conditions**

Table 5–4 indicates the action the system takes in response to
the boot conditions.

_____ **Note** _____

VAXstation 4000 systems do not have a Break Enable
/Disable switch. The boot action depends on the halt
action setting and whether or not a boot device is defined.

_____

Table 5–4   System Response to Boot Conditions

Break Switch	Halt Action	Boot Device Defined?	System Action
Disabled	NA	Yes	Boot from device
		No	Prompt for device
Enabled	Reboot or Restart_reboot	Yes	Boot from device
		No	Prompt for device
	Halt	NA	Exit to console mode

**Sample Boot,
VAX 4000
System, Boot
Device Defined**

On a VAX 4000 system, if a boot device is defined, the system displays the device logical name and the number 2 on the console. As the system continues booting, it decrements the countdown to 1 then 0.

Example 5–2 shows a sample VAX 4000 system autoboot with DIA0 as the boot device.

Example 5–2 VAX 4000 System Boot, Boot Device Defined

```
KAxx-A Vn.n, VMB n.n    ❶

Performing normal system tests.
66..65..64..63..62..61..60..59..58..57..56..55..54..53..52..51..
50..49..48..47..46..45..44..43..42..41..40..39..38..37..36..35..  ❷
34..33..32..31..30..29..28..27..26..25..24..23..22..21..20..19..
18..17..16..15..14..13..12..11..10..09..08..07..06..05..04..03..
Tests completed.
Loading system software.
(BOOT/R5:0 DIA0)   ❸

   2..              ❹
-DIA0
     1..0..
```

❶ CPU name, firmware version number, and VMB version number

❷ ROM based diagnostics countdown

❸ BOOT command string issued by system

❹ Boot countdown

**Sample Boot,
VAX 4000
System, Boot
Device Not
Defined**

If a boot device is not defined, the system displays a list of
bootable devices and prompts for a device from the list.

Example 5–3 shows a power-up display and the boot device list.

Example 5–3 VAX 4000 System Boot, Boot Device Not Defined

```
KAxx-A Vn.n VMB n.n

Performing normal system tests.
66..65..64..63..62..61..60..59..58..57..56..55..54..53..52..51..
50..49..48..47..46..45..44..43..42..41..40..39..38..37..36..35..
34..33..32..31..30..29..28..27..26..25..24..23..22..21..20..19..
18..17..16..15..14..13..12..11..10..09..08..07..06..05..04..03..
Tests completed.
Loading system software.
No default boot device has been specified.  ❶
Available devices.
-DIA0 (RF31)
-DIA1 (RF31)                        ❷
-MUA0 (TK70)
-EZA0 (08-00-2B-06-10-42)
Device? [EZA0]:                     ❸
```

❶ System reports it is unable to identify a default boot device

❷ List of available devices

❸ Boot device prompt

**Sample Boot,
VAX 4000
System,
Selecting a
Boot Device**

To select a boot device, enter a device name at the system prompt. Once a boot device is specified, the system will autoboot from that device on power up.

Example 5–4 shows a power-up display with the user entering the boot device name.

―――――――――― **Note** ――――――――――

If you do not enter a device name within 30 seconds, the system attempts to boot from the Ethernet device, EZA0.

―――――――――――――――――――――――――――――

Example 5–4 VAX 4000 System Boot, Selecting a Boot Device

```
KAxx-A Vn.n VMB n.n

Performing normal system tests.
66..65..64..63..62..61..60..59..58..57..56..55..54..53..52..51..
50..49..48..47..46..45..44..43..42..41..40..39..38..37..36..35..
34..33..32..31..30..29..28..27..26..25..24..23..22..21..20..19..
18..17..16..15..14..13..12..11..10..09..08..07..06..05..04..03..
Tests completed.
Loading system software.
No default boot device has been specified.
Available devices.
-DIA0 (RF31)
-DIA1 (RF31)
-MUA0 (TK70)
-EZA0 (08-00-2B-06-10-42)
Device? [EZA0]: DIA0 ❶
(BOOT/R5:0 DIA0)

   2..
-DIA0
    1..0..
```

❶ User specifies device DIA0

Manually Booting the System

Exiting to Console Mode

The system will exit to console mode (>>> prompt) on power up or after a power-fail or error halt if the Break Enable/Disable switch is set to enable and the halt action is set to HALT (or DEFAULT on VAX 4000 systems).

VAXstation 4000 systems do not have a Break Enable/Disable switch. Exiting to console mode depends on the halt action.

Exit to Console Mode, VAX 4000 Systems

Example 5–5 shows a power up to console mode for a typical VAX 4000 system.

Example 5–5 VAX 4000 Systems, Power Up to Console Mode

```
KAxx-A Vn.n VMB n.n

Performing normal system tests.
66..65..64..63..62..61..60..59..58..57..56..55..54..53..52..51..
50..49..48..47..46..45..44..43..42..41..40..39..38..37..36..35..
34..33..32..31..30..29..28..27..26..25..24..23..22..21..20..19..
18..17..16..15..14..13..12..11..10..09..08..07..06..05..04..03..
Tests completed.
>>>  ❶
```

❶ Console mode prompt

Exit to Console Mode, VAXstation 4000 Systems

On VAXstation 4000 systems, power-up self-tests are indicated by a status bar that fills as each self-test completes. The more memory in the system, the longer self-tests take. When all self-tests are run, the console prompt (>>>) is displayed.

Figure 5–1 shows a power up to console mode for a typical VAXstation 4000 system.

Figure 5–1 VAXstation 4000 System, Power Up to Console Mode

KA49–A Vn.n ❶
08–00–2B–04–03–12 ❷
32MB ❸

❹

OK
>>> ❺

NUO–0535–04–GRA

❶ CPU type and firmware version number

❷ Ethernet hardware address

❸ Memory size

❹ Status bar — increases in size as self-tests run

❺ Console mode prompt

Using the BOOT Command

When the system is in console mode you can manually boot the system by issuing the BOOT command.

The BOOT command allows you to boot the system from a:

- Predefined boot device
- Predefined boot device search list
- Device specified on the command line
- Device search list specified on the command

BOOT Command Syntax

The BOOT command syntax is as follows:

```
>>> BOOT [/qualifier...] [device_name[,device_name...]]
```

BOOT Command Examples

Table 5–5 shows examples of BOOT command strings.

Table 5–5 BOOT Command Examples

Command	System Action
BOOT	Boot from the default boot device or from the first bootable device in a string of devices.
	A default boot device, or string of bootable devices, can be defined by the SET BOOT command.
BOOT MIA5	Boot from TF85 tape unit 5.
BOOT DUA0,DIA0,MIA5,EZA0	
	Boot from the first device in the search string that contains bootable software.
	The boot device string can be up to 32 characters, with devices separated by commas and no spaces. The system checks the devices in the order specified and boots from the first one that contains bootable software.

_____ **Note** _____

If the Ethernet device (for example, EZA0) is to be part of the boot device search string, it should be the last device in the string. The system will continually attempt to boot over the Ethernet.

_____

Optional Boot Procedures

Booting from [SYSF] During an Upgrade

During a system upgrade, you may be required to boot from the [SYSF] root directory. To boot from [SYSF], enter the BOOT command in the following format:

>>> **BOOT /R5:F0000000** ddcu

Where *ddcu* is the device name of the system disk.

Example: The following command specifies to boot from the [SYSF] directory of a RF31 fixed disk:

>>> **BOOT /R5:F0000000 DIA0**

Booting from a Different Directory

By default, the OpenVMS operating system is installed in the system root directory named [SYS0]. However, you can use the VMSKITBLD procedure to add a copy of the operating system to another root directory (as long as it is *not* on the system disk). You can then boot the system from that directory.

Example: The following command specifies to boot from [SYS3] on an RF31 fixed disk that is not the system disk:

>>> **BOOT /R5:30000000 DIA1**

Definition: Conversational Boot

A conversational boot is commonly used in research and development environments and during software upgrades. Perform a conversational boot when you want to stop the boot process before it completes. The boot process stops after it loads SYS$SYSTEM:SYSBOOT.EXE and displays the SYSBOOT> prompt.

What You can do During a Conversational Boot

When the SYSBOOT> prompt is displayed during a conversational boot, you can enter certain SYSGEN commands to do the following:

- Look at system parameter values

- Change system parameter values

- Specify another parameter file

- Specify another system startup command procedure

- Select the default system parameter file if you modified system parameters to values that render the system unbootable

- Specify a minimum startup

Conversational Boot Procedure

There are several ways to perform a conversational boot. Table 5–6 presents a typical method.

Table 5–6 Conversational Boot Procedure

Step	Action
1.	Enter the BOOT command in the following format:
	>>> **BOOT/R5:00000001 [ddcu]**
	Where *ddcu* is the device name of the boot device. If you do not specify a device name, the system will boot from the default boot device when you finish issuing SYSGEN commands.
2.	At the SYSBOOT> prompt, enter the SYSGEN commands from the subset commands available:
	SYSBOOT> *sysgen_command*
3.	When you finish issuing SYSGEN commands, enter the CONTINUE command to complete the boot process
	SYSBOOT> **CONTINUE**

SYSGEN Commands

Table 5–7 lists the subset of SYSGEN commands available at the SYSBOOT> prompt. For more information about these commands, see the *VMS System Generation Manual*.

Table 5–7   SYSGEN Commands Used in SYSBOOT

Command	Description
CONTINUE	Resumes the boot process.
DISABLE CHECKS	Inhibits checking of parameter values specified with the SET command.
ENABLE CHECKS	Permits checking of parameter values specified with the SET command.
HELP	Displays a summary of commands on the console.
SET *parameter-name*	Establishes the name of a system parameter.
SET/STARTUP	Sets the name of the system startup command procedure.
SHOW *[parameter-name]*	Displays active, current, default, maximum, and minimum values for specific parameters. Use qualifiers to display characteristics of parameters grouped by categories.
USE *[file-spec]*	Specifies a parameter file to be used as a source of values. You must enter the entire file specification, including device and directory; you cannot specify a logical name.

Defining Default Boot Actions

Defining a Default Boot Device

The SET BOOT console command allows you to specify a default boot device, or a list of devices, which the system will search for boot software.

Once a default boot device is defined, the system will automatically boot from the device on power up or after a power-fail or error halt. If a boot device list is defined, the system will boot from the first device on the list which contains bootable software.

SET BOOT Syntax

The SET BOOT command syntax is as follows:

```
>>> SET BOOT [/qualifier...] device_name[,device_name...]
```

SET BOOT Examples

Table 5–8 shows examples of SET BOOT command strings.

Table 5–8   Sample SET BOOT Commands

Command String	Description
SET BOOT EZA0	Defines the default boot device to be the Ethernet controller.
SET BOOT DUA0,DIA0,MIA5,EZA0	
	Defines a boot device search string with DUA0, DIA0, MIA5, and EZA0 as possible boot devices.
	When attempting an autoboot, or if the BOOT command is issued without specifying a device, the system checks each device in order and boots from the first one that contains bootable software.

Notes on Defining a Boot Device

Selecting a device other than the Ethernet device is not appropriate for diskless and tapeless systems that must boot over the network.

If defining a boot device search string, the string can be up to 32 characters, with device names separated by commas and no spaces.

If an Ethernet device (for example, EZA0) is part of the string, it should be the last device of the string. The system will continuously attempt to boot over the Ethernet.

Defining the Default Halt Action

The SET HALT command allows you to define the action the system takes on power up or after a power-fail or error halt. The action taken depends on the state of the halt action flag.

When the system is shipped, the default action is set to halt. You can change the default action by entering the SET HALT command and specifying the keyword or value of the action you want to set.

SET HALT Syntax

The SET HALT command syntax is as follows:

```
>>> SET HALT {key_word | value}
```

SET HALT Keywords

Table 5–9 shows the SET HALT keywords, the associated values, and the system action taken on power-up or after a power-fail or error halt.

Table 5–9 SET HALT Keywords

Keyword	Value	System Action
DEFAULT[1]	0	Halt and display console prompt.
RESTART[2]	1	Attempt restart. If restart fails, halt.
REBOOT	2	Attempt reboot. If reboot fails, halt.
HALT	3	Halt and display console prompt.
RESTART_ REBOOT[1]	4	Attempt restart. If restart fails, attempt reboot. If reboot fails, halt.

[1] Keyword not supported on VAXstation 4000 systems.

[2] RESTART on VAXstation 4000 systems is the same as RESTART_REBOOT for the other systems.

6

System Backup and Restore Procedures

Introduction　　　This chapter describes the procedures for backing up and
restoring the system disk. Topics include:

- BACKUP overview
- Installing standalone BACKUP
- Booting standalone BACKUP
- Backing up the system disk
- Restoring the system disk

Standalone BACKUP Overview

Definition: Standalone BACKUP
Standalone BACKUP is a subset of the OpenVMS Backup utility that allows you to make a complete backup of the system disk. The utility runs without the support of the operating system.

Why Use Standalone BACKUP
Digital recommends that you run standalone BACKUP to make a complete backup of the system disk for the following reasons:

- The Backup utility that runs under control of the operating system copies only what is on the disk and ignores sections of any open files in memory.

  If you were to use the on-line backup utility, portions of files that were in memory, and data about files not yet written back to the disk (cached data), would not be saved to the backup copy.

- In case a problem occurs during an operating system update, or during the installation of other software products.

  Before you attempt any of these procedures, you should back up the system disk. If a problem occurs, you can restore the backup copy of the system disk.

- To prevent loss of system files if they are accidentally deleted.

  After you install or upgrade the operating system, or any other software products, you should back up the system disk. If a system file is deleted and renders the system disk inoperable, you can restore the backup copy and continue to use the system.

- In case the drive that holds the system disk malfunctions.

  If you have a backup copy of the operating system, you can restore it to a functioning disk and continue to use the system.

- To eliminate disk fragmentation, which happens when files are stored noncontiguously on the disk. The BACKUP command creates contiguous copies of files.

**Where to Store
Standalone
BACKUP**

Standalone BACKUP is normally supplied on a tape cartridge or compact disk, depending on the distribution media received with the system.

You can store standalone BACKUP on the system disk, a compact disk, a tape cartridge, or any other media the system supports. Digital recommends that you store standalone BACKUP on the system disk and on one or more tape cartridges (in case the original tape is damaged).

Installing Standalone BACKUP

Installing on the System Disk

You can install standalone BACKUP in any available root directory on the system disk from [SYS1] to [SYSE]. However, Digital has established [SYSE] as the standard directory for standalone BACKUP.

To install standalone BACKUP in the [SYSE] directory on the system disk, use the following procedure:

Step	Action
1.	Log in to the SYSTEM account.
2.	Enter the following command: `$ @SYS$UPDATE:STABACKIT SYS$SYSDEVICE:`
3.	When the procedure finishes, the system displays the following message: `The kit is complete.`

The STABACKIT procedure places the files in the directories [SYSE.SYSEXE] and [SYSE.SYS$LDR] on the system disk. It lists the files as they are copied.

If you want to install standalone BACKUP in another directory, change the target directory from SYS$SYSDEVICE: to the directory of your choice.

Installing on a Tape Cartridge

Digital recommends that you keep standalone BACKUP on a tape cartridge in case the system disk becomes corrupted. If you have a tape cartridge distribution kit, you already have standalone BACKUP on tape. However, you may want to make additional copies in case the original tape becomes damaged.

To install standalone BACKUP on a tape cartridge, use the following procedure:

Step	User Action or System Response
1.	Obtain a blank tape cartridge and write a descriptive name on the paper label. Insert the label into the label slot.
	The tape label should reflect the contents of the tape. For example, if you are building a Version 5.5-n kit, you may want to label the cartridge S/A BKUP V5.5-n TK85.
2.	Write-enable the tape cartridge.
3.	Insert the tape cartridge in the tape drive.
4.	Log in to the SYSTEM account.
5.	Enter the following command:
	`$ @SYS$UPDATE:STABACKIT`
6.	When the procedure asks for the name of the target device, enter the device name of the tape drive.
	In the example below, MIA5 is entered in response to the prompt for the device name.
|    | ```
%STABACKIT-I-SYMDEL, all global symbols deleted
Enter the name of the device on which to build the kit:
MIA5
``` |
| 7. | The system displays the following message. |
|    | ```
Please place the scratch tape cartridge in drive _MIA50:
This volume will receive the volume label SYSTEM.
Enter "YES" when ready:
``` |
| 8. | When you are ready to continue, enter Y (for Yes). |
| 9. | The procedure displays verification messages informing you that files are being copied. |

Step	User Action or System Response
10.	When standalone BACKUP is installed, the system displays a message similar to the following.
	``` Ending time 19-APR-1991 13:45:29.90 Starting time 19-APR-1991 13:22:39.05 The kit is complete. $ ```
11.	Remove the tape cartridge from the tape drive.
12.	Write-protect the cartridge and store it in a safe place.

Booting Standalone BACKUP

Before Booting Standalone BACKUP

Before you boot standalone BACKUP, you must shut down the operating system. The shutdown procedure writes the contents of the system caches back to the disk and closes any open files.

To shut down the operating system, perform the following procedure:

Step	User Action or System Response
1.	Set the Break Enable/Disable switch to Enable.
2.	Take one of the following actions:

If the operating system is . . .	Then
Running	Go to step 3
Not running	Go to step 5

Step	User Action or System Response
3.	Enter the following command to shut down the system:
	`$ @SYS$SYSTEM:SHUTDOWN`
4.	Answer the questions.
	When the procedure asks if an automatic system reboot should be performed, press Return for No. When the procedure is finished, the system displays the following message.
	`SYSTEM SHUTDOWN COMPLETE - USE CONSOLE TO HALT SYSTEM`
5.	Stop the system. If the system has a Halt button, press it twice. Ensure that the light on the button goes off. If the system does not have a Halt button, press the Break (F5) key.

Booting from the System Disk

Standalone BACKUP is normally booted from the system disk to save time. To boot standalone BACKUP from the system disk, use the following procedure:

Step	User Action or System Response
1.	Shut down the operating system.
2.	Enter the BOOT command in the following format:

```
>>> B/E0000000 device_name
```

Where *device_name* is the name of the system disk. For example, if the system disk is on DIA0, enter the following:

```
>>> B/E0000000 DIA0
```

| 3. | When the procedure asks for the date and time, enter the date and time in the 24-hour clock format. For example: |

```
Please Enter Date And Time (DD-MMM-YYYY HH:MM)
19-APR-1991 13:00
```

| 4. | The system displays a list of the local devices on the system. For example: |

```
Available device MIA5:     device type TF85
Available device DIA0:     device type RF31
Available device DUB0:     device type RRD42
    .
    .
    .
```

| 5. | Check the device listing. If the list is incomplete, make sure that all devices are connected properly to the system. See the installation manual for your system for details. |
| 6. | When standalone BACKUP finishes booting, it displays an identification message followed by the dollar-sign prompt ($): |

```
%BACKUP-I-IDENT, Standalone BACKUP V5.5; the date is 20-DEC-
1992 13:43
$
```

**Booting from a
Tape Cartridge**

If the system disk containing standalone BACKUP should
become unusable, you can boot standalone BACKUP from a tape
cartridge containing standalone BACKUP (either the distribution
tape or one you created).

To boot standalone BACKUP from a tape cartridge, perform the
following procedure. Booting from a tape takes approximately 20
minutes.

Step	User Action or System Response
1.	Shut down the operating system.
2.	Insert the tape cartridge containing standalone BACKUP in the tape drive.
3.	Enter the following command:

> `>>> B device_name`
>
> Where *device_name* is the device name of the tape drive.
> For example, if the system uses a TLZ04 drive, enter
> MKA0. If it uses a TF85 drive, enter MIA0.

| 4. | Standalone BACKUP displays a message similar to the following: |

> `VAX/VMS Version V5.5--n Major version id=1 Minor version id=0`

| 5. | When the procedure asks for the date and time, enter the date and time in the 24-hour clock format. For example: |

> `Please Enter Date And Time (DD-MMM-YYYY HH:MM)`
> **`19-APR-1991 13:00`**

| 6. | The system displays a list of local devices on the system. For example: |

```
Available device MIA0:     device type TF85
Available device DIA0:     device type RF31
Available device DUB0:     device type RRD42
     .
     .
     .
```

Step	User Action or System Response

7.	When standalone BACKUP finishes booting, it displays an identification message followed by the dollar-sign prompt ($):
	
	`%BACKUP-I-IDENT, Standalone BACKUP V5.5; the date is 19-APR-`
	`1991 13:00`
	`$`

8.	Remove the tape cartridge containing standalone BACKUP from the tape drive.

Booting from a Compact Disc

You can boot standalone BACKUP from the original compact disc that was supplied as the operating system distribution media.

To boot standalone BACKUP for a compact disc, use the following procedure. Booting from compact discs takes approximately 3 minutes.

Step	Action
1.	Shut down the operating system.
2.	Insert the operating system distribution compact disc in the drive.
3.	At the console prompt, enter the BOOT command:

```
>>> BOOT  device_name
```

Where *device-name* is the device name of the compact disc drive. For example, if the compact disc drive has a device name of DUB0, enter the following command:

```
>>> BOOT DUB0
```

| 4. | When the procedure asks for the date and time, enter the date and time using the 24-hour clock format. For example: |

```
Please Enter Date And Time (DD-MMM-YYYY HH:MM)
20-DEC-1991 13:00
```

| 5. | The procedure displays a list of the local devices on the system. For example: |

```
Available device MIA5:  device type TK85
Available device DIA0:  device type RF31
Available device DUB0:  device type RRD42
   .
   .
   .
```

| 6. | Copy the names of the RF drives on a piece of paper. If you will be using an RF drive to hold the system disk, you will need the device name as displayed by the standalone BACKUP procedure. |

Step	Action
7.	When standalone BACKUP finishes booting, the procedure displays an identification message followed by the dollar-sign prompt ($).

```
%BACKUP-I-IDENT, Standalone BACKUP V5.5; the date is 20-DEC-
1991 13:00
$
```

Backing Up the System Disk

Image Versus Physical Backup

Standalone BACKUP uses a subset of the VMS Backup utility's qualifiers. The key qualifier relative to backing up and restoring the system disk is /IMAGE. Table 6–1 summarizes the qualifier and contrasts it with /PHYSICAL which is used during other types of backup operations.

Table 6–1 Standalone BACKUP/IMAGE and /PHYSICAL Qualifiers

Qualifier	BACKUP Function
/IMAGE	Creates a functionally equivalent copy of the entire system disk.
/PHYSICAL	Copies, saves, restores, or compares the entire system disk in terms of logical blocks, ignoring any file structure.

For a description of the Backup utility, see the *VMS Backup Utility Manual*.

Before You Run Standalone BACKUP

Before you run standalone BACKUP to back up the system disk, perform the following preliminary steps:

Step	Action
1.	Write-protect the system disk by pressing the write protect button on the drive.
2.	Decide if you want to back up the system to a disk or to a tape cartridge.
3.	If you are using a tape cartridge, obtain a scratch tape that you can use for the backup copy. Write-enable the cartridge and insert it in the tape drive.
4.	Determine the device name of the drive holding the system disk, and the one holding the backup disk or tape cartridge. Enter the SHOW DEVICE command to obtain a list of devices.

BACKUP Procedure

To back up the system disk, use the following procedure:

Step	Action
1.	Boot standalone BACKUP.
2.	Enter the BACKUP command in one of the following formats.

- If backing up to disk:

$ **BACKUP/IMAGE/VERIFY** source_drive: target_drive:

- If backing up to tape:

$ **BACKUP/IMAGE/VERIFY** source_drive: target_drive:-
_$ saveset.**BCK/LABEL=**volume_label/**REWIND**

Where:	Is the:
source_drive	Device name of the system disk drive.
target_drive	Device name of the drive holding the backup disk or tape. **Note:** Before the backup operation begins, the target device is initialized, erasing all data currently on the device.
saveset.BCK	Name of the saveset to be created. The name should reflect the contents of the backup tape and cannot exceed 17 characters in length.
volume_label	Volume label of the tape cartridge in the tape drive. If the tape has been initialized already, use the same volume label assigned by the INITIALIZE command. If the tape has not been initialized, you can assign a volume label at this time. The volume label cannot have more than six characters.

Step	Action

Examples:

- Backing up to disk:

$ **BACKUP/IMAGE/VERIFY DIA0: DIA1**

- Backing up to tape:

$ **BACKUP/IMAGE/VERIFY DIA0: MIA5:-**
_$ **APR_19_1991.BCK/LABEL=19APRF/REWIND**

3. The system displays the following message.

   %BACKUP-I-STARTVERIFY, starting verification pass

4. Take one of the following actions:

If you are backing up to . . .	Then . . .
Another disk	Go to step 11
Tape **and** the contents of the system disk fit on one tape cartridge	Go to step 11
Tape **and** the system disk contains more data than one tape cartridge can store	Go to step 5

5. The system displays the following messages:

   %BACKUP-I-RESUME, Resuming operation on volume *n*
   %BACKUP-I-READYWRITE, Mount volume *n* on _MIA5: for writing
   Enter "YES" when ready:

6. Remove the backup tape cartridge from the tape drive and write-protect the cartridge.

   Label, number, and date the cartridge. The label and number should reflect the contents of the tape.

7. Write-enable another scratch tape cartridge and insert it in the drive.

8. When you are ready to continue, enter Y (for Yes) and press Return.

Step	Action
9.	The procedure displays the following message: `%BACKUP-I-STARTVERIFY, starting verification pass`
10.	Each time the procedure displays a mount request, repeat steps 5 through 9. When the backup is complete, go to step 11.

11.	When the procedure is finished, the system displays a message similar to the following:
	
	`%BACKUP-I-PROCDONE, operation completed.`
	`Processing finished at 18-JAN-1993 15:23`
	`If you do not want to perform another standalone BACKUP`
	`operation, use the console to halt the system.`
	
	`If you do want to perform another standalone BACKUP operation,`
	`ensure the standalone application volume is on-line and ready.`
	`Enter "YES" to continue:`

12.	If you were backing up to tape, remove the backup tape cartridge from the drive and write-protect the cartridge. Label, number, and date the cartridge. The label and number should reflect the contents of the tape.
13.	Stop the system. If the system has a Halt button, press it twice. Ensure that the light on the button goes off. If the system does not have a Halt button, press the Break (F5) key.
14.	Reboot the system.

Store the backup copy of the system disk in a safe place.

Notes on Volume Parameters

The BACKUP command creates a system disk that includes a Digital provided set of volume parameters, including a CLUSTER_SIZE (disk access scheme) of value 1. (The CLUSTER_SIZE parameter refers to the way files are stored on the disk, **not** to VAXcluster environments.)

You can change most volume parameters later with the SET VOLUME command. However, to change the CLUSTER_SIZE parameter, you must back up the system disk that has been initialized previously with the CLUSTER_SIZE value that you want.

To prevent the BACKUP command from reinitializing the target disk, use the /NOINITIALIZE qualifier. For more information about initializing a disk, see the *Guide to Maintaining a VMS System*. For more information on the BACKUP command, see the *VMS Backup Utility Manual*.

Restoring the System Disk

Restore Procedure

You can restore the system disk from a backup copy that was created on another disk or on a tape cartridge. To restore the system disk, use the following procedure:

Step	Action
1.	Determine the device name of the drive holding the system disk, and of the drive holding the backup disk or tape cartridge.
	Enter the SHOW DEVICE command at the console prompt if needed for a list of devices.
2.	If you are restoring from a backup tape cartridge, write-protect the cartridge and insert it in the drive.
3.	Boot standalone BACKUP.
4.	Enter the BACKUP command in one of the following formats.

• To restore from a backup disk:

$ **BACKUP/IMAGE/VERIFY** source_drive: target_drive:

• To restore from a tape cartridge:

$ **BACKUP/IMAGE/VERIFY** source_drive:-
_$ saveset.**BCK/SAV/REWIND** target_drive:

Where:	Is the:
source_drive	Device name of the drive holding the backup disk or tape cartridge.
target_drive	Device name of the drive holding the system disk.
saveset.BCK	Name of the saveset if restoring from a backup tape cartridge.

Step	Action
	Examples:

- Restoring from a backup disk:

$ **BACKUP/IMAGE/VERIFY DIA0: DIA1:**

- Restoring from a backup tape:

$ **BACKUP/IMAGE/VERIFY-**
_$ **MIA5:APR_19_1991.BCK/SAV/REWIND DIA0:**

Step	Action
5.	The system displays the following message:

`%BACKUP-I-STARTVERIFY, starting verification pass`

| 6. | Take one of the following actions: |

If you are restoring from . . .	Then
A backup disk	Go to step 9
A tape saveset, **and** the saveset fits on one tape	Go to step 9
A tape saveset, **and** the saveset takes more than one tape	Go to step 7

| 7. | The system displays the following message: |

```
%BACKUP-I-RESUME, Resuming operation on volume 2
%BACKUP-I-READYWRITE, Mount volume 2 on _MIA5: for reading
Enter "YES" when ready:
```

| 8. | Remove the backup tape cartridge from the drive. Insert the next cartridge in the drive and enter Y (for Yes). |
| | Each time you receive a mount request, repeat this step. When the restore is complete, go to step 9. |

Step	Action

9.	When the procedure is finished, the system displays the following message:
	
	`%BACKUP-I-PROCDONE, operation completed.`
	`Processing finished at 19-APR-1991 15:00:00.00`
	`If you do not want to perform another standalone BACKUP`
	`operation, use the console to halt the system.`
	
	`If you do want to perform another standalone BACKUP operation,`
	`ensure the standalone application volume is online and ready.`
	`Enter "YES" to continue:`

10.	If you were restoring from a backup tape cartridge, remove the cartridge from the drive.
11.	Stop the system. If the system has a Halt button, press it twice. Ensure that the light on the button goes off. If the system does not have a Halt button, press the Break (F5) key.
12.	Reboot the system.

Index

X