HEWLETT® PACKARD

Technical Reference Manual

Product Description - Vectra VLi 8 & VLi 8SF

This technical reference and BIOS document for Vectra VLi 8 and VLi 8SF PCs contains summary information only. More detailed information on system hardware is available in the *Technical Reference Manual - Vectra Technology*.

HP Vectra VLi 8 & VLi 8SF PCs

Contents

1 System Overview

Package Features 10
- VLi 8 Desktop 10
- VLi 8 Minitower 11
- VLi 8SF Desktop 12

Specifications 13
- Physical Characteristics 13
- Electrical Specifications (All Models) 16
- Environmental Specifications (All Models) 16

2 System Features

System Board & Backplane Layout 18
- System Boards 18
  - Pentium II/III-based Models (VLi 8 & VLi 8SF) 18
  - Celeron-based Models (VLi 8SF only) 19
- Backplane 20
  - VLi 8 Desktop 20
  - VLi 8 Minitower 21
  - VLi 8SF Desktop 22

Architectural View 23
- All VLi 8 & VLi 8SF Models 23

Main Memory 24

Processors 25

Mass Storage Devices 27
- Hard Disk Drives 27
- Floppy Disk Drives 27
- CD-ROM and DVD Drives 28

VLi 8 Models 28
DVD Region Codes 29
VLi 8SF Models 30

Matrox Millennium G200 AGP 2X Graphics Chip 32
Features 32
Video Memory 32
Supported Resolutions 33
UNDER WINDOWS 95 33
UNDER WINDOWS NT 4.0 33
Connectors 34

Audio 36

Network 37
VLi 8 Models 37
VLi 8SF Models 38

Accessory Boards 39

3 Serviceability

VLi 8 Models 42

VLi 8SF Models 44

4 BIOS Overview

BIOS Summary 46
Using the HP Setup Program 46
Main Menu 47
Advanced Menu 47
Security 48
Boot Menu 48
Power Menu 48

Power Saving and Ergonometry 49
Power-On from Space-Bar 49
Soft Power Down 49
Safe Off 49

BIOS Addresses 50
System Memory Map 50
HP I/O Port Map (I/O Addresses Used by the System) 50
DMA Channel Controllers 52
Interrupt Controllers 53
PCI Interrupt Request Lines 53

Order in Which the POST Tests are Performed 54

Beep Codes 61

5 Drivers and Software

Drivers 64

Software 64

BIOS Updates 65

About this Document

This technical reference and BIOS document for Vectra VLi 8 and VLi 8SF PCs contains summary information only. More detailed information on system hardware is available in the *Technical Reference Manual - Vectra Technology*.

VLi 8 & VLi 8SF Bibliography

- HP Vectra VLi 8 (D7940-90001) & VLi 8SF (D7820-90001) *User's Guides* manual
  HP Vectra VLi 8 (D7940-UPG-ABA) & VLi 8SF (D7820-UPG-ABA) *Troubleshooting and Upgrade Guide* manual at:
  www.hp.com/go/vectrasupport
- *Technical Reference Manual -Vectra Technology*
  www.hp.com/go/vectrasupport
- HP Vectra PC *Service Handbook - 14th edition* (to be published).
- HP *Support Assistant* CD-ROM (by subscription).

Data sheets can be obtained at:

- *Pentium Processors*
  www.intel.com/design/pentiumII/datashts
  www.intel.com/design/pentiumII/datashts
- *Celeron Processors*
  www.intel.com/design/celeron/datashts
- *Product Data Sheet*
  www.hp.com/vectra

1

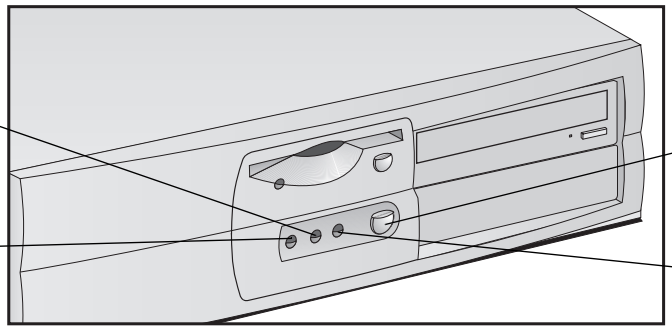
System Overview

This chapter introduces the internal and external features, and lists the specifications of the *HP Vectra VLi 8 and VLi 8SF PC* models.

Package Features

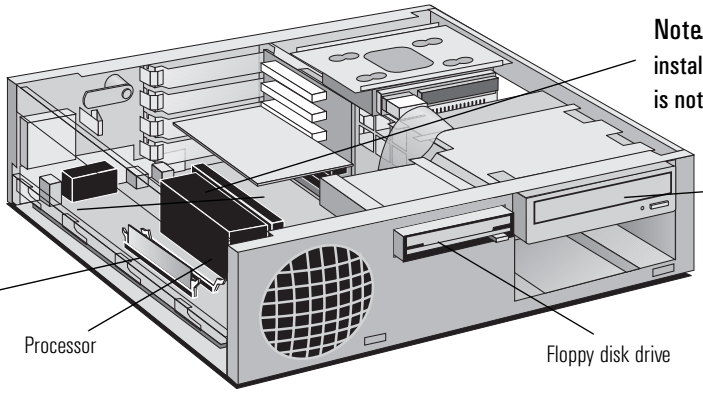
VLi 8 Desktop

Front view

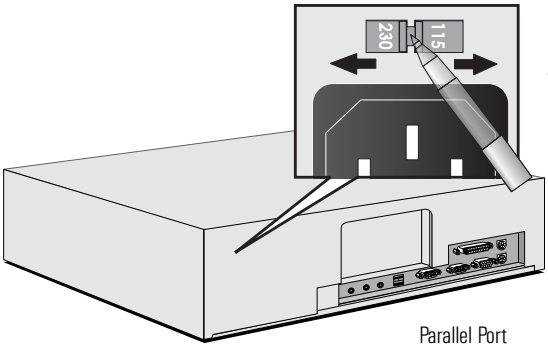


Front view with cover removed

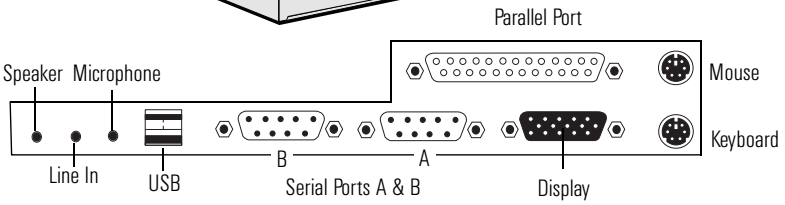
Note. An airflow guide, installed over the processor, is not shown in this graphic.



Rear view

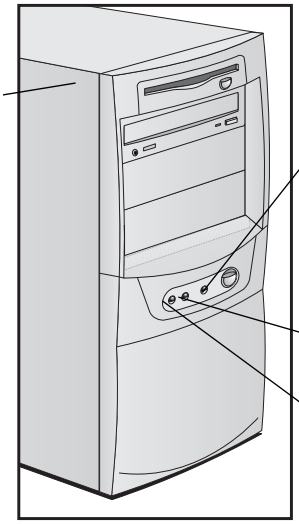


Rear connectors

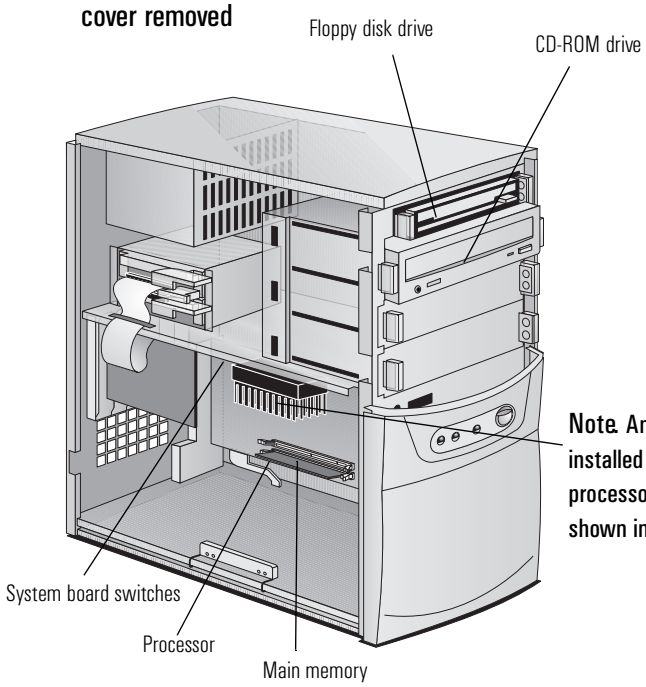


VLi 8 Minitower

Front view

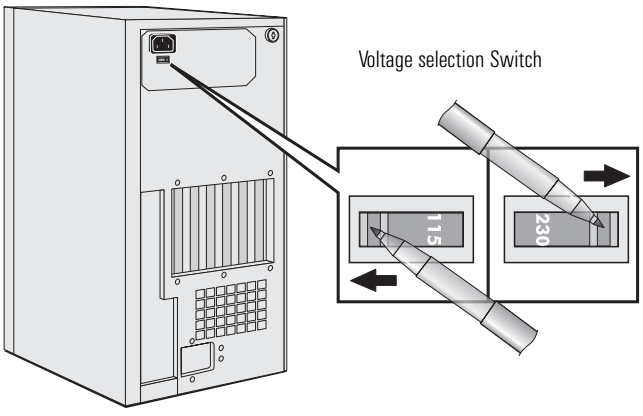


Front view with cover removed

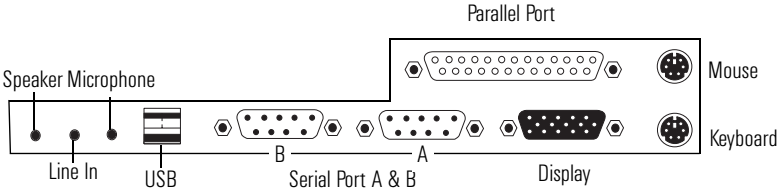


Note. An airflow guide, installed over the processor, is not shown in this graphic.

Rear view

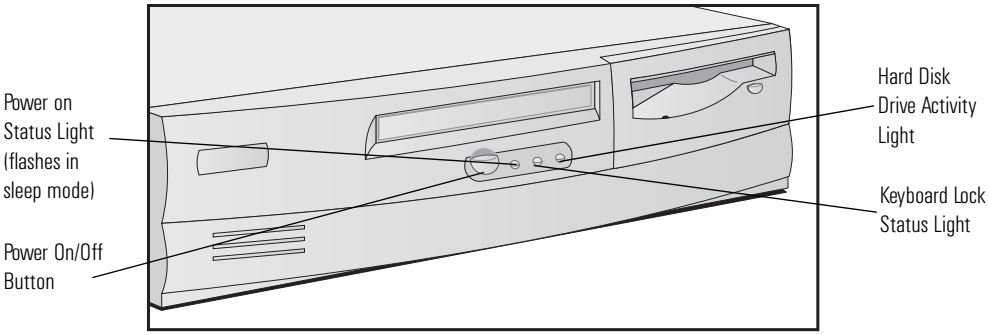


Rear connectors

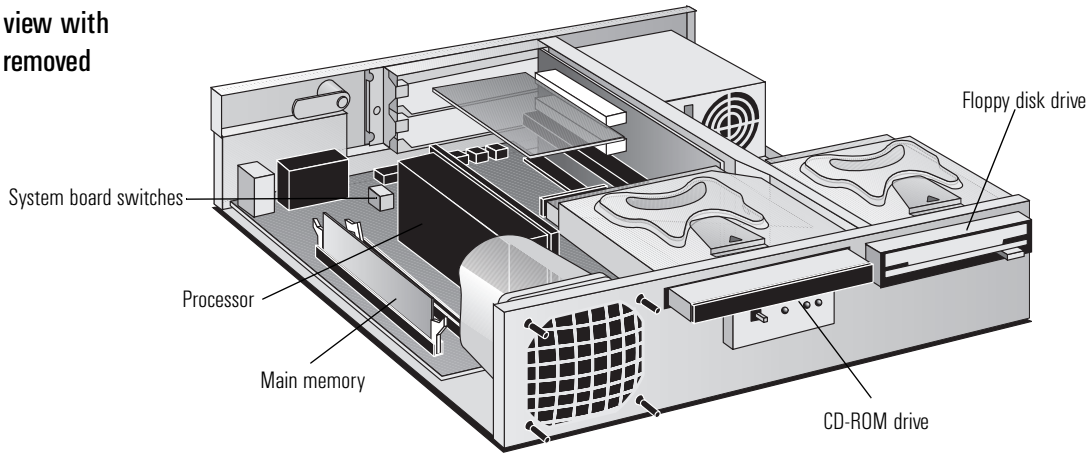


VLi 8SF Desktop

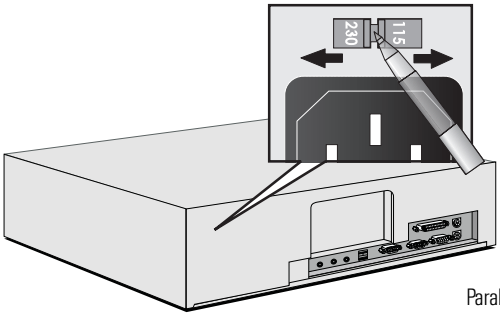
Front view



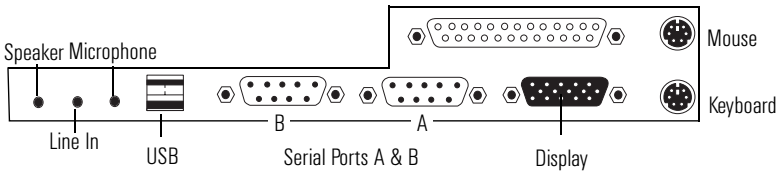
Front view with cover removed



Rear view



Rear Connectors



Specifications

Physical Characteristics

VLi 8 Desktop

Characteristic	Description
Weight (excluding display and keyboard)	10.4 kg (22.9 pounds)
Dimensions	Width: 44.3cm (17.4 inches) Height: 13.8cm (5.4 inches) Depth: 43.5cm (17.1 inches)
Footprint	0.193 m^2 (2.07 $ft.^2$)
HP Windows 95 Keyboard	18.3 (W) by 7 inches (D) by 1.3 inches (H), when flat, or 18.3 (W) by 7 inches (D) by 2 inches (H), when standing (46.4 cm x 17.8 cm x 3.3 cm [5.1 cm])
Power Supply	Input voltage: 100 - 127 V 6.0A, 200 - 240 V 3.0A ac (voltage selection switch) Input frequency: 50/60 Hz Maximum output power: 200 W continuous
Power Consumption	Processor: 30 W Video: 10 - 15 W Hard Disk Drive: 12 W (typical) CD-ROM Drive: 15.6 W PCI accessory slots: up to 25 W per slot ISA accessory slots: 10 W (max. per slot)

VLi 8 Minitower

Characteristic	Description
Weight (excluding display and keyboard)	14.8 kg (32.6 pounds)
Dimensions	Width: 20.7cm (8.1 inches) Height: 46.9cm (18.5 inches) Depth: 45.5cm (17.9 inches)
Footprint	0.094 m^2 (1.01 $ft.^2$)
HP Windows 95 Keyboard	18.3 (W) by 7 inches (D) by 1.3 inches (H), when flat, or 18.3 (W) by 7 inches (D) by 2 inches (H), when standing (46.4 cm x 17.8 cm x 3.3 cm [5.1 cm])
Power Supply	Input voltage: 100 - 127 V 6.0A, 200 - 240 V 3.0A ac (voltage selection switch) Input frequency: 50/60 Hz Maximum output power: 200 W continuous
Power Consumption	Processor: 30 W Video: 10 - 15 W Hard Disk Drive: 12 W (typical) CD-ROM Drive: 15.6 W PCI accessory slots: up to 25 W per slot ISA accessory slots: 10 W (max. per slot)

VLi 8SF Desktop

Characteristic	Description
Weight (excluding display and keyboard)	7.54 kg (16.5 pounds)
Dimensions	Width: 37 cm (14.6 inches) Height: 9.5 cm (3.7 inches) Depth: 39 cm (15.4 inches)
Footprint	0.144 m^2 (1.68 $ft.^2$)
HP Windows 95 Keyboard	18.3 (W) by 7 inches (D) by 1.3 inches (H), when flat, or 18.3 (W) by 7 inches (D) by 2 inches (H), when standing (46.4 cm x 17.8 cm x 3.3 cm [5.1 cm])
Power Supply	Input voltage: 100 - 127 V 6.0A, 200 - 240 V 3.0A ac (voltage selection switch) Input frequency: 50/60 Hz Maximum output power: 90 W continuous
Power Consumption	Processor: 30 W Video: 10 - 15 W Hard Disk Drive: 12 W (typical) CD-ROM Drive: 6 W PCI accessory slots: up to 25 W per slot ISA accessory slots: 10 W (max. per slot)

Electrical Specifications (All Models)

Any attempt to draw too much current (such as a short circuit across edge-connector pins, or an accessory board that is not suitable for these PCs), will cause the overload protection in the power supply to be triggered, and the PC could fail to boot. To get out of the power supply protection mode, remove the power cord, wait for 10 seconds, then replace the cord.

The power supply delivers 720mA at the V standby level. This extra current is required by the 100TX hardware layer so it can perform a remote power-on at reception of a magic frame. An older power supply should not be used for a repair.

NOTE

When the PC is turned off with the power button on the front panel, the power consumption falls below 5 Watts, but is not zero. The special on/off method used by this PC extends the lifetime of the power supply. To reach zero power consumption in "off" mode, either unplug the PC from the power outlet or use a power block with a switch. If the PC is turned off, the time settings are maintained by the battery indefinitely (until the battery runs out of power).

Environmental Specifications (All Models)

Environmental Specifications (System Processing Unit, with Hard Disk)	
Operating Temperature	+ 10°C to + 35°C (+ 50°F to 95° F)
Storage Temperature	-40°F to + 70°F (-40°C to + 158°C)
Operating Humidity	15% to 80% (relative)
Storage Humidity	8% to 85% (relative), non-condensing at 40°C (104°F)
Acoustic noise emission: VLi 8 Desktop VLi 8 Minitower VLi 8SF Desktop	(as defined ISO 7779) Sound level (LwA) ≤ 37 db (operating) Sound level (LwA) ≤ 37 db (operating) Sound level (LwA) ≤ 35.5 db (operating)
Operating Altitude	10000 ft (3100m) max
Storage Altitude	15000ft (4600m) max

Operating temperature and humidity ranges may vary depending upon the mass storage devices installed. High humidity levels can cause improper operation of disk drives. Low humidity levels can aggravate static electricity problems and cause excessive wear of the disk surface.

2

System Features

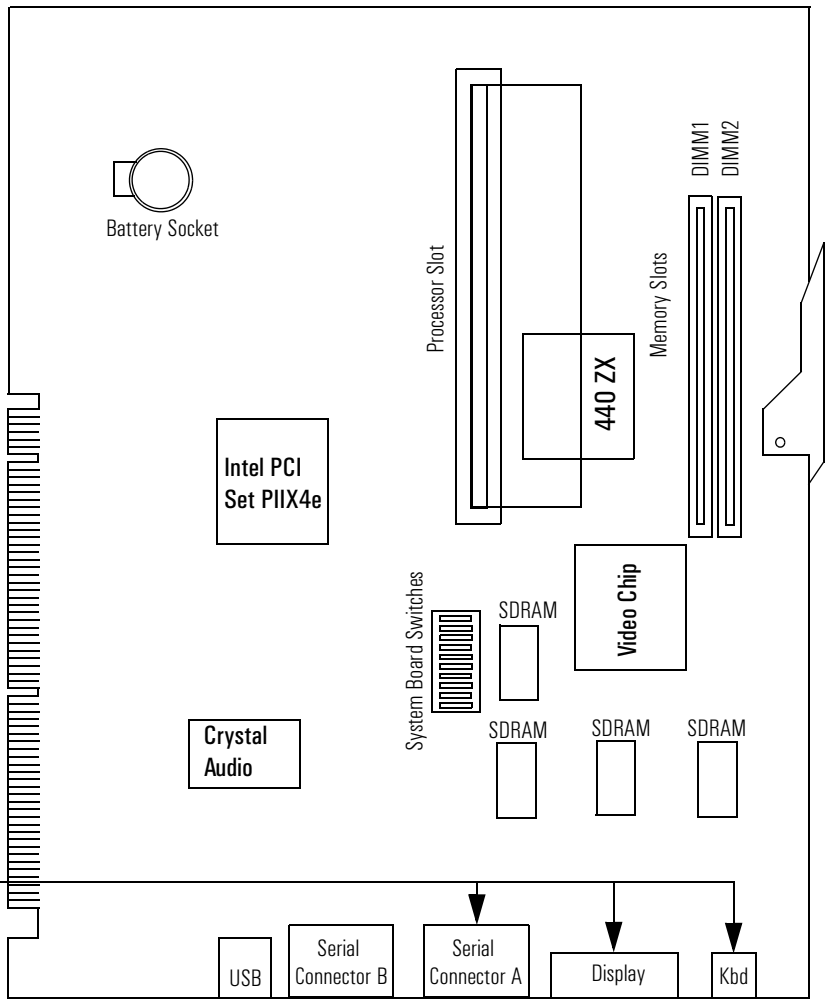
This chapter describes core components of the PC such as processors, chipsets, mass storage devices, graphics controllers, audio controllers, network features and input devices.

System Board & Backplane Layout

All *HP Vectra VLi 8 PC* system boards have a Pentium II/III processor slot. Some *HP Vectra VLi 8SF PC* models have a Pentium II/III processor slot, and others have a Celeron 370 socket.

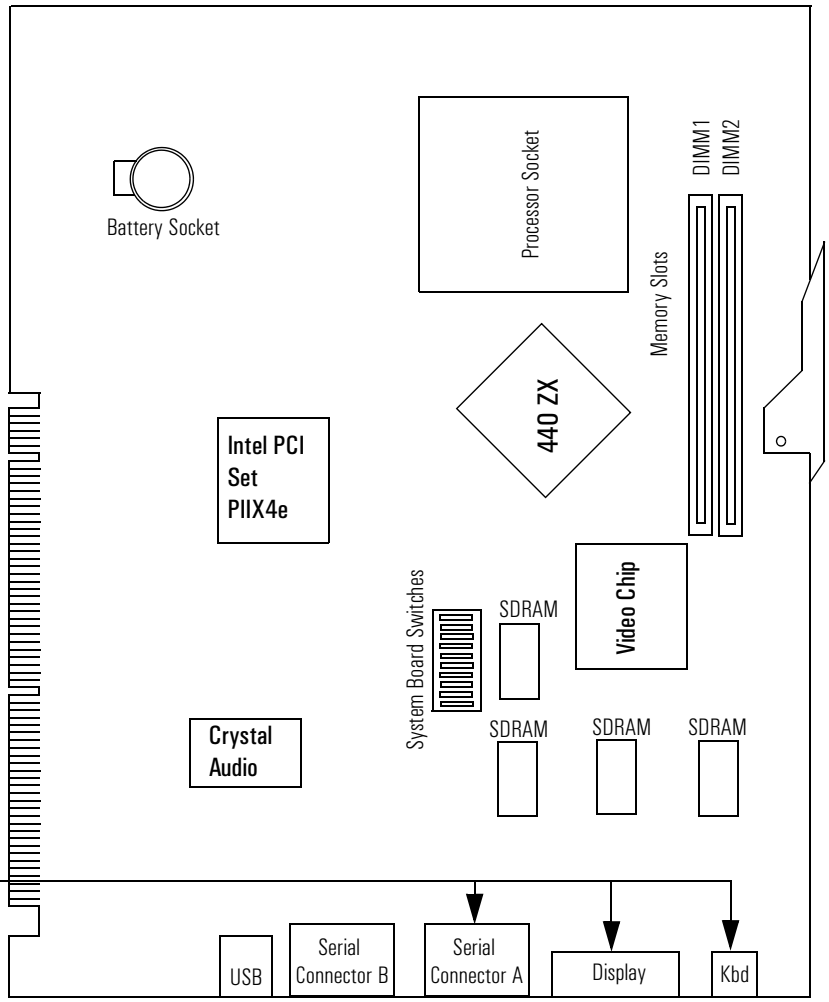
System Boards

Pentium II/III-based Models (VLi 8 & VLi 8SF)



The parallel port and mouse connector are located above Serial Port A, the Display Connector and the Keyboard Connector, respectively.

Celeron-based Models (VLi 8SF only)



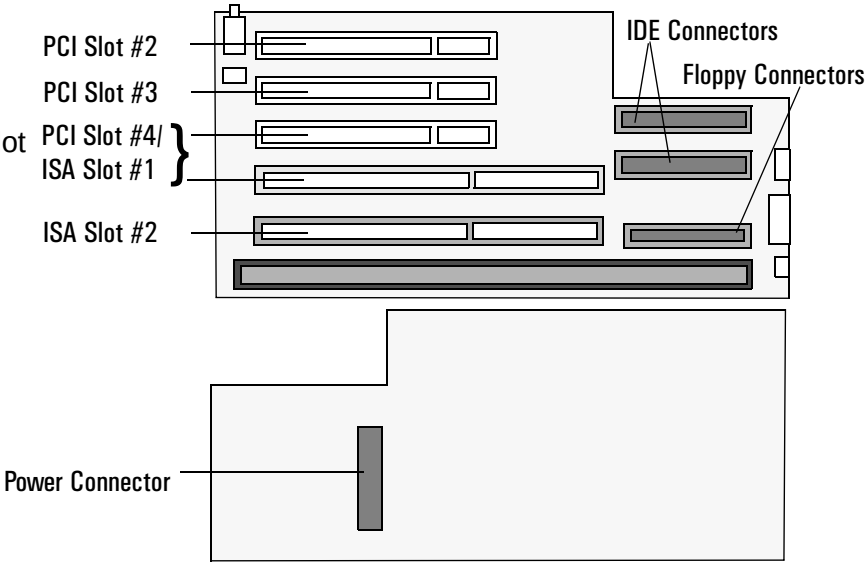
The parallel port and mouse connector are located above Serial Port A, the Display Connector and the Keyboard Connector, respectively.

Backplane

VLi 8 Desktop

Front View

- 2 X PCI slots
- 1 PCI/ISA Combination slot
- 1 X ISA slots
- 1 X system board slot



Back View

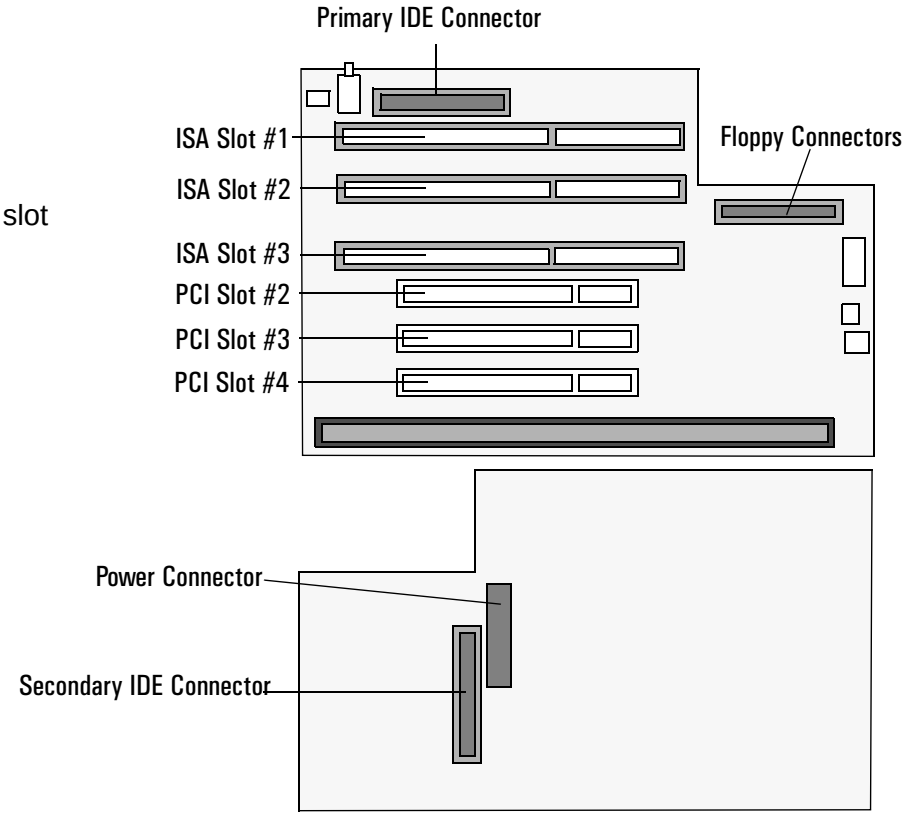
VLi 8 PCI Mapping

VLi 8 PCI Mapping Table			
Device	#**AD**[xx]	**PCI Device**	**Slot#**
0	11	440ZX PAC	
4	15	PIIX4E	
6	17	Integrated Audio	1
18	29	J1	2
16	27	J4	3
14	25	J8	4

VLi 8 Minitower

Front View

- 3 X ISA slots
- 3 X PCI slots
- 1 X system board slot



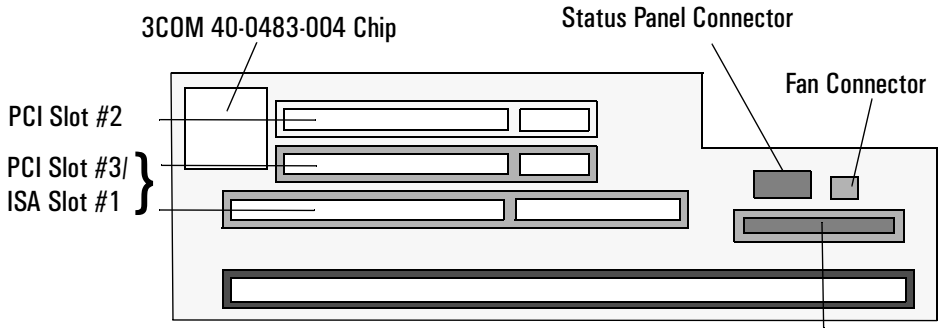
PCI Mapping

VLi 8 PCI Mapping Table			
Device	#**AD**[xx]	**PCI Device**	**Slot#**
0	11	440ZX PAC	
4	15	PIIX4E	
6	17	Integrated Audio	1
18	29	J1	2
16	27	J4	3
14	25	J8	4

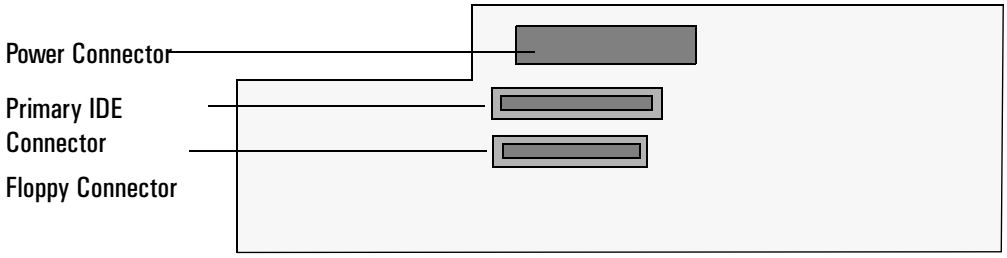
VLi 8SF Desktop

Front view

- 1 X PCI slot
- 1 X ISA/PCI combination slot
- 1 X system board slot



Back view

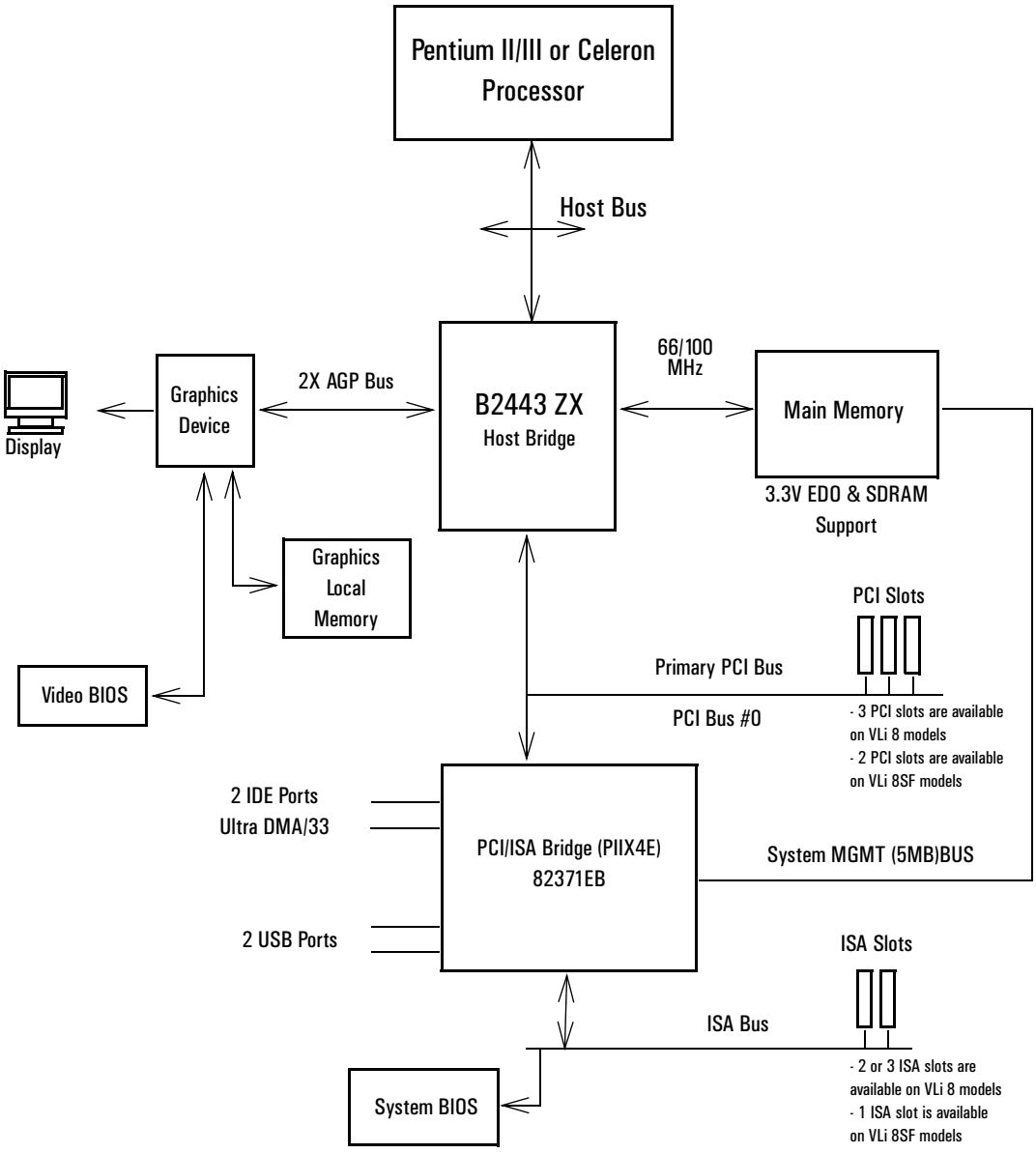


PCI Mapping

VLi 8SF PCI Mapping Table (Celeron)			
Device	#**AD**[xx]	**PCI Device**	**Slot**#
0	11	440ZX PAC	
4	15	PIIX4E	
6	17	Integrated Audio	1
18	29	J1	2
16	27	J4	3
11	22	Integrated LAN	4

Architectural View

All VLi 8 & VLi 8SF Models



Main Memory

There are two 168-pin DIMM slots on the system board for installing main memory; DIMM slots 1 and 2. All *HP Vectra VLi 8 and VLi 8SF PC* models are supplied with one memory module (either 32 MB or 64 MB non-ECC SDRAM) in one of the two slots, leaving the other slots free for memory upgrades. Only HP memory modules are supported.

The slots can be filled in any order. Memory upgrades are available in single 100 MHz modules of 32 MB, 64 MB, 128 MB or 256 MB modules. Note that although the 256 MB modules are ECC, the ECC feature is not used by this PC. Replacement of the supplied memory module may be necessary to obtain the 512 MB maximum memory.

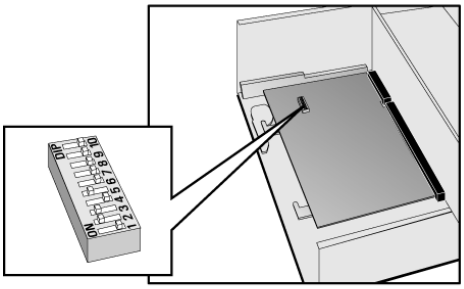
Processors

VLi 8 & VLi 8SF Models

Some models come with a single Pentium II processor and level-2 cache memory packaged in a self-contained, pre-sealed SECC2 module, installed on the system board.

Other models come with a single Pentium III processor and level-2 cache memory packaged in a self-contained, pre-sealed SECC2 module, installed on the system board.

The position of system board switches is shown below:



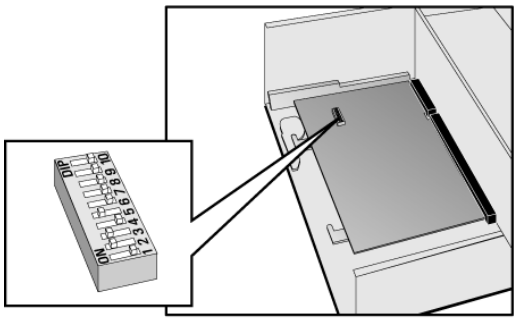
Switch	Switch function:	
1	Reserved	Do not use - OFF (default)
2	BIOS Crisis Recovery	Should normally be kept in the OFF position. Used in case of power loss during BIOS update. Refer to flash.txt in the BIOS package downloadable from the HP Web site.
3	Keyboard power-on:	ON = enabled (default) OFF = disabled
4	Clear Password:	OFF = disabled (default) ON= enabled / clear User and Administrator passwords
5	Clear CMOS:	OFF = normal (default) ON = clear CMOS and reload default values in *Setup*
6- 9	Processor speed, refer to the table on your PC's system board.	
10	Reserved	Do not use - OFF (default)

The correct processor speed switch settings are indicated on the system board.

VLi 8SF Models Only

The PC is equipped with a single Socket 370 Intel Celeron processor. Socket 370 is a conversion of Slot 1 (used previously by Celerons and Pentium IIs) to a socket, running at the same bus protocol as the Pentium II (the GTL+ bus protocol). The processor is connected to the system board through a Plastic Pin Grid Array (PPGA) 370 Socket. The reduction in size achieved by the Socket 370 Celeron is due to the integration of the L2 cache on the processor die.

The position of system board switches is shown below:



Switch	Switch function:	
1	Reserved	Do not use - OFF (default)
2	BIOS Crisis Recovery	Should normally be kept in the OFF position. Used in case of power loss during BIOS update. Refer to flash.txt in the BIOS package downloadable from the HP Web site.
3	Keyboard power-on:	ON = enabled (default) OFF = disabled
4	Clear Password:	OFF = disabled (default) ON= enabled / clear User and Administrator passwords
5	Clear CMOS:	OFF = normal (default) ON = clear CMOS and reload default values in *Setup*
6- 9	Processor speed, refer to the table on your PC's system board.	

Even though the Celeron processor's speed settings are automatic, HP recommends that you set the system board switches to the appropriate settings. The correct switch settings are indicated on the system board.

For more information on processor technology, refer to the *Technical Reference Manual - Vectra Technology.*

Mass Storage Devices

Hard Disk Drives

A 3.5-inch hard disk drive is supplied on an internal shelf in some models. These hard drives can be provided with the PC. To see which other hard disk drives can be purchased as accessories for the VLi 8 & VLi 8SF, refer to **www.hp.com/go/vectraaccessories**.

	4.3 GB Ultra-ATA 33	**8.4 GB Ultra-ATA 33**	**6.4 GB Ultra-ATA 33**	**13.5 GB Ultra-ATA 33**
Availability	VLi 8SF	VLi 8, VLi 8SF	VLi 8 models only	VLi 8 models only
Average seek write time	11.0 ms	11.0 ms	11.0 ms	-
Average seek read time	9.5 ms	9.5 ms	9.5 ms	9 ms
Revolutions per minute (RPM)	5400	5400	5400	7200
Average Latency	5.6 ms	5.6 ms	5.6 ms	4.18 ms
Maximum external transfer rate	16.7/33 MB/s	16.7/33 MB/s	16.7/33 MB/s	16.7/33 MB/s

To find out about Ultra-ATA DMA/33 hard disk drive technology, refer to the *Technical Reference Manual - Vectra Technology*.

Floppy Disk Drives

All models are supplied with a 3.5-inch floppy disk drive.

CD-ROM and DVD Drives

VLi 8 Models

Both the desktop and minitower models have a TEAC 32× Max IDE CD-ROM drive. It can play standard CD-ROM discs, conforming to optical and mechanical standards as specified in the Red and Yellow Book. The DVD Drive below can be purchased as an accessory. Refer to **www.hp.com/go/vectraaccessories.**

To find out about CD-ROM and DVD drive technology, refer to *Technical Reference Manual - Vectra Technology.*

Features of the CD-ROM Drive (D4384A)

- CD-ROM Mode-1 data disc.
- CD-ROM Mode-2 data disc (Mode 1 and Mode 2).
- Photo-CD Multisession.
- CD Audio disc.
- Mixed mode CD-ROM disc (data and audio).
- CD-ROM XA, CD-I, CD-Extra, CD-R, CD-RW.

	Description
Hp product number	D4384A
Disc Diameter	120 mm
Data Block Size	2,055 bytes (14X, Mode-1) 4,800 bytes (32X, Mode-2)
Storage Capacity	650 Mbytes (Mode-1) 742 Mbytes (Mode-2)
Read Mode	Full CAV[1] 10.3X to 24X
Burst Transfer Rate	PIO mode 4 - 16.6 Mbytes/s maximum Single Word DMA Mode 2 - 8.3 Mbytes/s maximum Multi Word DMA Mode 2 - 16.6 Mbytes/s maximum.
Access Time	Average Stroke (1 / 3) 110 ms Full Stroke 180 ms
Buffer Memory Size	128 kbytes
Rotational speed	Approx. 7,300 rpm maximum

[1]. CAV = Constant Angular Velocity

Features of the DVD-ROM Drive (D6935A)

- CD-ROM Mode-1 data disc.
- CD-ROM Mode-2 data disc (Mode 1 and Mode 2).
- Photo-CD Multisession.
- CD Audio disc.
- Mixed mode CD-ROM disc (data and audio).
- CD-ROM XA, CD-I, CD-Extra, CD-R, CD-RW.
- DVD-ROM, DVD-Video.

	Description
HP product number	D6935A
Disc Diameter	120 mm
Storage Capacity	650 MB to 17 GB (depending on disk type)
Read Mode	5 X max (DVD), 32X max CD-ROM
Burst Transfer Rate	PIO mode 4 - 16.6 Mbytes/s maximum Single Word DMA Mode 2 - 8.3 Mbytes/s maximum Multi Word DMA Mode 2 - 16.6 Mbytes/s maximum.
Access Time	Average Stroke (1 / 3) 110 ms Full Stroke 180 ms
Buffer Memory Size	128 kbytes
Rotational speed	Approx. 7,300 rpm maximum

NOTE

If a disk is still in the drive after power failure or drive failure, the disk can be reclaimed by inserting a straightened paper-clip into the small hole at the bottom of the door.

DVD Region Codes

The DVD-ROM drive is only able to play DVD video discs from regions 1 and 2 (see table below). Once a video disc has been played on the device, it will then only be able to play video discs with the same region code.

Region Codes	**Region**	**Supported by the D6935A DVD Drive**
1	USA & Canada	Yes
2	Europe & Japan	Yes
3	South East Asia	No
4	Latin America & Australia	No
5	Russia, Rest of Asia, Africa	No
6	China	No

VLi 8SF Models

The VLi 8SF models have a 24× Max Slim IDE CD-ROM drive. It can play standard CD-ROM discs, conforming to optical and mechanical standards as specified in the Red and Yellow Book.

Features of the Slim CD-ROM Drive (D8381A)

- CD-ROM Mode-1 data disc.
- CD-ROM Mode-2 data disc (Mode 1 and Mode 2).
- Photo-CD Multisession.
- Enhanced CD
- CD Audio disc.
- Mixed mode CD-ROM disc (data and audio).
- CD-ROM XA, CD-I, CD-Extra, CD-R, CD-RW.

	Description
HP product number	D8381A
Disc Diameter	120 mm
Data Block Size	2,055 bytes (14X, Mode-1) 4,800 bytes (32X, Mode-2)
Storage Capacity	650 Mbytes (Mode-1) 742 Mbytes (Mode-2)
Read Mode	Full CAV[1] 10.3X to 24X
Burst Transfer Rate	PIO mode 4 - 16.7 Mbytes/s maximum Single Word DMA Mode 2 - 8.3 Mbytes/s maximum Multi Word DMA Mode 2 - 16.7 Mbytes/s maximum.
Access Time	Average Stroke (1 / 3) 130 ms Full Stroke 300 ms
Buffer Memory Size	128 kbytes
Rotational speed	Approx. 5,136 rpm on average

[1]. CAV = Constant Angular Velocity

NOTE

The Slim CD-ROM drive's draw is not motorized; a spring mechanism operates the draw. To extract a CD-ROM, you will need to gently pull the draw out until you are able to remove the disk.

If a disk is still in the drive after power failure or drive failure, the disk can be reclaimed by inserting a straightened paper-clip into the small hole at the bottom of the door.

Audio Connection

The Slim CD-ROM drive does not have a separate audio connection to the system board. The audio signal is transmitted via the drive's IDE cable connection to the backplane.

Matrox Millennium G200 AGP 2X Graphics Chip

All *HP Vectra VLi 8 and VLi 8SF PC* models are supplied with a Matrox Millennium G200 AGP 2X graphics controller integrated in the system board (refer to the system board diagram on page 18 for its location).

The Matrox Millennium G200 is aimed at business users who want high-resolution support coupled with high performance.

For more information, refer to the *Technical Reference Manual - Vectra Technology* available in PDF (Acrobat) format from **www.hp.com/go/vectrasupport**

Features

- 128-bit DualBus graphics chip
- High-performance video with full AGP 2X support featuring Symmetrical Rendering Architecture
- Advanced 2D, 3D and software DVD video acceleration
- High-quality 32-bit color 3D rendering engine
- 8MB of graphics memory, non-upgradeable
- High-speed 250 MHz RAMDAC with ultra sharp image quality. Provides fast screen refresh to eliminate screen flicker.
- Support for high resolutions and colors

Video Memory

All *HP Vectra VLi 8 and VLi 8SF PC* models are supplied with 8 MB of video memory (not upgradeable) integrated on the system board.

The video RAM (also known as the frame buffer) is a local block of 50 ns SDRAM for holding both the on-screen surface (reflecting what is currently displayed on the screen), and the off-screen surface (video frame, fonts, double buffer).

Supported Resolutions

Under Windows 95

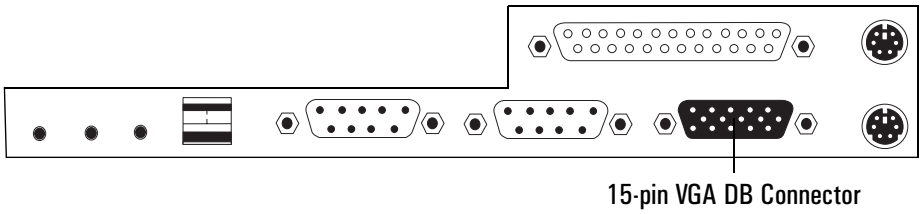
Resolution	Colors	Refresh rates
640 × 480	16	60 Hz
640 × 480	256	60, 72, 75, 85 Hz
640 × 480	64 K	60, 72, 75, 85 Hz
640 × 480	16 M	60, 72, 75, 85 Hz
800 × 600	16	60 Hz
800 × 600	256	56, 60, 72, 75, 85 Hz
800 × 600	64 K	56, 60, 72, 75, 85 Hz
800 × 600	16 M	56, 60, 72, 75, 85 Hz
1024 × 768	256	60, 70, 75, 85 Hz
1024 × 768	64 K	60, 70, 75, 85 Hz
1024 × 768	16 M	60, 70, 75, 85 Hz
1152 × 864	256	60, 70, 75, 85 Hz
1152 × 864	64 K	60, 70, 75, 85 Hz
1152 × 864	16 M	60, 70, 75, 85 Hz
1280 × 1024	256	60, 75, 85 Hz
1280 × 1024	64 K	60, 75, 85 Hz
1280 × 1024	16 M	60, 75, 85 Hz
1600 × 1200	256	60, 70, 75, 85 Hz
1600 × 1200	64 K	60, 70, 75 Hz

Under Windows NT 4.0

Resolution	Colors	Refresh rates
640 × 480	16	60 Hz
640 × 480	256	60, 72, 75, 85 Hz
640 × 480	32K	60, 72, 75, 85 Hz
640 × 480	64 K	60, 72, 75, 85 Hz
640 × 480	16 M	60, 72, 75, 85 Hz
800 × 600	16	60 Hz
800 × 600	256	56, 60, 72, 75, 85 Hz
800 × 600	32 K	56, 60, 72, 75, 85 Hz
800 × 600	64 K	56, 60, 72, 75, 85 Hz
800 × 600	16 M	56, 60, 72, 75, 85 Hz
1024 × 768	256	i43, 60, 70, 75, 85 Hz
1024 × 768	32 K	i43, 60, 70, 75, 85 Hz
1024 × 768	64 K	i43, 60, 70, 75, 85 Hz
1024 × 768	16 M	i43, 60, 70, 75, 85 Hz
1152 × 864	256	60, 70, 75, 85 Hz
1152 × 864	32 K	60, 70, 75, 85 Hz
1152 × 864	64 K	60, 70, 75, 85 Hz
1152 × 864	16 M	60, 70, 75, 85 Hz
1280 × 1024	256	60, 75, 85 Hz
1280 × 1024	32 K	60, 75, 85 Hz
1280 × 1024	64 K	60, 75, 85 Hz
1280 × 1024	16 M	60, 75, 85 Hz
1600 × 1200	256	60, 75, 85 Hz
1600 × 1200	32 K	60, 75, 75 Hz
1600 × 1200	64 K	60, 75 Hz

Connectors

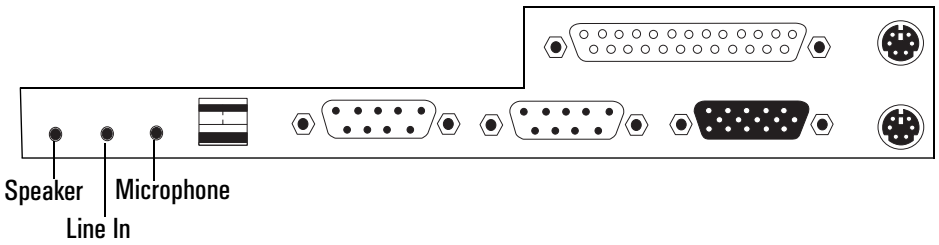
A 15-pin VGA DB connector is located on the rear panel of all VLi 8 and VLi 8SF PCs (refer to the system board diagrams on page 18 for its location).



Audio

The Crystal® integrated PCI audio solution (not upgradeable) in your PC is a two-chip solution made up of the CrystalClear™ CS4280 PCI audio controller and the CrystalClear CS4297 Audio Codec '97. The audio controller interfaces with the PCI bus and performs all digital operations such as sample rate conversions and synthesis. The CS4297 chip mixes and processes all the analog signals.

All models have a Line In jack, Line Out jack and Mic In jack connector located on the rear panel. These external jacks are standard connectors.



Adding an Audio Accessory Board

The integrated PCI audio can be disabled in the **Advanced** menu of the *Setup* program, if an audio accessory board is installed.

Slim CD-ROM's Audio Signal

The Slim CD-ROM drive does not have a separate audio connection to the system board. The audio signal is transmitted via the drive's IDE cable connection to the backplane.

For more information on audio technology, refer to the *Technical Reference Manual - Vectra Technology*.

Network

All *HP Vectra VLi 8SF PC* models and some *VLi 8* models are supplied with a 10/100 3Com 3C905B-TX network solution.

This network solution is a 32-bit PCI Ethernet Controller with advanced manageability capabilities. It features full-duplex, automatic 10/100 BT port selection, Remote Power-On (RPU), and Remote Wake-Up (RWU).

VLi 8 Models

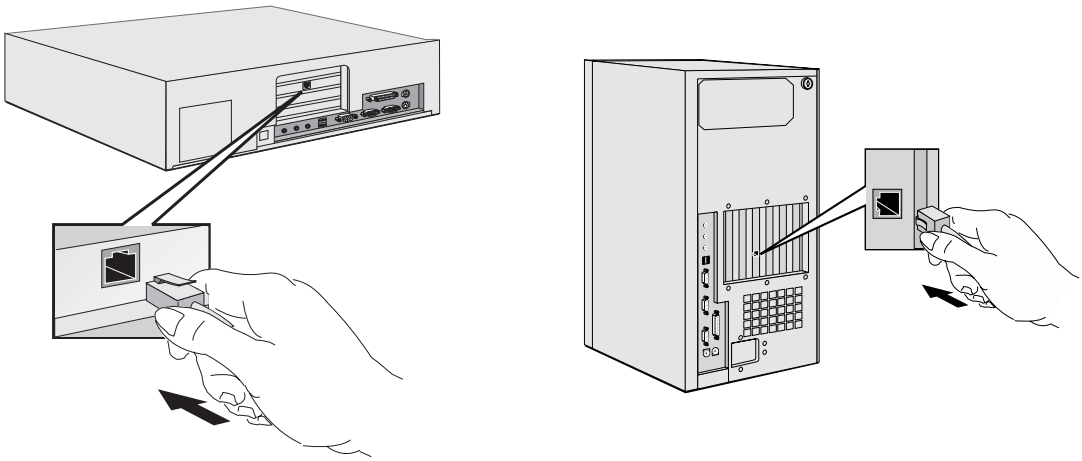
On *HP Vectra VLi 8* PC models, the network solution is deployed as an accessory board (part number D7506A), installed in PCI slot #3. The card has an optional Boot ROM for diskless node operation.

NOTE

A 3COM LAN Boot ROM is integrated in the BIOS ROM chip on the system board. As a result, it is not necessary to insert a Boot ROM chip into the LAN card to perform a Remote Boot.

Connectors

The 10/100BT connector is located on the rear of the PC.



A Wake On LAN (WOL) connector is located on the backplane (refer to page 23 for its location).

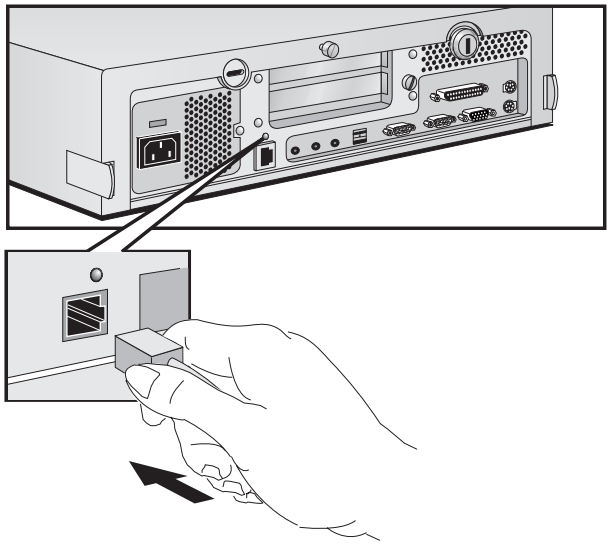
For more information on network technology, refer to the *Technical Reference Manual - Vectra Technology*.

VLi 8SF Models

On *HP Vectra VLi 8SF* PC models, the network solution is integrated; the 3COM chip is built into the backplane (refer to backplane diagram on page 22 for its location).

Connectors

The 10/100BT connector and a network activity indicator are located on the rear panel of the PC.



When connected, the activity indicator glows constantly. The indicator will blink to indicate network activity.

There is no Wake On LAN (WOL) connector.

Adding a Network Accessory Board

The integrated network can be disabled in the **Advanced** menu of the *Setup* program, if a network accessory board is installed. However, as there is no Wake On LAN (WOL) connector, this feature is lost when a network accessory board is installed.

NOTE

A 3COM LAN Boot ROM is integrated in the BIOS ROM chip on the system board. As a result, it is not necessary to insert a Boot ROM chip into the LAN card to perform a Remote Boot.

For more information on network technology, refer to the *Technical Reference Manual - Vectra Technology*.

Accessory Boards

Your PC uses logical slot numbers in the BIOS *Setup* program. You need to know these logical slot numbers if you want to change the PCI slot configuration in the *Setup* program (refer to the appropriate backplane diagrams on page 20 for their location).

VLi 8 Desktop

This model has four accessory board slots. Two PCI slots, one PCI/ISA combination slot and one ISA slot (refer to the backplane diagram on page 21 for their location).

- PCI slots #2, #3 and #4 can be used for full-length 32-bit PCI boards.
- ISA slots #1 and #2 can be used for full-length 16-bit ISA boards.

This model comes preloaded with a 3COM Network card installed in PCI slot #3.

VLi 8 Minitower

This model has six accessory board slots. Three PCI slots and three ISA board slots (refer to the backplane diagram on page 20 for their location).

- PCI slots #2, #3 and #4 can be used for full-length 32-bit PCI boards.
- ISA slots #1, #2 and 3# can be used for full-length XT format 16-bit ISA boards.

This model comes preloaded with a 3COM Network card in installed PCI slot #3.

VLi 8SF Desktop

This model has two accessory board slots. One PCI slot and one PCI/ISA combination slot (refer to the backplane diagram on page 22 for their location).

- PCI slots #2 and #3 can be used for 32-bit XT format PCI boards, less than 17.6 cm or 6.9-inches in length.
- ISA slot #1 can be used for a 16-bit half-length XT format ISA board.

NOTE

For a list of accessory boards that can be purchased as accessories for your PC, refer to **`www.hp.com/go/vectraaccessories`**.

3

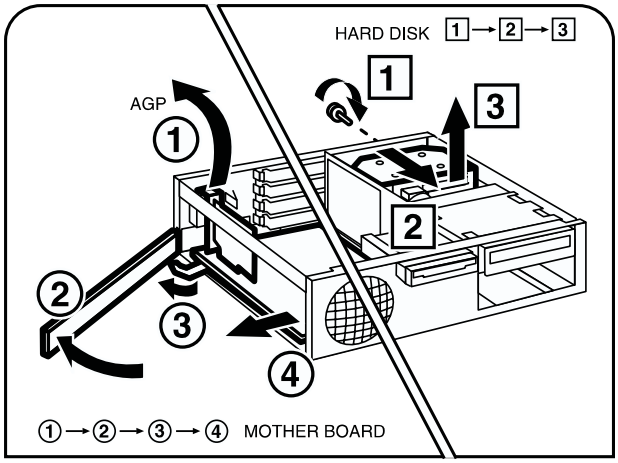
Serviceability

This chapter introduces the enhanced serviceability features of the *HP Vectra VLi 8 and VLi 8SF PC* models. It indicates how to quickly remove or add system components using the serviceability features developed for these PC models.

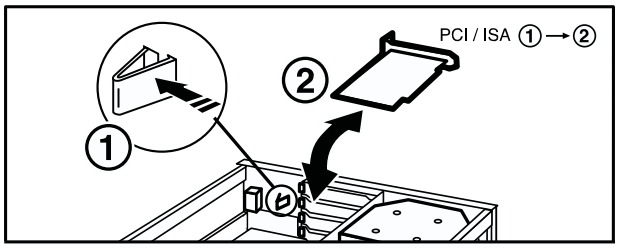
VLi 8 Models

Desktop

Shows how to remove the system board

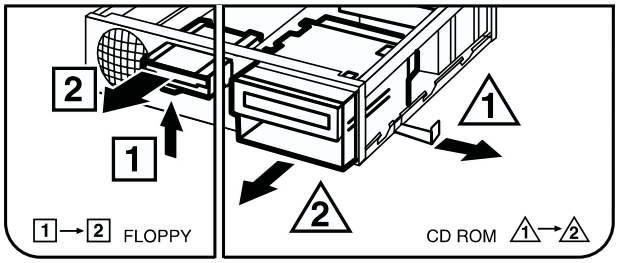


Shows how to remove the hard disk drive



Shows how to add an accessory board

Shows how to remove the floppy drive

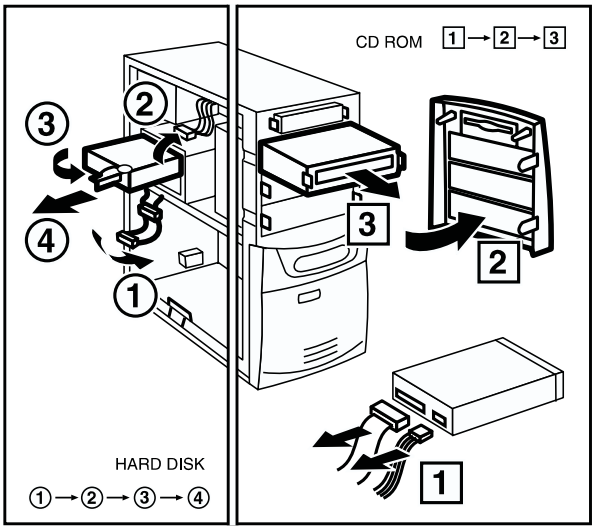


Shows how to remove the front drive bay

Note. Step 1 does not apply to VLi 8 PC models.

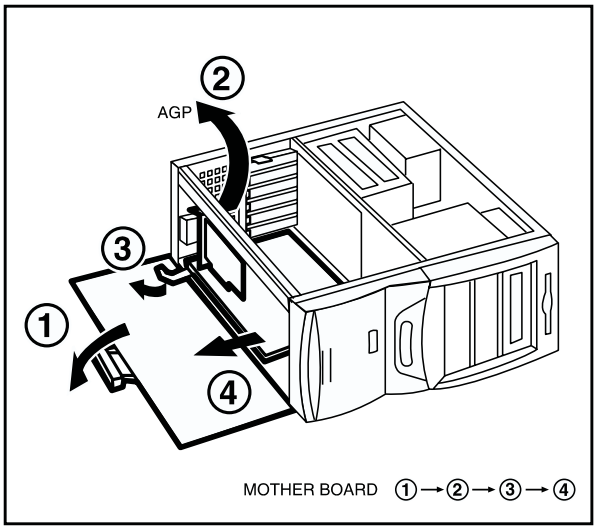
Minitower

Shows how to remove the hard disk drive



Shows how to remove the CD-ROM drive

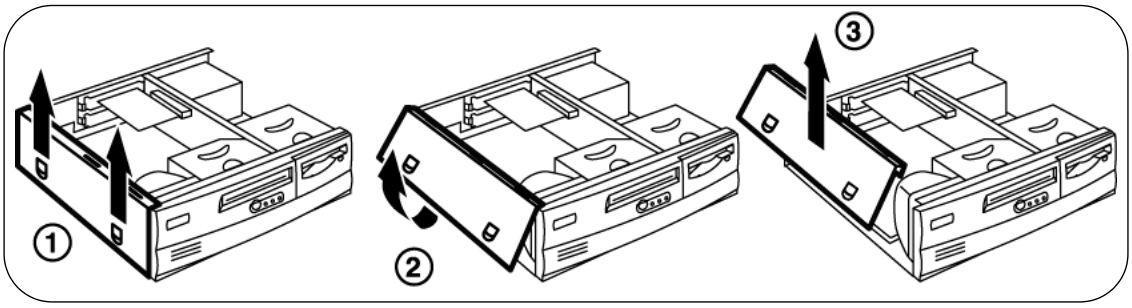
Shows how to remove the system board



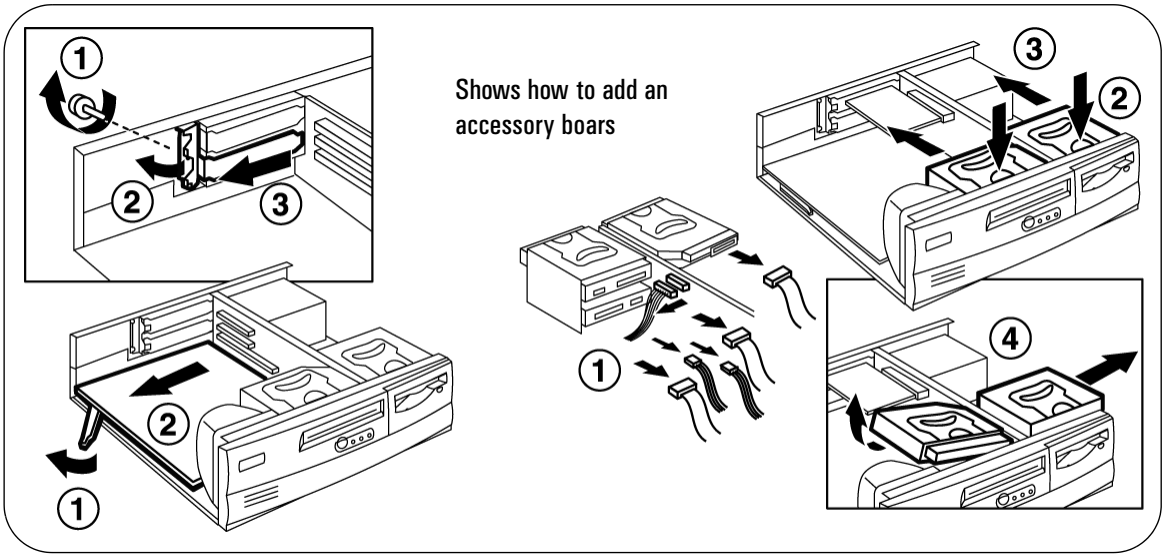
Note. Step 2 does not apply to VLi 8 PC models.

VLi 8SF Models

Shows how to remove the side panel



Shows how to remove the hard disk, floppy disk and CD-ROM drives



Shows how to add an accessory boars

Shows how to remove the system board

Shows how to remove the power and data cables before removing a hard disk, floppy disk and CD-ROM drive

4

BIOS Overview

This chapter describes the BIOS features for the *HP Vectra VLi 8 and VLi 8SF PC* models.

BIOS Summary

HP Vectra VLi 8 and *VLi 8SF* PCs contain an HP/Phoenix BIOS (Basic Input Output System). The system ROM contains the POST (power-on self-test) routines, and the BIOS: the System BIOS, video BIOS, and low option ROM.

The system BIOS is identified by the version number **HZ.01.xx**. The latest BIOS version for your PC and instructions for updating the BIOS can be downloaded from the HP's Support Web site at: **www.hp.com/go/vectrasupport**.

This section covers:

- The BIOS Setup program
- Power saving
- BIOS addresses
- The order in which POST tests are performed
- Beep codes.

Using the HP *Setup* Program

Press **F2** to run the *Setup* program, when the "Vectra" logo is displayed immediately after restarting the PC.

Press **F8** to enter the *Boot* menu. Use the boot menu to select the order of the devices the PC will use to start (boot) from.

Alternatively, press **Esc** to view the summary configuration screen. By default, this remains on the screen for 20 seconds, but by pressing the **Pause** key once, it can be held on the screen indefinitely until **F1** is pressed again. Pressing **F10** will cause the computer to be turned off.

The *Setup* screen offers five menus: Main, Advanced, Security, Boot, Power and Exit. These are selected using the left and right arrow keys.

Main Menu

The Main Menu contains the following fields:

- PnP Operating System
- Reset Configuration Data
- PS/2 Mouse
- System time and date
- Key click
- Key Auto-repeat Speed
- Processor serial number
- Standard Applications (set to **YES** by default)[1]
- Delay Before Auto-repeat
- Numlock at Power-On
- Boot-time Diagnostics Screen.

1. This field should be set to **YES** if all applications you are using are Year 2000 compliant.

Advanced Menu

The Advanced Menu does not have the same structure as the Main Menu and Power Menu. Instead of presenting a list of fields, it offers a list of sub-menus. The Advanced Menu contains the following sub-menus:

- *Memory and Cache.* Define how to configure the specified block of memory.
- *Floppy Disk Drives.* Enable or disable the on-board floppy disk controller.
- *IDE Devices.* Configure IDE Primary and Secondary devices.
- *Integrated I/O Ports.* Enable or disable the on-board parallel and serial ports at the specified address.
- *Integrated USB Interface.* Enable or disable the integrated USB (Universal Serial Bus) interface.
- *PCI Configuration.*
  - *PCI Device*. Use this option if you want to configure (enable/disable Option ROM Scan and Enable Master) PCI device.

VLi 8SF models only

  - *Integrated Network Interface.* Enable or disable the integrated network interface. This feature must be enabled when an ethernet card is installed.
- *ISA Resource Exclusion.* reserves interrupts for legacy ISA devices to prevent conflict with PCI/PnP devices.
- *Integrated Audio Interface.* Enable or disable the integrated PCI Audio interface. This feature must be disabled if an accessory board is installed.

Security

Sub-menus are presented for changing the characteristic and values of the System Administrator Password, User Password, Hardware Protection and Boot Device Security, the amount of protection against the system's drives and network connections, and the amount of protection against being able to boot from the system's drives and network connections. The Security Menu contains the following sub-menus:

- *User Password*. This password can only be set when an administrator password has been set. The User Password prevents unauthorized use of the computer, protects stored data.
- *Administrator Password*. This password prevents unauthorized access to the computer's configuration. It can also be used to start the computer.
- *Hardware Protection*. The following devices can have their accesses unlocked/locked: Integrated Floppy Disk Controller, Integrated IDE Controller, and Integrated Data Communications Ports.
- *Boot Device Security*. Select which devices are to be used for booting up the system. The option Disabled prevents unauthorized use of a device to start the computer.

Boot Menu

Select the order of the devices from which the BIOS attempts to boot the operating system. During POST, if the BIOS is unsuccessful at booting from one device, it will then try the next one on the *Boot Device Priority* list until an operating system is found.

The *QuickBoot Mode* option allows the system to skip certain tests while booting. This decreases the time needed to boot the system.

The *Boot-time Diagnostics* screen enables the user to display *either* the Vectra logo *or* diagnostic's screen during POST.

Power Menu

This menu allows you to set the *Suspend* and *Standby* delays. It enables the user to decide if an IRQ can reactivate the system when in suspend mode. It also allows the system administrator to decide whether the network interface is enabled as a means of reactivating the system from Suspend or *Off*.

Power Saving and Ergonometry

Power-On from Space-Bar

The *Power-on from the space-bar* function is enabled, provided that:

- The computer is connected to a Power-On keyboard (recognizable by the Power-On icon on the space bar).
- The computer is running a Windows operating system.
- The function has not been disabled by setting SW-3 to **open** on the system board switches.

Soft Power Down

Soft Power Down is available with the Windows NT operating system. If users want to shut down their PC, they are able to do so directly from the Windows NT interface. There is no longer any need to physically switch off the PC.

The hardware to do this is contained in the PIIX4E chipset. This chipset is described in detail in *Technical Reference Manual - Vectra Technology.*

Safe Off

Safe Off is available with the Windows 95 and Windows 98 operating systems. If users attempt to shut down the operating system when an application is open and has not been saved, they are requested to save their work before the computer can be powered off.

The hardware to do this is contained in the PIIX4E chipset. This chipset is described in detail in *Technical Reference Manual - Vectra Technology.*

BIOS Addresses

This section provides a summary of the main features of the HP system BIOS. This is software that provides an interface between the computer hardware and the operating system.

System Memory Map

Reserved memory used by accessory boards must be located in the area from C8000h to EFFFFh.

0000 0000 - 0000 03FF	Real-mode IDT
0000 0400 - 0000 04FF	BIOS Data Area
0000 0500 - 0009 FC00	Used by OS
0009 FC00 - 0009 FFFF	Extended BIOS Data Area
000A_0000 - 000B_FFFF	Video RAM or SMRAM (not visible unless in SMM)
000C 0000 - 000C 7FFF	Video ROM
000C 8000 - 000F FFFF	Adapter ROM, RAM, memory-mapped registers
000E 0000 - 000F FFFF	System BIOS (Flash/Shadow)[1]
10 0000 - FF FFFF	Memory (1 MB to 16 MB)
100 0000 - 1FF FFFF	Memory (16 MB to 32 MB)
200 0000 -3FF FFFF	Memory (32 MB to 64 MB)
400 0000 -1FFF FFFF	Memory (64 MB to 512 MB)
FFFC0000 - FFFF FFFF	256 KB BIOS (Flash)

1. This is for Physical memory. As soon as the PST has been completed, the E0000-E8000 segment is released for UMBs.

HP I/O Port Map (I/O Addresses Used by the System[1])

Peripheral devices, accessory devices and system controllers are accessed via the system I/O space, which is not located in system memory space. The 64 KB of addressable I/O space comprises 8-bit and 16-bit registers (called I/O ports) located in the various system components. When installing an accessory board, ensure that the I/O address space selected is in the free area of the space reserved for accessory boards (100h to 3FFh).

1. If configured.

Although the *Setup* program can be used to change some of the settings, the following address map is not completely BIOS dependent, but is determined partly by the operating system. Note that some of the I/O addresses are allocated dynamically.

I/O Address Ports	Function
0000 - 000F	DMA controller 1
0020 - 0021	Master interrupt controller (8259)
002E - 002F	Configuration registers
0040 - 0043	Timer 1
0060, 0064	Keyboard controller (reset, slow A20)
0061	Port B (speaker, NMI status and control)
0070	Bit 7: NMI mask register
0070 - 0071	RTC and CMOS data
0080	Manufacturing port (POST card)
0081 - 0083, 008F	DMA low page register
0092	PS/2 reset and Fast A20
00A0 - 00A1	Slave interrupt controller
00C0 - 00DF	DMA controller 2
00F0 - 00FF	Co-processor error
0170 - 0177	IDE secondary channel
01F0 - 01F7	IDE primary channel
0278 - 027F	LPT 2
02E8 - 02EF	Serial port 4 (COM4)
02F8 - 02FF	Serial port 2 (COM2)
0372 - 0377	IDE secondary channel, secondary floppy disk drive
0378 - 037A	LPT1
03B0 - 03DF	VGA
03E8 - 03EF	COM3
03F0h- 03F5	Floppy disk drive controller
03F6	IDE primary channel
03F7	Floppy disk drive controller
03F8 - 03FF	COM1
04D0 - 04D1	Interrupt edge/level control
0678 - 067B	LPT2 ECP
0778 - 077B	LPT1 ECP
0CF8 - 0CFF	PCI configuration space

DMA Channel Controllers

Only “I/O-to-memory” and “memory-to-I/O” transfers are allowed. “I/O-to-I/O” and “memory-to-memory” transfers are disallowed by the hardware configuration.

The system controller supports seven DMA channels, each with a page register used to extend the addressing range of the channel to 16 MB. The following table summarizes how the DMA channels are allocated.

DMA controller	
Channel	**Function**
0	Free
1	Free if not used for parallel port in *Setup*
2	Floppy disk controller
3	Free if not used for parallel port in *Setup*
4	Used to cascade DMA channels 0-3
5	Free
6	Free
7	Free

Interrupt Controllers

The Interrupt Requests (IRQ) are numbered sequentially, starting with the master controller, and followed by the slave.

IRQ (Interrupt Vector)	Interrupt Request Description
INTR	
IRQ0	System Timer
IRQ1	Keyboard Controller
IRQ3	Free if not used for serial port
IRQ4	Used by serial port if enabled
IRQ5	Free if not used for parallel port or audio
IRQ6	Floppy Disk Controller
IRQ7	LPT1
IRQ8	RTC
IRQ9	Available for PCI devices, if not used by ISA board or USB port
IRQ10	Available for PCI devices, if not used by ISA board or USB port
IRQ11	Available for PCI devices, if not used by ISA board or USB port
IRQ12	Mouse
IRQ13	Co-processor
IRQ14	IDE Primary channel
IRQ15	IDE Secondary channel. Free unless disabled

PCI Interrupt Request Lines

PCI devices generate interrupt requests using up to four PCI interrupt request lines (INTA#, INTB#, INTC#, and INTD#). PCI interrupts can be shared; several devices can use the same interrupt. However, optimal system performance is reached when minimizing the sharing of interrupts.

Order in Which the POST Tests are Performed

Each time the system is powered on, or a reset is performed, the POST is executed. The POST process verifies the basic functionality of the system components and initializes certain system parameters.

The POST starts by displaying a graphic screen of the Hewlett-Packard logo when the PC is restarted.

Devices, such as memory and newly installed hard disks, are configured automatically. The user is not requested to confirm the change. Newly removed hard disks are detected, and the user is prompted to confirm the new configuration by pressing F4. Note, though, that the POST does not detect when a hard disk drive has been otherwise changed.

During the POST, the BIOS and other ROM data is copied into high-speed shadow RAM. The shadow RAM is addressed at the same physical location as the original ROM in a manner which is completely transparent to applications. It therefore appears to behave as very fast ROM. This technique provides faster access to the system BIOS firmware.

The following table lists the POST checkpoint codes written at the start of each test.

Checkpoint Code	POST Routine Description
02h	Verify Real Mode
03h	Disable Non-Maskable Interrupt (NMI)
04h	Get CPU type
06h	Initialize system hardware
08h	Initialize chipset with initial POST values
09h	Set IN POST flag
0Ah	Initialize CPU registers
0Bh	Enable CPU cache
0Ch	Initialize caches to initial POST values
0Eh	Initialize I/O component

Checkpoint Code	POST Routine Description
0Fh	Initialize the local bus IDE
10h	Initialize Power Management
11h	Load alternate registers with initial POST values
12h	Restore CPU control word during warm boot
13h	Initialize PCI Bus Mastering devices
14h	Initialize keyboard controller
17h	Initialize cache before memory autosize
18h	8254 timer initialization
1Ah	8237 DMA controller initialization
1Ch	Reset Programmable Interrupt Controller
24h	Set ES segment register to 4 GB
26h	Enable A20 line
28h	Autosize DRAM
29h	Initialize POST Memory Manager
2Ah	Clear 512 KB base RAM
32h	Test CPU bus-clock frequency
33h	Initialize POST Dispatch Manager
34h	Test CMOS RAM
35h	Initialize alternate chipset registers
36h	Warm start shutdown
37h	Reinitialize the chipset (MB only)
38h	Shadow system BIOS ROM
39h	Reinitialize the cache (MB only)
3Ah	Autosize cache
3Ch	Configure advanced chipset registers

Checkpoint Code	POST Routine Description
3Dh	Load alternate registers with CMOS values
40h	Set initial CPU speed
42h	Initialize interrupt vectors
44h	Initialize BIOS interrupts
45h	POST device initialization
47h	Initialize manager for PCI Option ROMs (Rel. 5.1 and earlier)
48h	Check video configuration against CMOS
49h	Initialize PCI bus and devices
4Ah	Initialize all video adapters in system
4Bh	Display QuietBoot screen
4Ch	Shadow video BIOS ROM
4Eh	Display BIOS copyright notice
50h	Display CPU type
51h	Initialize EISA board
52h	Test keyboard
54h	Set key click if enabled
56h	Enable keyboard
59h	Initialize POST display service
5Ah	Display prompt “Press F2 to enter SETUP”
5Bh	Disable CPU cache
5Ch	Test RAM between 512 and 640 KB
60h	Test extended memory
62h	Test extended memory address lines
64h	Jump to UserPatch1
66h	Configure advanced cache registers

Checkpoint Code	POST Routine Description
67h	Initialize Multi Processor APIC
68h	Enable external and CPU caches
69h	Setup System Management Mode (SMM) area
6Ah	Display external L2 cache size
6Ch	Display shadow-area message
6Eh	Display possible high address for UMB recovery
70h	Display error messages
72h	Check for configuration errors
74h	Test real-time clock
76h	Check for keyboard errors
7Ah	Test for key lock on
7Ch	Set up hardware interrupt vectors
7Eh	Initialize coprocessor if present
80h	Disable onboard Super I/O ports and IRQs
81h	Late POST device initialization
82h	Detect and install external RS 232 ports
83h	Configure non-MCD IDE controllers
84h	Detect and install external parallel ports
85h	Initialize PC-compatible PnP ISA devices
86h	Re-initialize onboard I/O ports
87h	Configure Motherboard Configurable Devices
88h	Initialize BIOS Data Area
89h	Enable Non-Maskable Interrupts (NMIs)
8Ah	Initialize Extended BIOS Data Area
8Bh	Test and initialize PS/2

Checkpoint Code	POST Routine Description
8Ch	Initialize floppy controller
8Fh	Determine number of ATA drives
90h	Initialize hard disk controllers
91h	Initialize local-bus hard disk controllers
92h	Jump to UsersPatch2
93h	Build MPTABLE for multi-processor boards
94h	Disable A20 address line (Rel. 5.1 and earlier)
95h	Install CD ROM for boot
96h	Clear huge ES segment register
97h	Fixup Multi Processor table
99h	Check for SMART drive
9Ah	Shadow option ROMs
9Ch	Set up Power Management
9Eh	Enable hardware interrupts
9Fh	Determine number of ATA drives
A0h	Set time of day
A2h	Check key lock
A4h	Initialize typematic rate
A8h	Erase F2 prompt
AAh	Scan for F2 key stroke
ACh	Enter SETUP
AEh	Clear IN POST flag
B0h	Check for errors
B2h	POST done - prepare to boot operating system
B5H	Terminate QuietBoot

Checkpoint Code	POST Routine Description
B6h	Check password (optional)
B8h	Clear global descriptor table
B9h	Clean up all graphics
BAh	Initialize DMI parameters
BBh	Initialize PnP Option ROMs
BCh	Clear parity checkers
BDh	Display MultiBoot menu
BEh	Clear screen optional
BFh	Check virus and backup reminders
C0h	Try to boot with INT 19
C1h	Initialize POST Error Manager (PEM)
C2h	Initialize error logging
C3h	Initialize error display function
C4h	Initialize system error handling
The following are for boot block in Flash ROM	
E0h	Initialize the chipset
E1h	Initialize the bridge
E2h	Initialize the CPU
E3h	Initialize system timer
E4h	Initialize system I/O
E5h	Check force recovery boot
E6h	Checksum BIOS ROM
E7h	Go to BIOS
E8h	Set Huge Segment
E9h	Initialize Multi Processor

Checkpoint Code	POST Routine Description
EAh	Initialize OEM special code
EBh	Initialize PIC and DMA
ECh	Initialize Memory type
EDh	Initialize Memory size
EEh	Shadow Boot Block
EFh	System memory test
F0h	Initialize interrupt vectors
F1h	Initialize Run Time Clock
F2h	Initialize video
F3h	Initialize beeper
F4h	Initialize boot
F5h	Clear Huge segment
F6h	Boot to Mini DOS
F7h	Boot to Full DOS

Beep Codes

If a terminal error occurs during POST, the system issues a beep code before attempting to display the error in the upper left corner of the screen. Beep codes are useful for identifying the error when the system is unable to display the error message.

Beep Pattern	Beep Code	Numeric Code	Description
— -- -- ---	1-2-2-3	16h	BIOS ROM check-sum failure
— --- — —	1-3-1-1	20h	DRAM refresh test failure
— --- — ---	1-3-1-3	22h	8042 Keyboard controller test failure
— --- --- —	1-3-3-1		RAM module missing or not installed correctly[1]
— --- ---- —	1-3-4-1	2Ch	RAM failure on address line *xxxx*[2]
— --- ---- ---	1-3-4-3	2Eh	RAM failure on data bits *xxxx*[2] of low byte of memory bus
— --- ---- ---	1-3-4-3	30h	RAM failure on data bits *xxxx*[2] of high byte of memory bus
-- — -- ---	2-1-2-3	46h	ROM copyright notice check failure
-- -- --- —	2-2-3-1	58h	Unexpected interrupts test failure
— --	1-2	98h	Video configuration failure or option ROMs check-sum failure
-	1	B4h	This does not indicate an error. There is one short beep before system startup.

1. Non-HP memory modules are not supported. Only HP memory modules should be used.

2. If the BIOS detects error 2C or 2E (base 512K RAM error), it displays an additional word-bitmap (*xxxx*) indicating the address line or bits that failed. For example, “2C 0002” means address line 1 (bit one set) has failed. “2E 1020” means data bits 12 and 5 (bits 12 and 5 set) have failed in the lower 16 bits.

5

Drivers and Software

This chapter describes the drivers and software preloaded with the *HP Vectra VLi 8 and VLi 8SF PC* models.

Drivers

You can download up-to-date versions of drivers required for VLi 8 and VLi 8SF PCs from the "Software and Drivers" section of HP's Support web site at **www.hp.com/go/vectrasupport**.

Software

VLi 8 and VLi 8SF models come preloaded with the following software. You can download the most up-to-date versions from the "Software and Drivers" section of HP's Support web site at **www.hp.com/go/vectrasupport**.

Operating Systems:

- Either Windows 95 SR#2.5[1], Windows 98 RTM or Windows NT4 SP4a.

Software:

- DiagTools
- NT Lock
- Online documentation
- SoftOff
- TopTools
- McAfee Viruscan (under Windows NT)
- UFD Reader
- + Euro & Y2K patches
- SafeOff
- Viruscan (under Windows 95 & Windows 98).

1. The service release number may be different on different language versions.

BIOS Updates

The system BIOS is identified by the version number HZ.01.xx. The latest BIOS version for your PC and instructions for updating the BIOS can be downloaded from the HP support Web site at:
www.hp.com/go/vectrasupport.

The Technical Reference Manual contains the following documents downloadable from the Web in PDF format:

- **Introduction & Vectra Product Line Overview**
  Describes how to use the Technical Reference Manual and provides a brief overview of VEi and VLi PCs.
- **Product Description**
  The document you are reading. A separate document exists for VEi 7 models, VEi 8 models and VLi 8/VLi 8SF models, providing detailed BIOS information and summary information on the hardware components in the PC.
- **Vectra Technology**
  A detailed look at the hardware components in all the PCs in the product line. Includes information on processors, chip sets, graphics controllers, network cards, connectors and sockets.