
Technical Reference Manual

Product Description - Vectra VL600

This technical reference and BIOS document for Vectra VL600 PCs contains summary information only. More detailed information on system hardware is available in the *Technical Reference Manual - Vectra Technology*.

HP Vectra VL600 PCs

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About this Document

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VL600 Bibliography

- HP Vectra VL600 (D8610-90001) *User's Guides* manual
HP Vectra VL600 (D8610-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* Chapter at:
www.hp.com/go/vectrasupport.
- HP *Support Assistant* CD-ROM (by subscription).

Data sheets can be obtained at:

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

System Overview

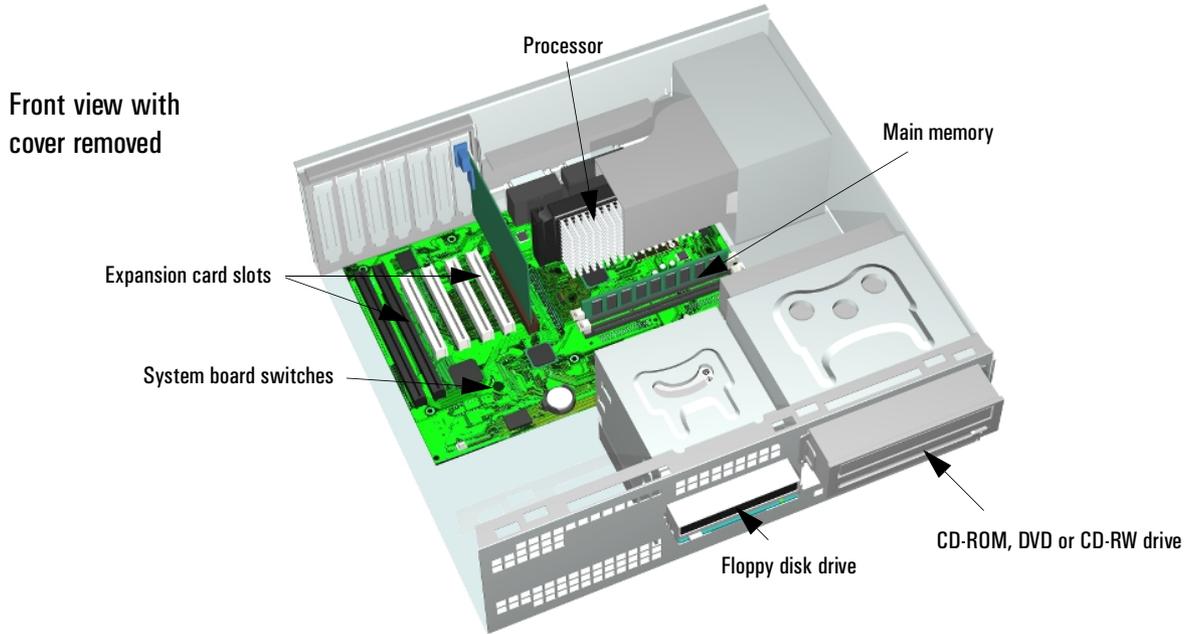
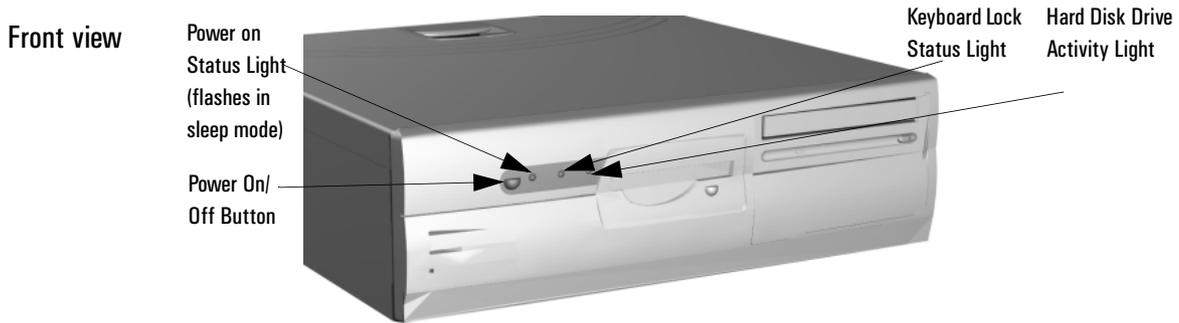
This chapter introduces the internal and external features, and lists the specifications of the HP Vectra VL600 PC models.

1 System Overview

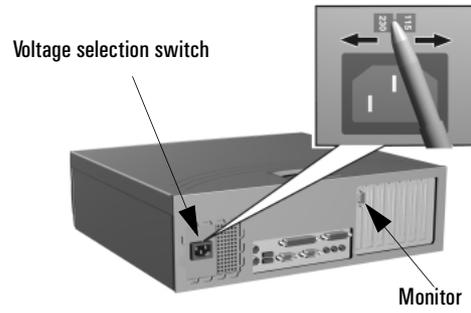
Package Features

Package Features

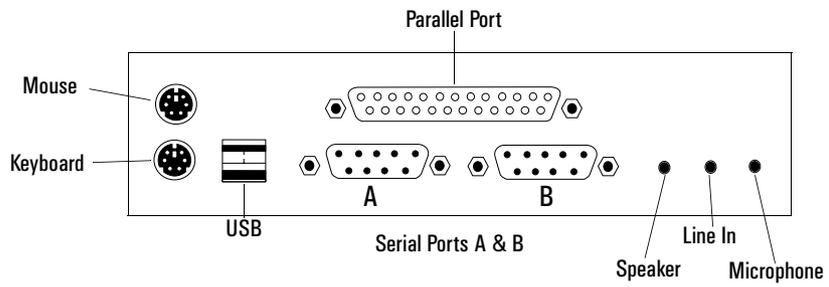
VL600 Desktop



Rear view



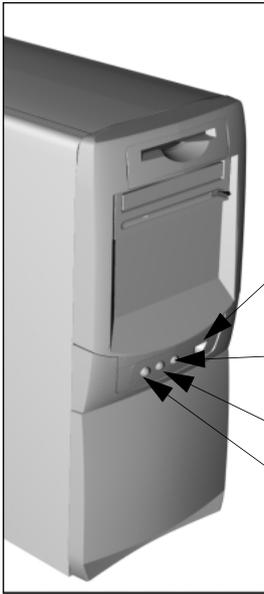
Rear connectors



1 System Overview
 Package Features

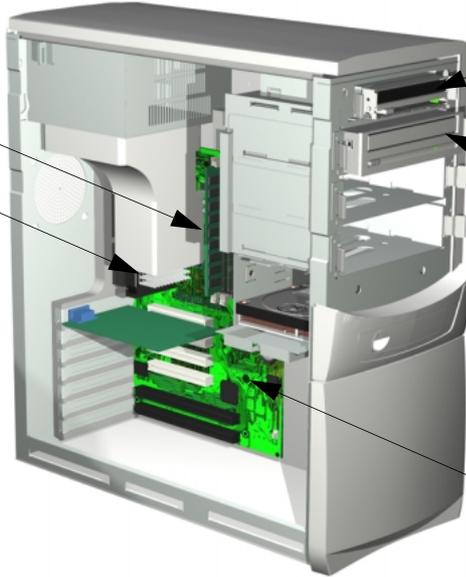
VL600 Minitower

Front view



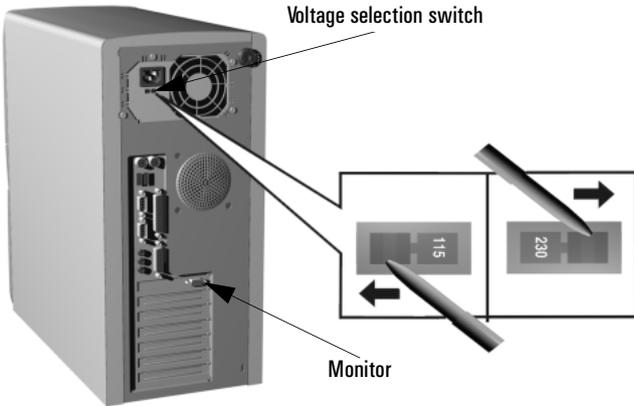
- Power On/Off Button
- Power On Status Light (flashes in sleep mode)
- Keyboard Lock Status Light
- Hard Disk Drive Activity Light

Front view with cover removed



- Main Memory
- Processor
- Floppy disk drive
- CD-ROM, DVD or CD-RW drive
- System board switches

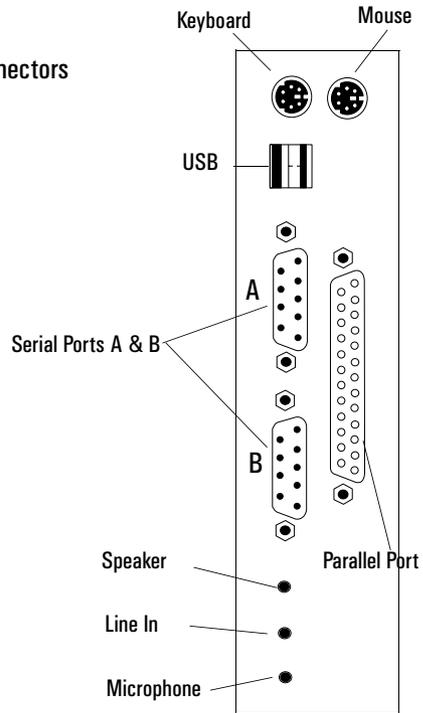
Rear view



Voltage selection switch

Monitor

Rear connectors



Specifications

Physical Characteristics

VL600 Desktop

Characteristic	Description
Weight (excluding display and keyboard)	10 kg (22 pounds)
Dimensions	Width: 43.5cm (17.13 inches) Height: 13.5cm (5.32 inches) Depth: 43 cm (16.93 inches)
Footprint	0.187 m ² (2.01 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 4.0A, 200 - 240 V 2.0A ac (voltage selection switch) Input frequency: 50/60 Hz + 12V = 4A -12V = 0.3A + 5V = 15A + 3.3V = 8A + 5V standby 2A Maximum output power: 120 W continuous + 5V and + 3.3V total output must not exceed 80W
Power Consumption (components)	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)

1 System Overview

Specifications

VL600 Minitower

Characteristic	Description
Weight (excluding display and keyboard)	13.4 kg (29.5 pounds)
Dimensions	Width: 20.6 cm (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 + 12V = 6A -12V = 0.3A + 5V = 22A + 3.3V = 14A (combined +5V and 3.3V cannot exceed 25A) + 5V standby 2A -5V = 0.3A Maximum output power: 200 W continuous + 5V and + 3.3V total output must not exceed 120W
Power Consumption (components)	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)

Both Platforms

Power Consumption

As an ENERGY STAR partner, HP has determined that this product meets the ENERGY STAR guidelines for energy efficiency (standard base models).

Power Consumption (PC running Windows98)	115V/60Hz	230V/50Hz
Operating with input/output:	75W	75W
Operating without input/output:	45W	45W
Suspend:	30W	30W
Off:	2.7W	2.7W

These are “typical” values given for the standard base models.

When the computer is turned off with the power button on the front panel, the power consumption falls below 3W but is not zero. The special on/off method used by these computers considerably extends the lifetime of the power supply. To reach zero power consumption in “off” mode, either unplug the power outlet or use a power block with a switch.

Acoustic Noise Emission

Acoustic Noise Emission (ISO 7779)	Sound Power (Average)	Sound Power (ISO 9296)	Sound Pressure (ISO 9296)
Operating (idle)	LwA = 37 dB	LwAd = 4.0 B	LpA = 29 dB
Operating with disk access	LwA = 42 dB	LwAd = 4.5 B	LpA = 33 dB
Operating with floppy access	LwA = 43 dB	LwAd = 4.6 B	LpA = 37 dB

The values are given for the standard configuration as shipped.

1 System Overview

Specifications

Electrical Specifications

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 2A 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 as a replacement.

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

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: VL600 Desktop VL600 Minitower	(as defined ISO 7779) Sound level (LwA) ≤ 37 db (operating) Sound level (LwA) ≤ 37 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.

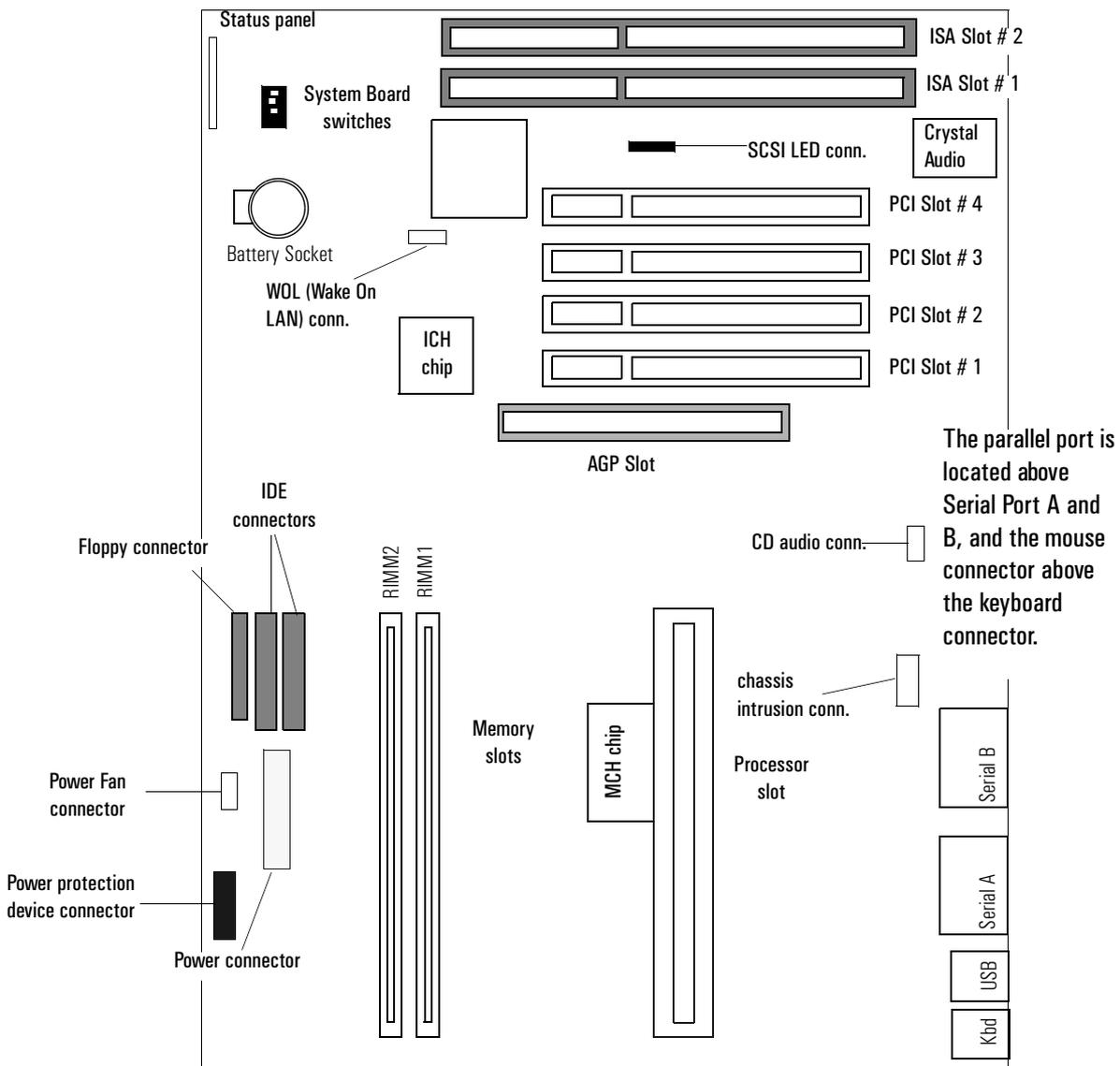
System Features

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

VL600 System Board Layout

All HP Vectra VL600 PC system boards have a Pentium III processor slot.

System Board



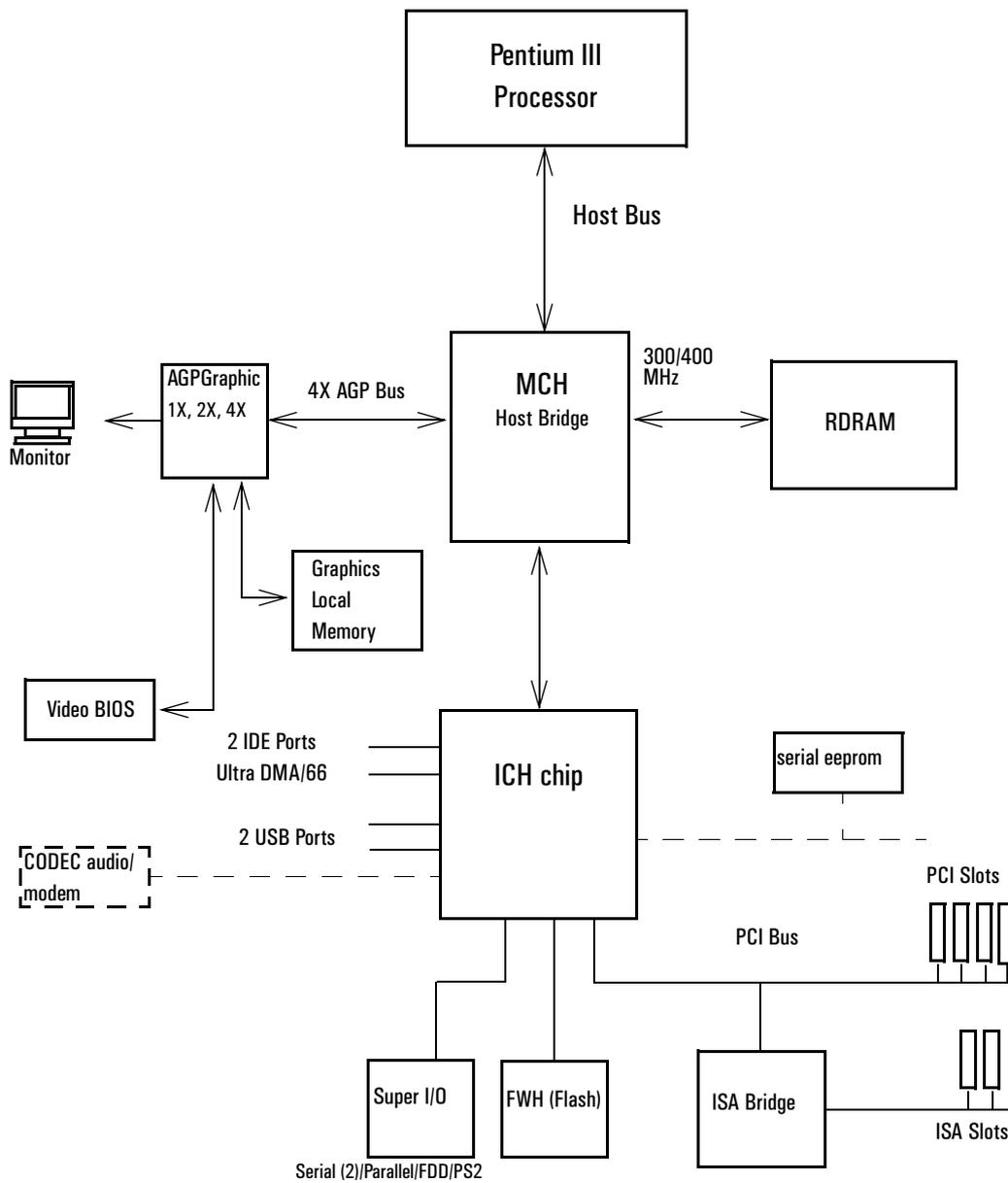
VL600 PCI Mapping

VL600 PCI Mapping Table			
Bus	Device	PCI Device	Slot#
0	0	MCH chip	
0	1	MCH chip: AGP bridge	
0	30	ICH chip: PCI bridge	
0	31	ICH chip	
1	0	AGP device	AGP slot
2	1	Integrated audio	
2	6	ISA bridge	
2	15	PCI slot 1	1
2	13	PCI slot 2	2
2	11	PCI slot 3	3
2	9	PCI slot 4	4

2 System Features

Architectural View

Architectural View



Main Memory

There are two 184-pin RIMM slots on the system board for installing main memory: RIMM slots 1 and 2. All *HP Vectra VL600 PC* models are supplied with one memory module (128 MB Rambus DRAM) in RIMM slot 1, the slot nearest the processor. Only HP memory modules are supported.

If only one RDRAM module is used, it must be installed in the slot nearest the processor. Any slot not filled with an RDRAM module must contain a continuity module. Memory upgrades are available in single modules of 128 MB, 256 MB or 512MB modules (when these become available). Replacement of the supplied memory module may be necessary to obtain the 1024 MB maximum memory.

Memory Types Supported

Memory detection: RDRAM (Rambus DRAM) support only, no SDRAM or EDO support.

- Minimum memory configuration supported is 64MB.
- Maximum memory supported by the system is 1GB using 256Mbit RDRAM technology. This will be available from early 2000.
- Continuity RIMM modules must be installed in slots without RIMMs.
- The BIOS supports PC600, PC700 and PC800 RIMMs, and a mixture of these RIMMs but it will program the Rambus frequency to the lowest frequency if a mixture is detected.

RDRAM Modules

Direct RDRAM components exist in three speeds. These components are referred to as:

- PC600 RDRAM
- PC700 RDRAM
- PC800 RDRAM.

The PCxxx nomenclature provides consistency with the current PC100 SDRAM naming. The numbers 600, 700 and 800 provide the speed indication for the module. Speed in this case relates to Mega data transfers per second (Mt/s), which is twice the clock frequency in MHz.

2 System Features

Main Memory

Example: PC700 RDRAM, the number 700 is not exactly the Mt/s capability if the part, actual Mt/s rate is about 711 Mt/s.

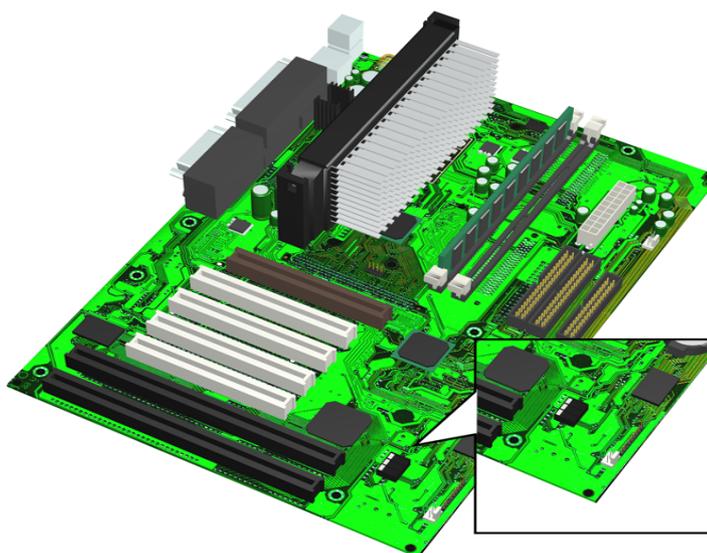
Table with possible mixes, but not recommended:

FSB	PC600	PC700	PC800	PC600+PC700	PC700+PC800
100 MHz	✓ (600 MHz)	✓, speed down to PC600	✓ (800MHz)	✓, runs like PC600	✓, runs like PC600
133 MHz	✓ (533 MHz)	✓ (700MHz)	✓ (800MHz)	✓, runs like PC600	✓, runs like PC700

Processors

All 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 latest Pentium III processors have either 256KB level 2 cache on die or 512KB of out-of-chip level 2 cache.

The position of system board switches is shown below:



SWITCH BLOCK (SW 1)		
Switch	Switch function:	
1	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.
2	CMOS	OFF = normal (default) ON = clear CMOS and reload default values in <i>Setup</i>
3	Password	OFF = enabled (default) ON = disabled / clear User and Administrator passwords

Processor speed is recognized automatically.

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

2 System Features

Mass Storage Devices

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 VL600, refer to www.hp.com/go/pcaccessories.

	10 GB Ultra-ATA 66	15 GB Ultra-ATA 66	30 GB Ultra-ATA 66	9.1 GB Ultra-SCSI
Typical Seek Times (ms)				
Average	9.5	8.5	< 9.0	6.8
Track-to-Track	2.0	0.8	< 1.0	0.9
Full Stroke	18.0	15.0	< 20.0	15.0
Rotational Speed (RPM)	5 400	7 200	7 200	7 200
Internal Data Rate (Mb/s)	Up to 194	235	191 to 298	Up to 257
Buffer Size (KB) Ultra ATA	512	512	2048	2048

To find out about Ultra-ATA DMA/ 66 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

Models may be fitted with a 48X 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. This drive can also be purchased as an accessory. Refer to www.hp.com/go/pcaccessories.

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

**Features of the
CD-ROM Drive
(D9444A)**

- 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	D9444A
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. 11,100 rpm maximum

¹CAV = Constant Angular Velocity

**Features of the
CD-RW Drive
(D9524A)**

- 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	D9524A
Disc Diameter	120 mm

2 System Features

Mass Storage Devices

	Description
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 20X
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

¹CAV = Constant Angular Velocity

Features of the DVD-ROM Drive (D7521A)

- 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, DVD Audio, DVD-RAM.

	Description
HP product number	D7521A
Disc Diameter	120 mm
Storage Capacity	650 MB to 17 GB (depending on disk type)
Read Mode	8 X max (DVD), 40X 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). DVD region settings can be changed up to 5 times.

Region Codes	Region	Supported by the D4388A 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

2 System Features

Matrox Millennium G250 AGP 2X Graphics Card

Matrox Millennium G250 AGP 2X Graphics Card

Some *HP Vectra VL600 PC* models are supplied with a Matrox Millennium G250 AGP 2X graphics card.

The Matrox Millennium G250 is aimed at business users who want high-resolution support coupled with high performance.

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

Key Features

- 128-bit DualBus graphics chip
- 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, upgradeable to 16MB
- 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 Matrox Millennium G250 graphics cards are supplied with 8 MB of video memory (upgradeable to 16MB).

The video RAM (also known as the frame buffer) is a local block of 6 ns 166MHz SGRAM 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, bitmaps, textures).

Supported Refresh Rates

Resolution	Vertical Refresh Rates (Hz) ¹				Max. Horizontal Refresh Rates (kHz) ¹			
	8-bit	16-bit	24-bit	32-bit	8-bit	16-bit	24-bit	32-bit
640x480	200	200	200	200	101.8	101.8	101.8	101.8
800x600	180	180	180	180	113.55	113.55	113.55	113.55
1024x768	140	140	140	140	113.15	113.15	113.15	113.15
1152x864	120	120	120	120	109.38	109.38	109.38	109.38
1280x1024	100	100	100	90	107.23	107.23	96.47	74.59
1600x1200	90	90	85	65	112.50	112.50	100.00	81.25
1920x1080	80	80	75	60	93.75	93.75	87.89	70.31
1920x1200	76	76	70	-	96.88	96.88	90.42	-
1800x1440	70	70	65	-	96.88	96.88	96.98	-

¹These are the maximum refresh rates with 166Mhz SGRAM, 250MHz Integrated RAMDAC.
83/166 @ 8, 24 and 32 bpp, 105/140 @ 16 bpp

2 System Features

Matrox Millennium G400 AGP 4X Graphics Card

Matrox Millennium G400 AGP 4X Graphics Card

Some *Vectra VL600 PC* models are supplied with a Matrox Millennium G400 AGP 4X graphics controller.

The Matrox Millennium G400 is a very high performance 2D/3D graphics card.

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

Key Features

- 256-bit DualBus graphics chip
- AGP 4X host interface with 1GB/s bandwidth and Symmetrical Rendering Architecture
- High performance 2D, 3D and software DVD video acceleration
- High-quality 32-bit color 3D rendering engine
- Upgradeable with Matrox Dual Head modules
- 32MB of local graphics memory, non-upgradeable
- High-speed 300 MHz RAMDAC with ultra sharp image quality. Provides fast screen refresh to eliminate screen flicker
- Support for high resolutions and colors.

Video Memory

Single Head Matrox Millennium G400 graphics cards are supplied with 32 MB of video memory (non-upgradeable). Dual Head cards are supplied with 16MB of video memory.

The video RAM (also known as the frame buffer) is a local block of 6 ns 128-bit 166MHz SGRAM 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, bitmaps, textures).

Supported Refresh Rates

Resolution	Max. Vertical Refresh Rates (Hz)			Max. Horizontal Refresh Rates (kHz)		
	8/16 bpp	24 bpp	32 bpp	8/16 bpp	24 bpp	32 bpp
4:3 aspect ratios	8/16 bpp	24 bpp	32 bpp	8/16 bpp	24 bpp	32 bpp
640x480	200	200	200	130	130	130
800x600	200	200	200	130	130	130
1024x768	160	160	160	130	130	130
1152x864	140	140	140	130	130	130
1280x1024	120	120	120	130	130	130
1600x1200	100	100	100	130	130	130
1600x1280	90	90	90	130	130	130
1800x1440	80	80	80	120	120	120
1920x1440	75	75	75	115	115	115
2048x1536	70	70	70	110	110	110
16:9 aspect ratios						
1600x1024	120	120	120	130	130	130
1920x1035	100	100	100	115	115	115
1920x1080	100	100	100	115	115	115
1920x1200	90	90	90 H	115	115	115

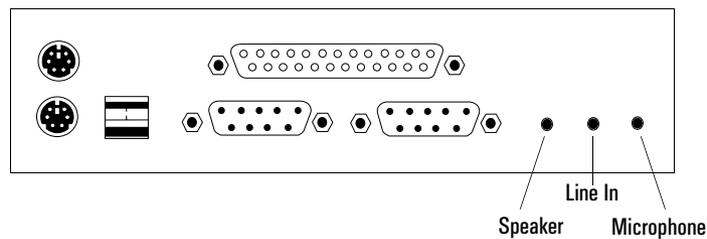
2 System Features

Audio

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.

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

Network

Some *HP Vectra VL600 PC* models are supplied with a 10/100 3Com 3C905C-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, depending on OS support, Remote Wake-Up (RWU).

On *HP Vectra VL600 PC* models, the network solution is deployed as an accessory board (part number D7522A), installed in PCI slot #4. 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

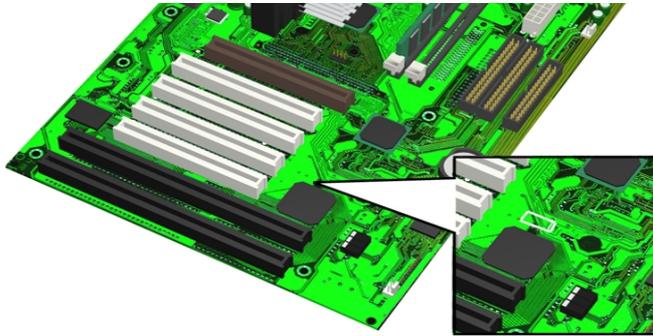
The 10/100BT connector is located on the rear of the PC.



2 System Features

Network

A Wake On LAN (WOL) connector is located on the system board as shown here. It is not required for PCI 2.2-compliant LAN cards such as the 3Com 3C905CTX LAN card but can be useful for other cards.



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 system board diagram on page 16 for their location). PCI slot numbers are also indicated on the motherboard silkscreen.

The VL600 has seven accessory board slots: four PCI slots, two ISA slots and one AGP slot (refer to the system board diagram on page 16 for their location).

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

The PC may come preloaded with a 3COM Network card installed in PCI slot #4.

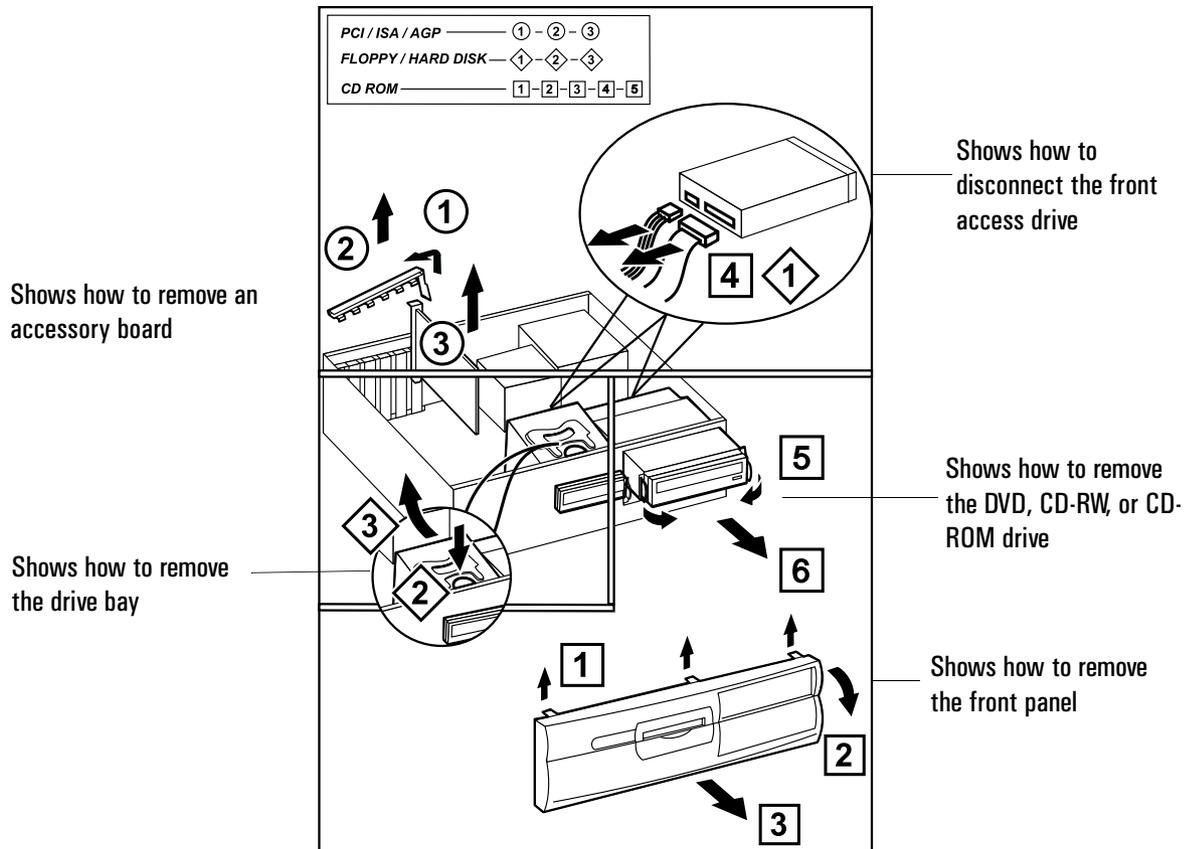
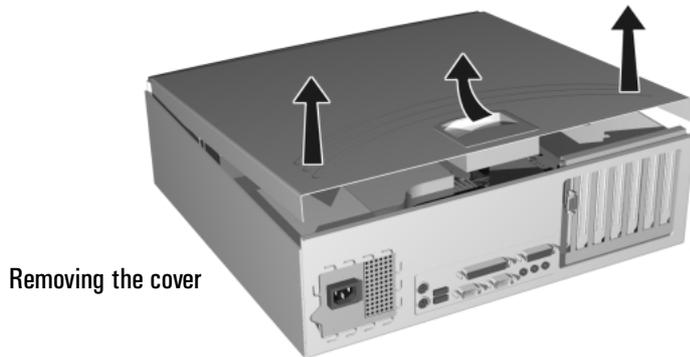
2 System Features

Accessory Boards

Serviceability

This chapter introduces the enhanced serviceability features of the *HP Vectra VL600* PC. It shows how easily you can open the PC and remove or add system components using the serviceability features developed for these PC models.

VL600 Desktop



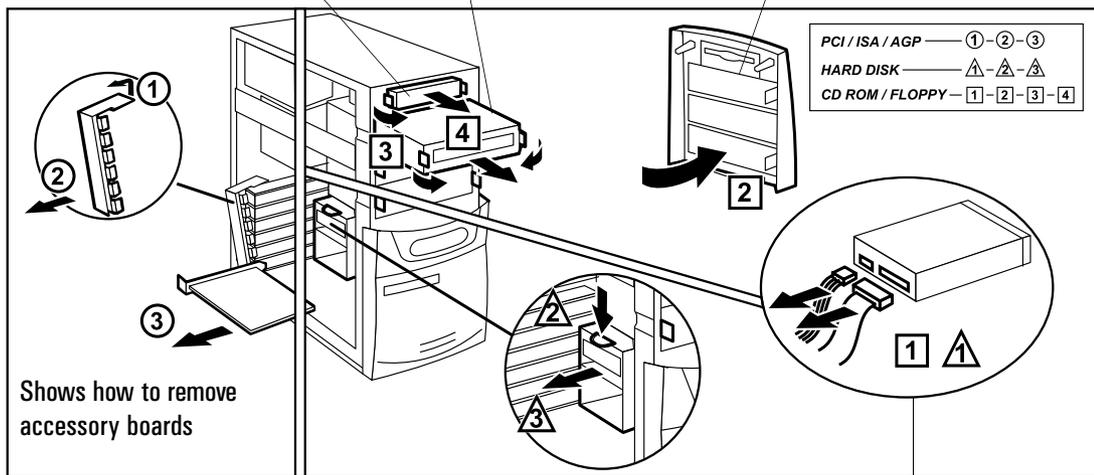
VL600 Minitower



Shows how to remove the floppy drive

Shows how to remove the DVD, CD-RW, or CD-ROM drive

Shows how to remove the front panel



3 Serviceability
VL600 Minitower

BIOS Overview

This chapter describes the BIOS features for the *HP Vectra VL600 PC* models.

BIOS Summary

HP Vectra VL600 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 3Com LAN option ROM.

The system BIOS is identified by the version number **hy.xx.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 any key is pressed.

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
- System date
- Numlock
- Key click
- Keyboard auto-repeat rate
- Keyboard auto-repeat delay
- Processor serial number

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.
 - *Flexible Disk Drives*. Enable or disable the on-board floppy disk controller.
 - *IDE Devices*. Configure IDE Primary and Secondary devices.
 - *I/O Device Configuration*. 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.
 - *Integrated Audio Interface*. Enable or disable the integrated PCI Audio interface. This feature must be disabled if an accessory board is installed.
 - *PCI Configuration*. Configure a specific PCI device.
 - *ISA Resource Exclusion*. Reserve interrupts for legacy ISA devices to prevent conflict with PCI/PnP devices.
 - *VGA PCI/AGP Config*. Configure PCI or AGP as the boot display device (set to PCI if you have added a PCI video card).
-

4 BIOS Overview

BIOS Summary

Security

Sub-menus are presented for changing the characteristics 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 be unlocked/locked: Integrated Flexible Disk Controller, Integrated IDE Controller, and Integrated Data Communications Ports.
- *Boot Devices Security*. Select which devices are to be used for booting the system. The option Disabled prevents unauthorized use of a device to start the computer.

Boot Menu

Boot Device Priority allows you to 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 list until an operating system is found.

Hard Disk Drives allows you to choose the hard drive you want to boot from.

Removable Devices allows you to choose which drive letters you want to assign to removable devices.

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

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 ICH chipset. This chipset is described in detail in *Technical Reference Manual - HP 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 ICH chipset. This chipset is described in detail in *Technical Reference Manual - HP 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)
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)
FFF80000 - FFFF FFFF	512 KB BIOS (Flash)

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

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).

4 BIOS Overview

BIOS Addresses

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	NS364 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 <i>Setup</i>
2	Floppy disk controller
3	Free if not used for parallel port in <i>Setup</i>
4	Used to cascade DMA channels 0-3
5	Free
6	Free
7	Free

4 BIOS Overview

BIOS Addresses

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	Used by serial port if enabled
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 started.

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

4 BIOS Overview

Order in Which the POST Tests are Performed

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

4 BIOS Overview

Order in Which the POST Tests are Performed

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

4 BIOS Overview

Order in Which the POST Tests are Performed

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

4 BIOS Overview

Order in Which the POST Tests are Performed

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

4 BIOS Overview

Order in Which the POST Tests are Performed

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
BC h	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

4 BIOS Overview

Order in Which the POST Tests are Performed

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

4 BIOS Overview

Beep Codes

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 checksum failure
— — — — —	1-3-1-1	20h	DRAM refresh test failure
— — — — —	1-3-1-3	22h	8042 Keyboard controller test failure
— — — — —	1-3-3-1	28h	RAM module missing or not installed correctly ¹
— — — — —	1-3-4-1	2Ch	RAM failure on address line <i>xxxx</i>
— — — — —	1-3-4-3	2Eh	RAM failure on data bits <i>xxxx</i> ² of low byte of memory bus
— — — — —	1-4-1-1	30h	RAM failure on data bits <i>xxxx</i> 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
---	3		This does not indicate an error under Windows NT 4.0. If the HP Soft Power Down utility is installed, the PC generates 3 short beeps at Windows NT boot.

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

Drivers and Software

This chapter describes the drivers and software preloaded with *HP Vectra VL600* PCs.

5 Drivers and Software

Drivers

Drivers

You can download up-to-date versions of drivers required for VL600 PCs from the “Software and Drivers” section of HP’s Support web site at www.hp.com/go/vectrasupport.

Software

VL600 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 OSR 2.5¹, Windows 98 SE or Windows NT4 SP5.

- Software:**•
- DiagTools
 - NT Lock
 - Online documentation
 - SoftOff
 - TopTools
 - UDF Reader
 - + Euro & Y2K patches
 - SafeOff

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

BIOS Updates

The system BIOS is identified by the version number hy.xx.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.

5 Drivers and Software

BIOS Updates



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The Technical Reference Manual contains the following documents available on the *HP Information CD-ROM* or downloadable from the Web in PDF format:

- **Introduction & HP Vectra Product Line Overview**
Describes how to use the Technical Reference Manual and provides a brief overview of VEi, VLi and VL600 PCs.
- **Product Description**
The document you are reading. A separate document exists for VEi 7 models, VEi 8 models, VL600 models and VLi 8/VLi 8SF models, providing detailed BIOS information and summary information on the hardware components in the PC.
- **HP Vectra Technology**
A detailed look at the hardware components in all the PCs in the product line. Includes information on processors, chip sets, graphics