

Aptiva[®] S Series 1G Product Guide

Part Number: A19959-003

Revision History

Revision	Revision History	Date
-003	Final release.	March 2000

† Third-party brands and trademarks are the property of their respective owners.

Contents

1 Overview	7
System Features	7
Feature Summary	7
Controls, Indicators, and Connectors.....	8
Intel® Pentium® III Processor 1 GHz	10
Intel® VC820 Motherboard.....	10
Video Adapter.....	10
Sound Card	10
Modem	11
Home Network Card	11
DVD-ROM Drive	11
CD-Rewriteable Drive	11
IBM® HelpWare® Support and Services	12
Before You Call for Service	12
Printed Documentation.....	12
Online Documentation.....	12
Software.....	12
Using Electronic Services	13
The World Wide Web.....	13
Using Electronic Support Services	14
Getting Information by Fax.....	14
Getting Help by Telephone	14
30-day "Up and Running" Support	15
Technical Support for Software	15
Additional Support.....	15
Hardware Warranty Service	15
What To Do Before You Call.....	15
Purchasing Additional Support.....	17
How To Purchase Additional Support.....	17
Express Maintenance.....	19
Depot Repair.....	20
International Warranty Service - Not Available	20
Product Warranties and Notices	21
Warranty Statements.....	21
IBM Statement of Limited Warranty for United States, Puerto Rico, and Canada (Part 1 - General Terms)	21
Part 2 -- Worldwide County-Unique Terms	24
2 Motherboard Features	29
Feature Summary	29
Components.....	30
Main Memory	31
Intel® 820 Chipset.....	31

Intel® 82820 Memory Controller Hub (MCH)	31
Intel® 82801AA I/O Controller Hub (ICH)	31
Intel® 82802AB Firmware Hub (FWH).....	32
Input/Output (I/O) Controller	32
Real-Time Clock.....	32
USB Support	33
PCI Enhanced IDE Interface	33
Expansion Slots.....	33
Accelerated Graphics Port (AGP).....	33
BIOS.....	34
PCI Auto Configuration	34
IDE Auto Configuration	34
Security Passwords	34
PC Speaker.....	34
Battery.....	34
Power Management Features	35
Wake on LAN Technology	35
Instantly Available Technology	35
Wake on Ring.....	38
Resume on Ring.....	38
Regulatory Compliance	38
Motherboard Certification Markings.....	39
3 Upgrading the BIOS	41
Preparing for the Upgrade.....	41
Obtain the BIOS Upgrade File	41
Record the Current BIOS Settings.....	42
Create a Bootable Diskette.....	42
Create the BIOS Upgrade Diskette.....	42
Upgrading the BIOS	43
Recovering the BIOS.....	44
4 Using the Setup Program	45
BIOS Setup Program Modes	45
Maintenance Menu.....	46
Main Menu	47
Advanced Menu	48
Boot Configuration Submenu.....	48
Peripheral Configuration Submenu.....	49
IDE Configuration	51
IDE Configuration Submenus	52
Diskette Configuration Submenu	53
Event Log Configuration Submenu.....	53
Video Configuration Submenu	54
Security Menu	54
Power Menu	55
Boot Menu.....	56
Exit Menu	57

5	Motherboard Technical Reference	59
	Motherboard Connectors.....	59
	Back Panel Connectors	60
	Midboard Connectors	61
	Front Panel Connectors.....	62
	Motherboard Board Resources	63
	Memory Map	63
	DMA Channels	63
	I/O Map	64
	Interrupts	66
6	Installing Internal Options.....	67
	Removing and Replacing the Side Cover	67
	Installing and Removing Adapters	69
	Removing and Replacing the Fan Assembly	70
	Installing and Removing Memory	71
	How to Install Memory	71
	How to Remove Memory	72
	Replacing the Battery	73
	Setting the BIOS Configuration Jumper.....	74
	Clearing Passwords	75
	Installing Internal Drives	76
A	POST Error Messages and Indicators.....	79
	BIOS Beep Codes	79
	BIOS Error Messages	80

Figures

Figure 1.	Front Panel Features	8
Figure 2.	Back Panel Features.....	9
Figure 3.	Motherboard Components.....	30
Figure 4.	Connector Groups.....	59
Figure 5.	Back Panel Connectors.....	60
Figure 6.	Midboard Connectors.....	61
Figure 7.	Front Panel Connectors	62
Figure 8.	Removing the Side Cover	67
Figure 9.	Installing an Adapter	69
Figure 10.	Removing and Replacing the Fan Assembly	70
Figure 11.	Installing a Memory Module	71
Figure 12.	Removing the Battery.....	73
Figure 13.	Location of the BIOS Configuration Jumper Block.....	74
Figure 14.	Removing the Front Cover	76
Figure 15.	Installing an Internal Drive.....	77

Tables

Table 1.	Standby Current Requirements.....	37
Table 2.	Safety Regulations.....	38
Table 3.	EMC Regulations.....	39
Table 4.	BIOS Setup Program Menu Bar.....	45
Table 5.	BIOS Setup Program Function Keys.....	46
Table 6.	Maintenance Menu.....	46
Table 7.	Main Menu.....	47
Table 8.	Advanced Menu.....	48
Table 9.	Boot Configuration Submenu.....	48
Table 10.	Peripheral Configuration Submenu.....	49
Table 11.	IDE Configuration.....	51
Table 12.	IDE Configuration Submenus.....	52
Table 13.	Diskette Configuration Submenu.....	53
Table 14.	Event Log Configuration Submenu.....	53
Table 15.	Video Configuration Submenu.....	54
Table 16.	Security Menu.....	54
Table 17.	Power Menu.....	55
Table 18.	Boot Menu.....	56
Table 19.	Exit Menu.....	57
Table 20.	System Memory Map.....	63
Table 21.	DMA Channels.....	63
Table 22.	I/O Map.....	64
Table 23.	Interrupts.....	66
Table 24.	Jumper Settings for the BIOS Setup Program Modes.....	74
Table 25.	Beep Codes.....	79
Table 26.	BIOS Error Messages.....	80

1 Overview

This chapter provides an overview of the IBM® Aptiva® S Series 1G system features, a description of IBM® HelpWare® Support and Services, and product warranty and notices information.

System Features

Feature Summary

Processor	Intel® Pentium® III Processor 1 GHz
Motherboard	Intel® Desktop Board VC820
Memory	128 MB, PC-800, RDRAM, non-ECC
Video card	Hercules 3D Prophet DDR-DVI
Sound card	Creative Sound Blaster Live! Value
Modem	GVC F-1156IV Soft Modem, Conexant V.90/K56flex
Network card	Intel® Anypoint™ Home 10 Mbps PCI Card
DVD-ROM drive	8x maximum DVD-ROM read speed, 40x maximum CD-ROM read speed
CD-Rewritable drive	32x read, 4x record, and 4x rewrite capability
Hard disk drive	40 GB, 7200 RPM, UltraDMA 66
Floppy drive	1.44 MB, standard
Power supply	200 W, with 1.5 A +5VSB

 **NOTE**

For more information about Aptiva systems, see:

http://commerce.www.ibm.com/content/home/en_US/aptiva.html

Controls, Indicators, and Connectors

Figure 1 shows the front of the system unit.

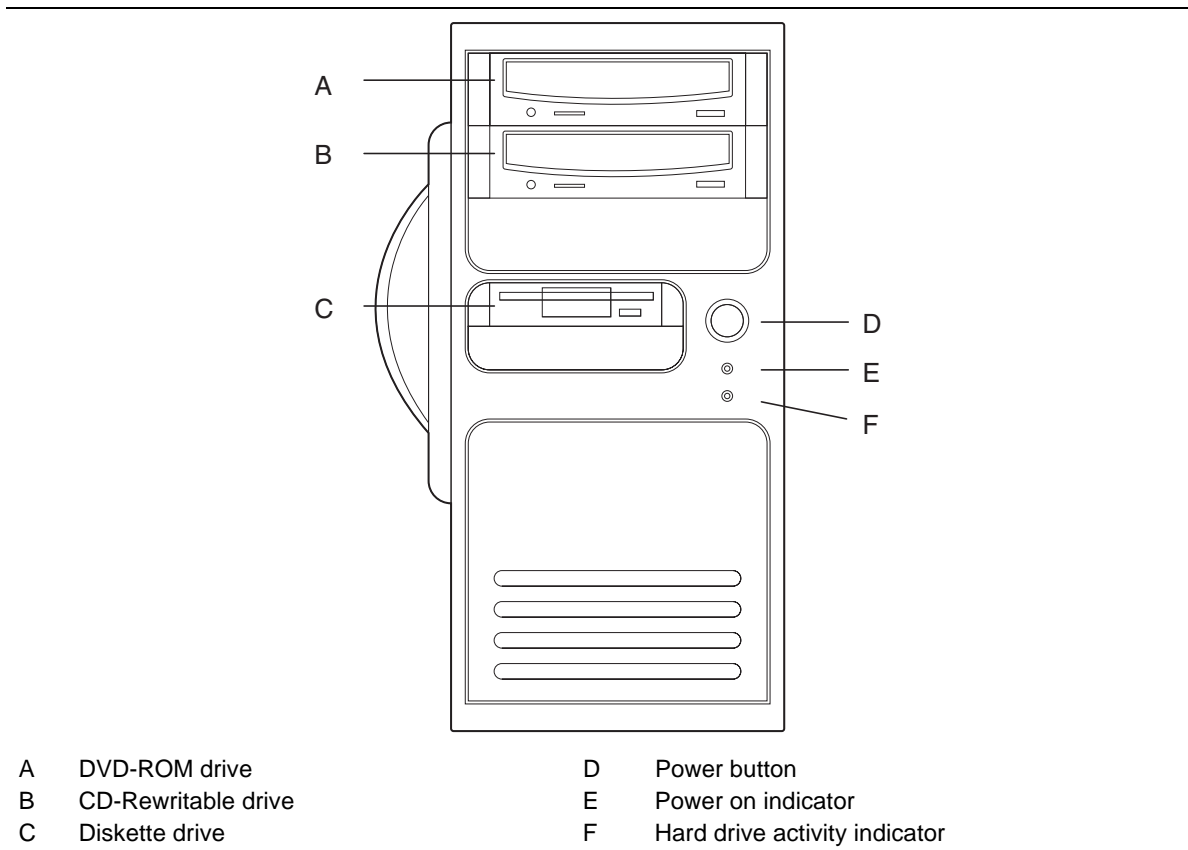
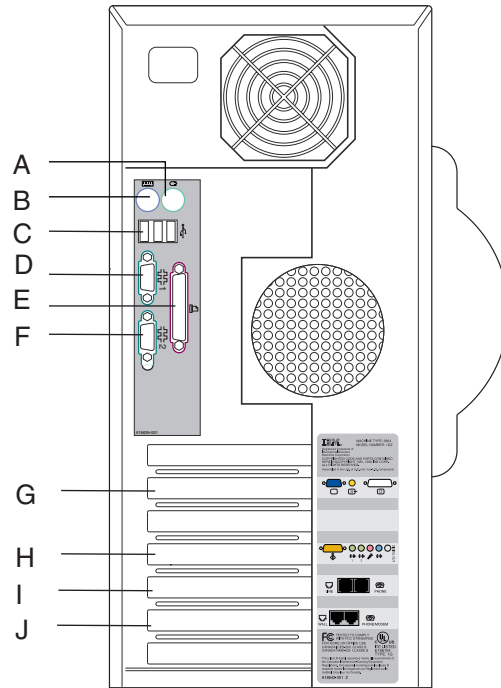


Figure 1. Front Panel Features

Figure 2 shows the back of the system unit.



- | | | | |
|---|--------------------|---|----------------------------|
| A | Mouse connector | F | Serial port 2 |
| B | Keyboard connector | G | Video adapter location |
| C | USB connectors | H | Sound card location |
| D | Serial port 1 | I | Modem location |
| E | Parallel port | J | Home network card location |

Figure 2. Back Panel Features

Intel® Pentium® III Processor 1 GHz

The motherboard supports a single Intel Pentium III processor. The processor connects to the desktop board through the 242-contact slot connector. When mounted in the slot connector, the processor is secured by a retention mechanism attached to the desktop board.

NOTE

For information about the Intel® Pentium® III processor 1GHz, see:

<http://www.intel.com/pentiumiii/>

Intel® VC820 Motherboard

The Intel VC820 motherboard is based on the new Intel 820 chipset and offers a 133-MHz system bus, 4x AGP graphics capability, and twice the I/O performance for an exciting new PC experience, both on and off the Internet.

Chapter 2 of this manual describes the version of the VC820 motherboard used in the Aptiva system.

NOTE

To access the BIOS setup screens, you will need to press F2 on the keyboard during the system boot process.

For more information about the motherboard, see:

http://www.developer.intel.com/design/motherbd/vc/vc_ds.htm

Video Adapter

The 3D Prophet DDR-DVI video adapter card uses nVidia's GeForce 256 DDR engine to provide revolutionary 3D features. Features include:

- AGP 4x/2x
- 256-bit rendering
- outstanding 2D resolution
- advanced support for Open GL and DirectX7
- 32 MB DDR RAM
- DVI-OUT
- TV-OUT
- DVD-Video acceleration

Sound Card

The Creative SoundBlaster Live! Value PCI sound card provides:

- E-mu Systems EMU10K1 wave-table synthesis
- E-mu Systems EMU10K1 patented effects processor
- Environmental 3D positional audio technology

- Hollywood-quality, 32-bit digital audio engine

Modem

The GVC F-1156IV controllerless PCI modem card provides:

- V.90 / K56Flex readiness
- ACPI power management compliance
- Data/FAX capability
- Host based DSVD
- V.80 support

Home Network Card

The Intel® Anypoint™ Home Network 10 Mbps PCI card provides:

- premium performance for larger home and small office networks
- phoneline-based home networks of up to 25 PCs
- 10 Mbps transfer rates ideal for large CAD and graphics files
- support for future applications like distributed full-motion video
- support for sharing Internet access (including cable and DSL modem)
- support for printer and drive sharing, file transfer, and multi-player gaming

NOTE

For more information about the home network card, go to:
<http://www.intel.com/anypoint/products/pci10/>

DVD-ROM Drive

The DVD-ROM multimedia drive provides:

- DVD-RAM, DVD-R, DVD-ROM, CD-RW, CD-R, and CD-ROM disc compatibility
- 8x maximum DVD-ROM read speed
- 40x maximum CD-ROM read speed
- 120 ms DVD-ROM / 90 ms CD-ROM access time
- Enhanced IDE (ATAPI) interface
- DVD-RAM, DVD-R, DVD-ROM, CD-RW, CD-R, and CD-ROM disc compatibility

CD-Rewritable Drive

The rewritable CD drive provides:

- 32x read, 4x record, and 4x rewrite capability
- 650 MB of data capacity
- IDE/ATAPI interface

IBM® HelpWare® Support and Services

IBM® HelpWare® services are available from IBM whenever you need help, for as long as you own your IBM Aptiva Personal Computer. They include a variety of services, options, and solutions. When your warranty period expires, HelpWare services are available for purchase.

There are two ways to get help quickly from IBM:

- **On the World Wide Web.** Refer to "Using Electronic Services" for the address of your country- or region-specific IBM Aptiva Support Web page.
- **By Telephone.** Refer to "Getting Help by Telephone" for information about HelpWare telephone services.

Before You Call for Service

Many computer problems can be solved without outside assistance, by using the online help or by looking in the online or printed documentation that comes with your computer or software. Following are some methods you can use to solve problems yourself.

Printed Documentation

The documentation that comes with your computer contains information about how to troubleshoot hardware and software problems. When you know the nature of the problem, you can follow the instructions in "Troubleshooting." Match the description or error codes with your question, and follow the instructions to solve the problem.

Online Documentation

Your computer also comes with online documentation, such as Help and README files installed on your hard disk, which you can use to solve problems.

Help Files

The operating system and most preinstalled programs on your computer contain online help files. Most help files contain information about solving problems and preventing future problems.

README Files

Most operating systems and software programs also come with a file named README.TXT. This is a text file that contains important information about the program. You can read README.TXT files by opening them in any text file editor on your computer. If an Aptiva README file is provided, it is named APTIVA.TXT.

Software

Your computer comes with several software programs to help you solve problems or find answers to your questions.

Diagnostics Programs Provided with Your Computer

Your computer comes with a set of diagnostic programs to help you identify computer problems: PC-Doctor for Windows and IBM Enhanced Diagnostics.

PC-Doctor for Windows works through the Windows operating system to diagnose hardware and report operating-system-controlled settings that can cause hardware problems. You must install PC-Doctor for Windows from the *Software Selections* CD before you can use it. IBM Enhanced Diagnostics is an enhanced version of the DOS-based PC-Doctor program. IBM Enhanced Diagnostics performs tests directly on the hardware, independent of the Windows operating system. You run IBM Enhanced Diagnostics directly from the Enhanced Diagnostics CD. Make sure you run both of these programs before you contact the IBM PC HelpCenter for technical support.

Using Electronic Services

There are many ways to receive technical support and information. When you use electronic support, the only charges that typically apply are the ones you pay to your telephone company or to the company you use to log onto the World Wide Web (your Internet service provider). Here are some of the electronic support options that you can use.

The World Wide Web

You can link to the IBM Aptiva Support page to search for technical tips, download device-driver updates, and find out about many other things.

For the United States, Canada, Australia, and New Zealand, the address for the IBM Personal Computing Support home page is:

<http://www.ibm.com/pc/support>

From the Support home page, under **Select a Brand**, click the arrow, and select **Aptiva & PS/1** to go to the IBM Aptiva Support page.

For other countries or regions, use the following address:

<http://www.ibm.com/pc/xx/aptiva.html>

Replace *xx* with the two-letter code shown in the following table.

Country or region	Code
Austria	AT
Belgium	BE
Denmark	DK
Finland	FI
France	FR
Germany	DE
Ireland	UK
Italy	IT
Luxembourg	BE
Netherlands	NL
Norway	NO

Spain	ES
Sweden	SE
Switzerland	CH
United Kingdom	UK

You can access the IBM Online Assistant from most of these Web sites. The IBM Online Assistant is a tool that you can use to diagnose common technical problems. To use the IBM Online Assistant, you must first connect to the IBM Aptiva Support Web page and complete a personal profile. Use the IBM Online Assistant for troubleshooting and step-by-step solutions.

Using Electronic Support Services

If you have a modem, you can get help from several popular services. Online information services provide assistance through question-and-answer message areas, live chat rooms, searchable databases, and more.

Technical information is available on a wide range of topics, such as:

- Hardware setup and configuration
- Preinstalled software
- Operating systems
- Networking
- Communications
- Multimedia

In addition, the latest device driver updates are available.

Commercial online services, such as America Online (AOL), contain information about IBM products. (For AOL, use the keyword IBM.)

Getting Information by Fax

If you have a touch-tone telephone and access to a fax machine, in the U.S. and Canada you can receive by fax marketing and technical information on many topics, including hardware, operating systems, and local area networks (LANs). You can call the IBM Automated Fax System 24 hours a day, 7 days a week. Follow the recorded instructions, and the requested information will be sent to your fax machine.

To access the IBM Automated Fax System, call 1-800-426-3395.

A catalog (approximately 40 pages) of IBM Automated Fax topics is available.

Getting Help by Telephone

During the warranty period, you can get help and information by telephone through the IBM PC HelpCenter technical-support center. Expert technical-support representatives are available to assist you. You might be charged for some calls and not for others, depending on the type of problem. You must register your computer to receive telephone support.

For help with installing, configuring, or using software, see "Purchasing Additional Support."

The following services are available by telephone.

30-day "Up and Running" Support

During the first 30 days after you purchase your computer, you can call the IBM PC HelpCenter technical-support center at no charge to ask questions about:

- Setting up your computer and attaching a monitor and printer
- Starting the preinstalled operating system
- Starting the preinstalled software programs and the software programs that come with your computer

Long distance telephone charges might apply.

Technical Support for Software

If you need help setting up or installing the preinstalled software programs or the software programs that come with your computer during the 30-day "Up and Running" support period, technical-support representatives can help you install (or reinstall) the software that comes with your computer, if necessary. Answers to your "how to" questions about software programs are available for a fee. For more information, see "Purchasing Additional Support."

Additional Support

At times, you might need additional assistance after the 30-day "Up and Running" support period, or you might require "how to" help and support. IBM PC HelpCenter technical-support representatives can assist you for a fee. For more information, see "Purchasing Additional Support."

Note: Make sure that you write down your date of purchase and keep your receipt in a safe place. You will be required to present your proof of purchase to receive service under your IBM warranty.

Hardware Warranty Service

If the Aptiva PC that you purchased does not function as warranted, during the period of your warranty, the IBM PC HelpCenter technical-support center will provide warranty service for IBM factory-installed hardware.

Your Aptiva PC is subject to the terms of your IBM warranty and the IBM International License Agreement for Non-Warranted Programs, which are included with your computer. Please read these terms carefully.

Note: To find your machine and model type and your serial number, look on the back of the system unit.

If your computer is having a problem that is not covered by your IBM warranty, see "Purchasing Additional Support."

What To Do Before You Call

Note: If your call is not covered by 30-day "Up and Running" support or by your IBM warranty, you will be required to provide a major credit-card number for support.

By doing the following items, you will help the ICM PC HelpCenter technical-support representative handle your call, and you will help reduce the amount of time it takes to diagnose problems and answer your questions.

If possible, run both the DOS version and Windows version of PC-Doctor diagnostics. Save and print the log files created by both the DOS and Windows versions of diagnostics so that you can provide these to the technical-support representative. (The log file created in the Windows version is automatically saved in C:PCDR\DETAILED.TXT.) For information about how to use the PC-Doctor diagnostics, refer to "Troubleshooting."

When you call the IBM HelpCenter, you will be required to provide the following information:

- Name
- Address
- Telephone number
- Machine type, model, and serial number (found on a decal on the back of the system unit).
- Registration number (when you receive one)
- Date of purchase
- A description of the problem
- The exact working of any error messages
- Hardware and software configuration information for your computer

If your call is not covered by 30-day "Up and Running" support or by your IBM warranty, you might be required to provide a major credit-card number for support. You will not be billed if it is determined that your call is covered under "Up and Running" support or by your IBM warranty.

Please be at your computer when you call.

Country or region	Phone number	Hours of operation
Australia	13-14-26	9 a.m. to p p.m. (EST - Australia), 365 days a year
Austria	1 546 325 102	10 a.m. to 1 p.m. and 2 p.m. to 7 p.m. CET Monday - Friday
Belgium (Dutch)	02-714-3504	9 a.m. to 9 p.m. CET Monday - Friday
Belgium (French)	02-714-3503	9 a.m. to 9 p.m. CET Monday - Friday
Canada	1-800-565-3344	24 hours a day, 7 days a week (excluding holidays)
U.S.A. and Puerto Rico	1-919-517-2800	24 hours a day, 365 days a year (response times may vary)
Denmark	3525-6904	9 a.m. to 9 p.m. CET Monday - Friday; 10 a.m. to 7 a.m. CET Saturday
Finland	(09) 2294 3004	8 a.m. to 8 p.m. CET Monday - Friday
France	01-6932-4004	9 a.m. to 9 p.m. CET Monday - Friday
Germany	069-6654-9004	10 a.m. to 1 p.m. and 2 p.m. to 7 p.m. CET Monday - Friday
Ireland	01-8159208	9 a.m. to 9 p.m. GMT Monday - Friday
Italy	02-4827-7003	10 a.m. to 1 p.m. and 2 p.m. to 7 p.m. CET Monday - Friday
Luxembourg	298-977-5058	9 a.m. to 9 p.m. CET Monday - Friday
Netherlands	020-504-0530	9 a.m. to 9 p.m. CET Monday - Friday

New Zealand	0800-446-149	9 a.m. to 9 p.m. (EST - Australia), 365 days a year
Norway	2-305-0304	9 a.m. to 9 p.m. CET Monday - Friday; 12 noon to 5:30 p.m. CET Saturday and Sunday
Portugal	01 791-5147	Voice mail only
Spain	91-662-4261	10 a.m. to 1 p.m. and 2 p.m. to 7 p.m. CET Monday - Friday
Sweden	08-632-0051	9 a.m. to 9 p.m. CET Monday - Friday
Switzerland (French)	0848 80 55 00	9 a.m. to 9 p.m. CET Monday - Friday
Switzerland (German)	0848 80 55 00	10 a.m. to 1 p.m. and 2 p.m. to 7 p.m. CET Monday - Friday
Switzerland (Italian)	0848 80 55 00	10 a.m. to 1 p.m. and 2 p.m. to 7 p.m. CET Monday - Friday
United Kingdom	01475-555 001	9 a.m. to 9 p.m. GMT Monday - Friday
U.S.A. and Puerto Rico	1-919-517-2800	24 hours a day, 365 days a year (response times may vary)

In the United States and Canada, the technical-support representative might also be able to fax or mail additional technical or product information to you, such as:

- Sales information
- Product brochures
- Locations of IBM resellers
- Services available through IBM

If you need help with a specific program or if you need help after your warranty has ended, these services are available for a fee. For more information about additional services, see "Purchasing Additional Support."

Purchasing Additional Support

During and after the warranty period for your computer, you can purchase additional HelpWare services. Enhanced PC Support Line service includes assistance with the following items:

- Assistance with installing, configuring, and using selected software applications
- Using the operating system
- Setting up and using multimedia device drivers
- Installing and configuring out-of-warranty IBM PC products

How To Purchase Additional Support

You can purchase support in the following ways. All the following support options are available in all countries unless otherwise noted.

900 Number

In the United States and Canada, you can call the 900 number to receive immediate support from an IBM PC technical-support representative. Your local telephone company will bill you by the minute for each call. Persons under age 18 must have permission of a parent or legal guardian prior to placing the call.

Country	Phone number	Hours of operation	Cost
United States	For installing and configuring in-warranty IBM Aptiva products: 1-900-555-HELP (4357)	Monday - Friday, 9 a.m. to 9 p.m. Eastern Time	\$2.99 (U.S. currency) per minute beginning after the first minute
United States	For using application software and for out-of-warranty IBM products: 1-900-555-CLUB (2582)	Monday - Friday, 9 a.m. to 9 p.m. Eastern Time	\$2.99 (U.S. currency) per minute beginning after the first minute
Canada	1-900-565-9988	24 hours a day	\$3.50 (Canadian currency) per minute

Flat Rate

You can call the IBM PC HelpCenter technical-support center to purchase support for a single incident or multiple incidents (in Canada, call 1-800-565-3344). The flat-rate option is not available in Australia or New Zealand.

Single Incident

The single-incident option allows you to pay a flat fee for each individual problem you need to resolve.

Multiple-incident Packs

With multiple-incident packs, you can purchase a block of problem resolutions at a discount from the single-incident price. Each pack expires one year from the date of purchase. The following multiple-incident packs are available:

- 3-incident pack
- 5-incident pack (Australia and New Zealand only)
- 10-incident pack

In most countries, all available options are payable by credit card only. In Australia, all options are payable by credit card, cheque, or money order.

An incident is a request for telephone assistance about a single question or problem. An incident can involve multiple conversations or actions that might include (but are not limited to):

- Your initial request
- Research by IBM
- A call back from IBM to you

Requests for assistance on multiple questions or problems will be considered as multiple incidents.

To order additional support packages, refer to the phone numbers and hours of operation in your country or region. In the United States and Canada, use the following part numbers when you call.

Support Package	U.S. part number	Canadian part number
Single incident	2419720	EPCS1
3-incident pack	2419721	EPCS3
10-incident pack	2419722	EPCS10

Getting More Information

Enhanced PC Support Line services are available for products on the Supported Products list. To receive a brochure of Enhanced PC Support Line services or a Supported Products list:

- In the U.S.:
 1. Call 1-800-426-3395.
 2. Select option 1.
 3. Select option 1.
 4. Select a document:
 - For a brochure, select document number 11690.
 - For a Supported Products list, select document number 11682.
 5. When you have finished, press 1.
 6. Enter your fax number and press the # key.
- In Canada, contact the IBM HelpFax service:
 1. Call 1-800-465-3299.
 2. Select your language.
 3. Select option 1.
 4. Select option 1.
 5. Select a document:
 - For a brochure, select document number 16129.
 - For a Supported Products list, select document number 16130.
 6. Follow the instructions given to complete the call.
- In all other countries, contact your IBM reseller or IBM marketing representative.

Express Maintenance

Express Maintenance is available to customers in the United States and Canada. Express Maintenance is a parts-exchange service that allows IBM HelpCenter personnel to replace selected in-warranty hardware parts and ship them directly to you, so that you do not have to completely disassemble your computer and take it to an authorized IBM servicer for repair. Some servicers function as drop-off points that can send your computer to another location for repair.

When you call for Express Maintenance at 1-919-517-2800, your credit-card information will be requested, but you will not be billed if you return the defective part to IBM within 30 days of your receipt of the new part. If the part is not returned within 30 days, your credit card will be charged the full retail price of the part. Credit-card information will not be made available to anyone outside IBM.

Depot Repair

Depot repair is a process for obtaining service for an eligible IBM computer that requires repair. The computer is picked up at a location you designate, delivered to the IBM repair center, repaired, and returned to you.

Eligibility for depot repair depends on your model and your geographic location. In some cases, depot repair is the only repair method provided during the warranty period. Eligibility for depot repair will be determined when you call the IBM HelpCenter for service.

If HelpCenter personnel determine that your computer requires service, and the problem cannot be resolved remotely or by the Express Maintenance parts exchange process, you will be offered depot repair if the computer is eligible. The HelpCenter will then send an IBM-approved shipping container, packing materials, and preprinted shipping labels for the IBM-approved courier. IBM is not responsible for:

- computers damaged in transit if you do not use the IBM-approved shipping container
- computers lost in transit to the repair center if you do not use the IBM-approved courier indicated on the shipping label.

International Warranty Service - Not Available

International Warranty Service (IWS) is an IBM program that is available on selected IBM Commercial PC products. IWS allows customers who travel or need to move products to another country to register the products with IBM's International Warranty Service Office (IWSO). Upon registering the product with the IWSO, IBM will issue a certificate that will be honored wherever IBM or IBM resellers sell and service IBM Commercial PC products. The IWS program is not available for Aptiva products.

Product Warranties and Notices

This section includes product warranties, trademarks and notices.

Warranty Statements

The warranty statements consist of two parts: Part 1 and Part 2. Part 1 varies by country. Part 2 is the same for both statements. Be sure to read both the Part 1 that applies to your country and Part 2.

- **United States, Puerto Rico, and Canada (Z125-4753-05 11/97)**
(Part 1 - General Terms)
- **Worldwide Country-Unique Terms**
(Part 2 - Country-Unique Terms)

IBM Statement of Limited Warranty for United States, Puerto Rico, and Canada (Part 1 - General Terms)

*This Statement of Limited Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. **The terms of Part 2 may replace or modify those of Part 1.** The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. Nothing in this Statement of Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.*

Machine -- Aptiva Personal Computer
Machine Type 6864

Warranty Period* -- Parts: One (1) Year; Labor: One (1) Year

**Contact your place of purchase for warranty service information. Some IBM Machines are eligible for on-site warranty service depending on the country where service is performed.*

The IBM Warranty for Machines

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent,

you may return it to your place of purchase and your money will be refunded. The replacement may not be new, but will be in good working order.

Extent of Warranty

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Unless specified otherwise, IBM provides non-IBM machines **WITHOUT WARRANTIES OF ANY KIND.**

Any technical or other support provided for a Machine under warranty, such as assistance via telephone with “how-to” questions and those regarding Machine set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND.**

Warranty Service

To obtain warranty service for the Machine, contact your reseller or IBM. In the United States, call IBM at 1-919-517-2800. In Canada, call IBM at 1-800-565-3344. You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. IBM may repair the failing Machine or exchange it at its discretion.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many features,

conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to:

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
 - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides,
 - b. secure all programs, data, and funds contained in a Machine,
 - c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations, and
 - d. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

Production Status

Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), IBM is liable for no more than:

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the greater of U.S. \$100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS), EVEN IF IBM, ITS SUPPLIERS OR OUR RESELLER IS INFORMED OF

THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES., SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

Part 2 -- Worldwide County-Unique Terms

ASIA PACIFIC

AUSTRALIA: The IBM Warranty for Machines: The following paragraph is added to this Section:

The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other legislation and are only limited to the extent permitted by the applicable legislation.

Extent of Warranty: The following replaces the first and second sentences of this Section:

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, operation in other than the Specified Operating Environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible.

Limitation of Liability: The following is added to this Section:

Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

PEOPLE'S REPUBLIC OF CHINA: Governing Law: The following is added to this Statement: The laws of the State of New York govern this Statement.

INDIA: Limitation of Liability: The following replaces items 1 and 2 of this Section:

1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence;
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Warranty, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

NEW ZEALAND: The IBM Warranty for Machines: The following paragraph is added to this Section:

The warranties specified in this Section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: The following is added to this Section:

Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

The following terms apply to all EMEA countries.

The terms of this Statement of Warranty apply to Machines purchased from an IBM reseller. If you purchased this Machine from IBM, the terms and conditions of the applicable IBM agreement prevail over this warranty statement.

Warranty Service

If you purchased an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchased an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

The applicable laws, Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided. However, the laws of Austria govern this Statement if the warranty service is provided in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Federal Republic of Yugoslavia, Georgia, Hungary, Kazakhstan, Kirghizia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, and Ukraine.

The following terms apply to the country specified:

EGYPT: Limitation of Liability: The following replaces item 2 in this Section:

as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

FRANCE: Limitation of Liability: The following replaces the second sentence of the first paragraph of this Section:

In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: (items 1 and 2 unchanged).

GERMANY: The IBM Warranty for Machines: The following replaces the first sentence of the first paragraph of this Section:

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this Section:

The minimum warranty period for Machines is six months.

In case IBM or your reseller are unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

Extent of Warranty: The second paragraph does not apply.

Warranty Service: The following is added to this Section:

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Production Status: The following paragraph replaces this Section:

Each Machine is newly manufactured. It may incorporate in addition to new parts, re-used parts as well.

Limitation of Liability: The following is added to this Section:

The limitations and exclusions specified in the Statement of Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

In item 2, replace "U.S. \$100,000" with "1.000.000 DEM."

The following sentence is added to the end of the first paragraph of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

IRELAND: Extent of Warranty: The following is added to this Section:

Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: The following replaces items one and two of the first paragraph of this Section:

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and 2. the amount of any other actual direct damages, up to the greater of Irish Pounds 75,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY: Limitation of Liability: The following replaces the second sentence in the first paragraph:

In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than: (item 1 unchanged) 2) as to any other actual damage arising in all situations involving non-performance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

The following replaces the second paragraph of this Section:

Unless otherwise provided by mandatory law, IBM and your reseller are not liable for any of the following: (items 1 and 2 unchanged) 3) indirect damages, even if IBM or your reseller is informed of their possibility.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND:

Limitation of Liability: The following is added to this Section:

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

TURKIYE: Production Status: The following replaces this Section:

IBM fulfils customer orders for IBM Machines as newly manufactured in accordance with IBM's production standards.

UNITED KINGDOM: Limitation of Liability: The following replaces items 1 and 2 of the first paragraph of this Section:

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to the greater of Pounds Sterling 150,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

The following item is added to this paragraph:

3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default will be limited to damages.

NORTH AMERICA

CANADA: Warranty Service: The following is added to this Section:

To obtain warranty service from IBM, call **1-800-565-3344**.

UNITED STATES OF AMERICA: Warranty Service: The following is added to this Section:

To obtain warranty service from IBM, call **1-919-517-2800**.

2 Motherboard Features

Feature Summary

Form Factor	ATX (12.0 inches by 8.2 inches)
Processor	Support for Intel® Pentium® III processors
Memory	Two 168-pin Direct Rambus† RIMM† connectors
Chipset	Intel® 820 chipset, consisting of: <ul style="list-style-type: none">• Intel® 82820 Memory Controller Hub (MCH)• Intel® 82801AA I/O Controller Hub (ICH)• Intel® 82802AB 4 Mbit Firmware Hub (FWH)
I/O Control	SMSC LPC47M102 ultra I/O controller
Video	Universal AGP connector supporting 1X, 2X, and 4X AGP cards
Peripheral Interfaces	<ul style="list-style-type: none">• Two serial ports• Two Universal Serial Bus (USB) ports• One parallel port• Two IDE interfaces with Ultra DMA support• One diskette drive interface
Expansion Capabilities	<ul style="list-style-type: none">• Audio Modem Riser (AMR) connector Two available PCI add-in card expansion slots
BIOS	<ul style="list-style-type: none">• Intel/AMI BIOS• Intel 82802AB 4 Mbit FWH
Power Management	<ul style="list-style-type: none">• Support for Advanced Configuration and Power Management Interface (ACPI) including Suspend-to-RAM• Support for Advanced Power Management (APM)
Remote and Local Management	<ul style="list-style-type: none">• Hardware monitor• Chassis intrusion detection connector
Other Features	<ul style="list-style-type: none">• Enhanced diagnostics LEDs on the back panel• SCSI hard drive activity LED connector for the front panel• Speaker



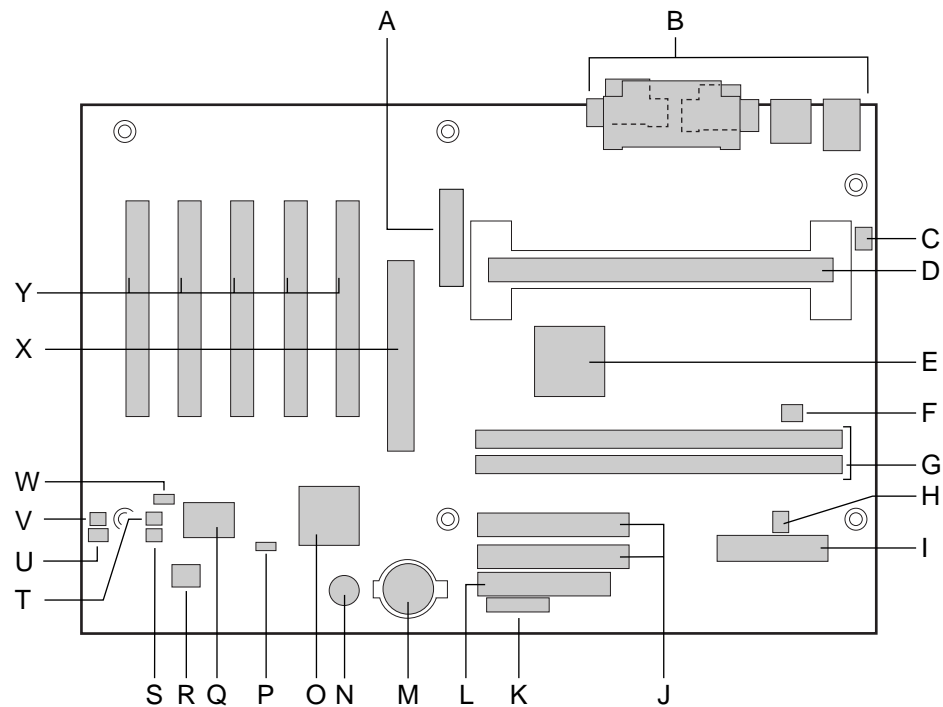
NOTE

For information about Intel® desktop boards, including technical product specifications, BIOS upgrades, and device drivers, go to the Intel World Wide Web site at:

<http://support.intel.com/support/motherboards/desktop/>

Components

Figure 3 shows the major components on the motherboard.



A	Audio Modem Riser connector	N	Speaker
B	Back panel connectors	O	Intel 82801AA I/O Controller Hub (ICH)
C	Processor fan connector	P	Wake on LAN† technology connector
D	242-contact slot connector	Q	SMSC LPC47M102 ultra I/O controller
E	Intel 82820 Memory Controller Hub (MCH)	R	Intel 82802AB Firmware Hub (FWH)
F	Chassis fan connector	S	SCSI hard drive LED connector
G	RIMM sockets	T	Wake on Ring connector
H	Chassis fan connector	U	PC/PCI connector
I	Power supply connector	V	Chassis intrusion connector
J	IDE connectors	W	BIOS configuration jumper block
K	Front panel connector	X	Universal AGP connector
L	Diskette drive connector	Y	PCI slots
M	Battery		

Figure 3. Motherboard Components

Main Memory

The motherboard has two 2.5 V memory module sockets that support RIMMs containing Direct Rambus DRAM (RDRAM) devices. When shipped, your system has one 128 MB RIMM installed in socket 0, and a CRIMM continuity module installed in socket 1.

The desktop board supports the memory features:

- 168-pin modules with gold-plated contacts
- Memory bus frequency: 300 MHz/356 MHz/400 MHz
- Module density: 64 MB, 96 MB, 128 MB, and 256 MB
- Maximum memory: 512 MB (128 Mbit technology)
- Single- and double-sided modules
- Serial Presence Detect (SPD) memory
- ECC and non-ECC memory
- Suspend-to-RAM

NOTE

For information about vendors that support these memory requirements, refer to the VC820 link on this Intel web site:

<http://support.intel.com/support/motherboards/desktop/>

For information about installing memory, see Chapter 6.

Intel® 820 Chipset

The Intel 820 chipset consists of the following devices:

- Intel 82820 Memory Controller Hub (MCH)
- Intel 82801AA I/O Controller Hub (ICH)
- Intel 82802AB Firmware Hub (FWH)

Intel® 82820 Memory Controller Hub (MCH)

The MCH has these features:

- Integrated single Direct Rambus technology memory channel
- Auto-detection of RDRAM memory
- Support for a single AGP device
- 133/100 MHz system bus

Intel® 82801AA I/O Controller Hub (ICH)

The ICH has these features:

- Support for the PCI interface
- Support for the Low Pin Count (LPC) interface
- Integrated IDE controller

- Support for USB
- General purpose I/O
- Power management logic
- Support for the System Management Bus
- Real-Time Clock
- Support for AC '97 audio devices and modems

Intel® 82802AB Firmware Hub (FWH)

The FWH has these features:

- System BIOS
- System security and manageability logic that enables protection for storing and updating of platform information
- Random Number Generator (RNG) for use in security applications

Input/Output (I/O) Controller

The SMSC LPC47M102 ultra I/O controller handles the exchange of information between the processor and external devices, such as a mouse, keyboard, or printer that are connected to the computer. The controller features the following:

- Two serial ports
- One parallel port with Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) support
- Mouse and keyboard controller
- Diskette drive controller with support for one drive
- MIDI/Game port
- Fan control

Real-Time Clock

The desktop board has a time-of-day clock and 100-year calendar that will rollover to 2000 at the turn of the century. A battery on the desktop board keeps the clock current when the computer is turned off.

NOTE

The recommended method of accessing the date in systems with Intel desktop boards is indirectly from the Real-Time Clock (RTC) via the BIOS. The BIOS on Intel desktop boards contains a century checking and maintenance feature that checks the least two significant digits of the year stored in the RTC during each BIOS request (INT 1Ah) to read the date and, if less than 80 (i.e., 1980 is the first year supported by the PC), updates the century byte to 20. This feature enables operating systems and applications using the BIOS date/time services to reliably manipulate the year as a four-digit value.

For more information about the year 2000 capability of systems with Intel desktop boards, see the Intel World Wide Web site:

<http://support.intel.com/support/year2000/index.htm>

USB Support

The motherboard has three USB ports. You can connect three USB peripheral devices directly to the computer without an external hub. To attach more than three devices, connect an external hub to either of the built-in ports. The motherboard supports the standard universal host controller interface (UHCI) and takes advantage of standard software drivers written to be compatible with UHCI.

NOTE

Computer systems that have an unshielded cable attached to a USB port might not meet FCC Class B requirements, even if no device or a low-speed USB device is attached to the cable. Use a shielded cable that meets the requirements for a high-speed USB device.

PCI Enhanced IDE Interface

The PCI enhanced IDE interface handles the exchange of information between the processor and peripheral devices like hard disks, CD-ROM drives, and Iomega Zip[†] drives inside the computer. The interface supports:

- Up to four IDE devices (such as hard drives)
- ATAPI devices (such as CD-ROM drives)
- PIO Mode 3 and PIO Mode 4 devices
- Ultra ATA/33 and Ultra ATA/66
- Support for laser servo (LS-120) drives

Expansion Slots

The motherboard has five PCI expansion slots, a universal AGP connector, and an AMR connector. The sound card, the modem, and the home networking card occupy three of the PCI slots. The AGP video card is installed in the AGP connector. Two PCI expansion slots and the AMR connector remain open when the system is shipped.

Accelerated Graphics Port (AGP)

The AGP is a high-performance bus for graphics-intensive applications, such as 3D graphics. AGP is independent of the PCI bus and is intended for exclusive use with graphical display devices.

BIOS

The BIOS provides the power-on self-test (POST), the BIOS Setup program, the PCI and IDE auto-configuration utilities, and the video BIOS. The BIOS is stored in the Intel 82802AB Firmware Hub.

The BIOS can be upgraded by following the instructions in Chapter 3.

PCI Auto Configuration

If you install a PCI add-in board in your computer, the PCI auto-configuration utility in the BIOS automatically detects and configures the resources (IRQs, DMA channels, and I/O space) for that add-in board. You do not need to run the BIOS Setup program after you install a PCI add-in board.

IDE Auto Configuration

If you install an IDE device (such as, a hard drive) in your computer, the IDE auto-configuration utility in the BIOS automatically detects and configures the device for your computer. You do not need to run the BIOS Setup program after installing an IDE device.

Security Passwords

The BIOS includes security features that restrict whether the BIOS Setup program can be accessed and who can boot the computer. A supervisor password and a user password can be set for the Setup and for booting the computer, with the following restrictions:

- The supervisor password gives unrestricted access to view and change all Setup options. If only the supervisor password is set, pressing <Enter> at the password prompt of Setup gives the user restricted access to Setup.
- If both the supervisor and user passwords are set, you must enter either the supervisor password or the user password to access Setup. Setup options are then available for viewing and changing depending on whether the supervisor or user password was entered.
- Setting a user password restricts who can boot the computer. The password prompt is displayed before the computer is booted. If only the supervisor password is set, the computer boots without asking for a password. If both passwords are set, you can enter either password to boot the computer.

PC Speaker

A 47 Ω inductive speaker is mounted on the motherboard. The speaker provides audible error code (beep code) information during the power-on self-test (POST).

Battery

A battery on the motherboard keeps the values in CMOS RAM and the clock current when the computer is turned off. See Chapter 6 for instructions on how to replace the battery.

Power Management Features

Power management is implemented at several levels, including:

- Software support:
 - Advanced Power Management (APM)
 - Advanced Configuration and Power Interface (ACPI)
- Hardware support:
 - Wake on LAN technology
 - Instantly Available technology
 - Wake on Ring
 - Resume on Ring

If the board is used with an ACPI-aware operating system, the BIOS can provide ACPI support. Otherwise, it defaults to APM support.

Wake on LAN Technology

The Wake on LAN technology connector can be used with PCI bus network adapters that have a remote wake-up connector. Network adapters that are PCI 2.2 compliant assert the wake-up signal using the PCI bus signal PME# (pin A19 on the PCI bus connectors). See Figure 6 on page 61 for the location of the Wake on LAN technology connector.



CAUTION

For Wake on LAN technology, the 5-V standby line for the power supply must be capable of delivering +5 V \pm 5 % at 720 mA. Failure to provide adequate standby current when using this feature can damage the power supply.

Instantly Available Technology

Instantly Available technology enables the board to enter the ACPI S3 (Suspend-to-RAM) sleep state. While in the S3 sleep state, the computer will appear to be off. When signaled by a wake-up device or event, the system quickly returns to its last known awake state.

The motherboard standby power indicator is lit when the memory modules and PCI bus connectors have power, even when the computer appears to be off.

If the system has a dual-colored power LED on the front panel, the sleep state is indicated by the LED turning amber. For more information about front panel LED states, see the *Desktop Board VC820 Technical Product Specification*.

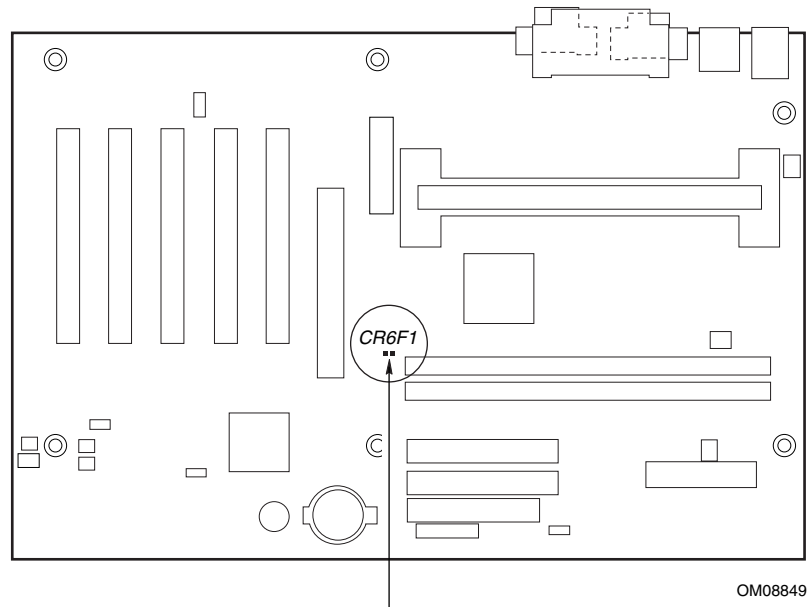


Figure 4. Location of Standby Power Indicator



CAUTION

If the standby current necessary to support multiple wake events from the PCI and/or USB buses exceeds power supply capacity, the desktop board may lose register settings stored in memory, etc. Calculate the standby current requirements using the steps described below.

Power supplies used with this desktop board must be able to provide enough standby current to support the standard Instantly Available (ACPI S3 sleep state) configuration. Some values are set per specifications such as PCI 2.2. The values given in the table for Instantly Available are for a system containing a single wake-enabled PCI (or AGP) device and five non-wake devices. Actual measurements may vary.

To estimate the amount of stand-by current required for a particular system configuration:

1. From the PCI 2.2 row, determine the number of supported wake-enabled adapters required (PCI and AGP) and multiply by 375 mA.
2. Determine the number of non-wake adapters and multiply by 20 mA.
3. Total the values derived from steps 1 and 2 and replace the PCI 2.2 value (currently 475 mA) in the table with the new value.
4. Add the rows to the estimated standby current required to support Instantly Available.
5. Add the current required to support the optional features.
6. Total the estimated standby current required to support Instantly Available and the current required to support the optional features.

Table 1. Standby Current Requirements

Instantly Available Current Support (Estimated)	Description	Current Requirements (mA)
	Standby Power Indicator LED	12
	Front Panel LED	12
	I/O Controller (LPC47M102)	10
	RS-232 Transceivers*	60
	Chipset/Memory (RDRAM)*	100
	Miscellaneous Instantly Available control logic	15
	ICH	0.3
	Glue3 ASIC	2.2
	PCI 2.2 (5 slots + AGP)*	475
	Total	676.5
Optional Current Support (Add to Standard STR total. See instructions above.)	Description	Current Requirements (mA)
	82559 LAN controller	225
	AMR*	150
	PS/2 Ports*	300
	USB Ports*	607.5

* Dependent upon system configuration

NOTE

PCI requirements are calculated by totaling the following:

- One wake-enabled device @ 375 mA
- Five non wake-enabled devices @ 20 mA each

PS/2 Ports requirements per the IBM PS/2 Port Specification (Sept 1991):

- Keyboard @ 275 mA
- Mouse @ 70 mA

USB requirements are calculated by totaling the following:

- One wake-enabled device @ 500 mA
- USB hub @ 100 mA
- Three USB non-wake-enabled devices @ 2.5 mA each

The USB ports are limited to a combined total of 700 mA.

Wake on Ring

The operation of Wake on Ring can be summarized as follows:

- Powers up the computer from either APM soft-off mode or the ACPI S3 and S5 states.
- Requires two calls to access the computer:
 1. The first call powers up the computer.
 2. The second call enables access (when the appropriate software is loaded).
- Detects incoming call differently for external as opposed to internal modems:
 - For external modems, hardware on the desktop board monitors the ring indicate (RI) input of serial port A (serial port B does not support this feature).
 - For internal modems, a cable must be routed from the modem to the Wake on Ring connector.

See Figure 6 on page 61 for the location of the Wake on Ring connector on the desktop board.

Resume on Ring

The operation of Resume on Ring can be summarized as follows:

- Resumes operation from either the APM sleep mode or the ACPI S1 state
- Requires only one call to access the computer
- Detects incoming call similarly for external and internal modems; does not use the Wake on Ring connector
- Requires modem interrupt be unmasked for correct operation

Regulatory Compliance

The motherboard complies with the following safety and EMC regulations:-

Table 2. Safety Regulations

Regulation	Title
UL 1950/CSA950, 3 rd edition, Dated 07-28-95	Bi-National Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada)
EN 60950, 2 nd Edition, 1992 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Community)
IEC 950, 2 nd edition, 1991 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (International)
EMKO-TSE (74-SEC) 207/94	Summary of Nordic deviations to EN 60950. (Norway, Sweden, Denmark, and Finland)

Table 3. EMC Regulations

Regulation	Title
FCC Class B	Title 47 of the Code of Federal Regulations, Parts 2 and 15, Subpart B, pertaining to unintentional radiators. (USA)
CISPR 22, 2 nd Edition, 1993 (Class B)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (International)
VCCI Class B (ITE)	Implementation Regulations for Voluntary Control of Radio Interference by Data Processing Equipment and Electronic Office Machines. (Japan)
EN55022 (1994) (Class B)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (Europe)
EN50082-1 (1992)	Generic Immunity Standard; Currently compliance is determined via testing to IEC 801-2, -3, and -4. (Europe)
ICES-003 (1997)	Interference-Causing Equipment Standard, Digital Apparatus, Class B (Including CRC c.1374) (Canada)
AS/NZ 3548	Australian Communications Authority (ACA), Standard for Electromagnetic Compatibility

Motherboard Certification Markings

This printed circuit assembly has the following product certification markings:

- UL Joint Recognition mark: Consists of small c followed by a stylized backward UR and followed by a small US. (Component side)
- Manufacturer's recognition mark: Consists of a unique UL recognized manufacturer's logo, along with a flammability rating (94V-0). (Solder side)
- UL file number for desktop boards: E139761 (Component side)
- PB part number: Intel bare circuit board part number (Solder side) 726794-003
- Battery "+ Side Up" marking: Located on the component side of the board in close proximity to the battery holder.
- FCC logo/declaration: Located on the solder side.
- ACA (C-Tick) mark: Consists of a unique letter C, with a tick mark; followed by N-232. Located on the component side of the desktop board and on the shipping container.
- CE mark: Located on the component side and on the shipping container.

3 Upgrading the BIOS

This chapter tells you how to:

- Upgrade the BIOS using the Intel® Flash Memory Update Utility
- Recover the BIOS if an upgrade fails
- Change the BIOS language

Preparing for the Upgrade

Before you upgrade the BIOS, prepare by:

- Obtaining the BIOS upgrade file
- Recording the current BIOS settings
- Creating a bootable diskette
- Creating the BIOS upgrade diskette

Obtain the BIOS Upgrade File

You can upgrade to a new version of the BIOS by using the BIOS upgrade file. The BIOS upgrade file is a compressed self-extracting archive that contains all the files you need to upgrade the BIOS. The BIOS upgrade file contains:

- New BIOS files
- BIOS recovery files
- Intel Flash Memory Update Utility

You can obtain the BIOS upgrade file through your computer supplier or from the Intel World Wide Web site:

<http://support.intel.com/support/motherboards/desktop/>



NOTE

Please review the instructions distributed with the update utility before attempting a BIOS upgrade.

The Intel Flash Memory Update Utility allows you to:

- Upgrade the BIOS in flash memory.
- Update the language section of the BIOS.

Record the Current BIOS Settings

1. Boot the computer and press <F2> when you see the message:
Press <F2> Key if you want to run SETUP

NOTE

Do not skip step 2. You will need these settings to configure your computer at the end of the upgrade procedure.

2. Write down the current settings in the BIOS Setup program.

Create a Bootable Diskette

NOTE

If your drive A is an LS-120 diskette drive, you must use a 1.44-MB diskette as the bootable BIOS upgrade diskette. The computer is unable to recover a BIOS from an LS-120 diskette.

To create a bootable diskette using a DOS system:

- Place an unformatted diskette in the diskette drive and format the diskette using the /s option.
Example: format a: /s
- Alternatively, place a formatted diskette in the diskette drive and use the sys command.
Example: sys a:

To create a bootable diskette using a non-DOS system:

1. Obtain the BIOS upgrade file through your computer supplier or from the Intel World Wide Web site:
<http://support.intel.com/support/motherboards/desktop/>
2. Copy the BIOS upgrade file to a temporary directory on your hard disk.
3. Change to the temporary directory.
4. To extract the files, double click on the BIOS upgrade file, for example, VCBIOSxx.EXE.
5. One of the extracted files is MK_BOOTZ.EXE. Double click on this file to extract the README.TXT file.
6. Follow the directions in the README.TXT file.

Create the BIOS Upgrade Diskette

1. Obtain the BIOS upgrade file through your computer supplier or from the Intel World Wide Web site:
<http://support.intel.com/support/motherboards/desktop/>
2. Copy the BIOS upgrade file to a temporary directory on your hard disk.
3. From the C:\ prompt, change to the temporary directory.
4. To extract the file, type the name of the BIOS upgrade file, for example, VCBIOSxx.EXE
5. Press <Enter>. The extracted file contains the following files:
LICENSE.TXT
BIOINSTR.TXT
BIOS.EXE

MK_BOOTZ.EXE

6. Read the LICENSE.TXT file, which contains the software license agreement, and the BIOINSTR.TXT file, which contains the instructions for the BIOS upgrade.
7. Insert the bootable diskette into drive A.
8. To extract the BIOS.EXE file to the diskette, change to the temporary directory that holds the BIOS.EXE file and type:

BIOS A:
9. Press <Enter>.
10. The diskette now holds the new BIOS files, the Intel Flash Update Utility, and the recovery files.

Upgrading the BIOS



CAUTION

The AUTOEXEC.BAT file provided with the update files updates the BIOS in two parts: first updating the boot block and displaying the “Operation completed successfully” message and then updating the BIOS core. You will be asked to reboot the system when the update process is complete. Do not interrupt the process or the system may not be capable of rebooting.

1. Boot the computer with the BIOS upgrade diskette in drive A. During system boot, the AUTOEXEC.BAT file provided with the update files will automatically run the BIOS update process.
2. The AUTOEXEC.BAT file updates the BIOS in two parts: first updating the boot block and displaying the “Operation completed successfully” message and then updating the BIOS core.
3. When the update process is complete, the monitor will display a message telling you to remove the diskette and to reboot the system.
4. As the computer boots, check the BIOS identifier (version number) to make sure the upgrade was successful. If a logo appears, press <Esc> to view the POST messages.
5. To enter the BIOS Setup program, press <F2> when you see the message:

Press <F2> to Run SETUP
6. For proper operation, load the BIOS Setup program defaults. To load the defaults, press <F9>.
7. To accept the defaults, press <Enter>.
8. In Setup, enter the settings you wrote down before beginning the BIOS upgrade.
9. To save the settings, press <F10>.
10. To accept the settings, press <Enter>.
11. Turn off the computer and reboot.

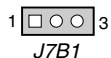
Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade; however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure uses recovery mode for the Setup program.

NOTE

Because of the small amount of code available in the boot block area, there is no video support. You will not see anything on the screen during this procedure. Monitor the procedure by listening to the speaker and looking at the diskette drive LED.

1. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
2. Remove the computer cover and locate the configuration jumper block (J7B1).
3. Remove the jumper from all pins as shown below to set recovery mode for Setup.



4. Insert the bootable BIOS upgrade diskette into diskette drive A.
5. Replace the computer cover, connect the power cord, turn on the computer, and allow it to boot. The recovery process will take a few minutes.
6. Listen to the speaker.
 - Two beeps and the end of activity in drive A indicate successful BIOS recovery.
 - A series of continuous beeps indicates failed BIOS recovery.
7. If recovery fails, return to step 1 and repeat the recovery process.
8. If recovery is successful, turn off the computer, and disconnect its power cord.
9. Remove the computer cover and continue with the following steps.
10. On the jumper block (J7B1), reinstall the jumper back on pins 1-2 as shown below to set normal mode for Setup.



11. Leave the upgrade diskette in drive A, replace the computer cover, and connect the computer's power cord.
12. Turn on the computer and continue with the BIOS upgrade (see page 43).

4 Using the Setup Program

You can use the BIOS Setup program to change the configuration information and boot sequence for the computer. This chapter tells you how to access the BIOS Setup program and lists Setup features, options, and default settings.

 **NOTE**

For reference purposes, you should write down the current Setup settings. When you make changes to the settings, update this record.

BIOS Setup Program Modes

The BIOS Setup program has three modes of operation:

- Normal mode for normal operations
- Configure mode for clearing passwords
- Recovery mode for recovering the BIOS data

The BIOS Setup program operating mode is controlled by the setting of the configuration jumper block. The jumper is set to normal mode at the factory.

 **NOTE**

The Setup menus described in this section apply to VC820 boards with BIOS identifier VC82010A.86A. Boards with other BIOS identifiers might have differences in some of the Setup menu screens.

Table 4. BIOS Setup Program Menu Bar

BIOS Setup Program Menu Screen	Description
Maintenance	Used for clearing the BIOS Setup program passwords. This menu is only available in configure mode.
Main	Allocates resources for hardware components.
Advanced	Specifies advanced features available through the chipset.
Security	Specifies passwords and security features.
Power	Specifies power management features.
Boot	Specifies boot options and power supply controls.
Exit	Saves or discards changes to the BIOS Setup program options.

Table 5 shows the function keys available for menu screens.

Table 5. BIOS Setup Program Function Keys

BIOS Setup Program Function Key	Description
<<-> or <->	Selects a different menu screen
<↑> or <↓>	Moves cursor up or down
<Tab>	Moves cursor to the next field
<Enter>	Executes command or selects the submenu
<F9>	Load the default configuration values for the current menu
<F10>	Save the current values and exits the BIOS Setup program
<Esc>	Exits the menu

Maintenance Menu

This menu is used for clearing the Setup passwords. Setup only displays this menu in configure mode.

Table 6. Maintenance Menu

Feature	Options	Description
Clear All Passwords	No options	Clears the user and supervisor passwords

Main Menu

This menu reports processor and memory information and is used for configuring the system date and system time.

Table 7. Main Menu

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS.
Processor Type	No options	Displays processor type.
Processor Speed	No options	Displays processor speed.
Cache RAM	No options	Displays the size of second-level cache and whether it is ECC-capable.
Total Memory	No options	Displays the total amount of RAM on the desktop board.
Memory Bank 0 Memory Bank 1 Memory Bank 2	No options	Displays the type of memory module installed in each memory bank.
Processor Serial Number	<ul style="list-style-type: none"> • Disabled (default) • Enabled 	Enables and disables the processor serial number.
Memory Configuration	<ul style="list-style-type: none"> • Non-ECC • ECC (default) 	Enables and disables ECC.
Cache Bus ECC	<ul style="list-style-type: none"> • Enabled (default) • Disabled 	Enables and disables cache bus ECC.
System Time	Hour, minute, and second	Specifies the current time.
System Date	Day of week Month/day/year	Specifies the current date.

Advanced Menu

This menu is used for setting advanced features that are available through the chipset.

Table 8. Advanced Menu

Feature	Options	Description
Boot Configuration	No options	Configures Plug and Play and the Numlock key, and resets configuration data. When selected, displays the Boot Settings Configuration submenu.
Peripheral Configuration	No options	Configures peripheral ports and devices. When selected, displays the Peripheral Configuration submenu.
IDE Configuration	No options	Specifies type of connected IDE device.
Diskette Configuration	No options	When selected, displays the Floppy Options submenu.
Event Log Configuration	No options	Configures Event Logging. When selected, displays the Event Log Configuration submenu.
Video Configuration	No options	Configures video features. When selected, displays the Video Configuration submenu.

Boot Configuration Submenu

This menu is used for setting the Plug and Play options and the power-on state of the Numlock key, and for resetting configuration data.

Table 9. Boot Configuration Submenu

Feature	Options	Description
Plug & Play O/S	<ul style="list-style-type: none"> • No (default) • Yes 	Specifies if manual configuration is desired. No lets the BIOS configure all devices. This setting is appropriate when using a Plug and Play operating system. Yes lets the operating system configure Plug and Play devices not required to boot the system. This option is available for use during lab testing.
Reset Config Data	<ul style="list-style-type: none"> • No (default) • Yes 	No does not clear the PCI/PnP configuration data stored in flash memory on the next boot. Yes clears the PCI/PnP configuration data stored in flash memory on the next boot.
Numlock	<ul style="list-style-type: none"> • Off • On (default) 	Specifies the power-on state of the Numlock feature on the numeric keypad of the keyboard.

Peripheral Configuration Submenu

This submenu is used for configuring the computer peripherals.

Table 10. Peripheral Configuration Submenu

Feature	Options	Description
Serial Port A	<ul style="list-style-type: none"> • Disabled • Enabled • Auto (default) 	<p>Configures serial port A.</p> <p><i>Auto</i> assigns the first free COM port, normally COM1, the address 3F8h, and the interrupt IRQ4.</p> <p>An * (asterisk) displayed next to an address indicates a conflict with another device.</p>
Base I/O Address	<ul style="list-style-type: none"> • 3F8 (default) • 2F8 • 3E8 • 2E8 	<p>Specifies the base I/O address for serial port A, if serial port A is Enabled.</p>
Interrupt	<ul style="list-style-type: none"> • IRQ 3 • IRQ 4 (default) 	<p>Specifies the interrupt for serial port A, if serial port A is Enabled.</p>
Serial Port B	<ul style="list-style-type: none"> • Disabled • Enabled • Auto (default) 	<p>Configures serial port B.</p> <p><i>Auto</i> assigns the first free COM port, normally COM2, the address 2F8h and the interrupt IRQ3.</p> <p>An * (asterisk) displayed next to an address indicates a conflict with another device.</p> <p>If either serial port address is set, that address will not appear in the list of options for the other serial port.</p>
Mode	<ul style="list-style-type: none"> • Normal (default) • IrDA[†] SIR-A • ASK_IR 	<p>Specifies the mode for serial port B for normal (COM 2) or infrared applications. This option is not available if serial port B has been disabled.</p>
Base I/O Address	<ul style="list-style-type: none"> • 3F8 • 2F8 (default) • 3E8 • 2E8 	<p>Specifies the base I/O address for serial port B.</p>
Interrupt	<ul style="list-style-type: none"> • IRQ 3 • IRQ 4 default) 	<p>Specifies the interrupt for serial port B.</p>

continued

Table 10. Peripheral Configuration Submenu (continued)

Feature	Options	Description
Parallel Port	<ul style="list-style-type: none"> • Disabled • Enabled • Auto (default) 	<p>Configures the parallel port.</p> <p><i>Auto</i> assigns LPT1 the address 378h and the interrupt IRQ7.</p> <p>An * (asterisk) displayed next to an address indicates a conflict with another device.</p>
Mode	<ul style="list-style-type: none"> • Output Only • Bi-directional (default) • EPP • ECP 	<p>Selects the mode for the parallel port. Not available if the parallel port is disabled.</p> <p><i>Output Only</i> operates in AT-compatible mode.</p> <p><i>Bi-directional</i> operates in PS/2-compatible mode.</p> <p><i>EPP</i> is Extended Parallel Port mode, a high-speed bi-directional mode.</p> <p><i>ECP</i> is Enhanced Capabilities Port mode, a high-speed bi-directional mode.</p>
Base I/O Address	<ul style="list-style-type: none"> • 378 (default) • 278 • 228 	Specifies the base I/O address for the parallel port.
Interrupt	<ul style="list-style-type: none"> • IRQ 5 (default) • IRQ 7 	Specifies the interrupt for the parallel port.
Audio Device	<ul style="list-style-type: none"> • Disabled (default) • Enabled 	Enables or disables the onboard audio subsystem.
Modem Device	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables or disables the modem.
Legacy USB Support	<ul style="list-style-type: none"> • Disabled • Enabled • Auto (default) 	Enables or disables USB legacy support.

IDE Configuration

This menu is used for configuring the IDE controller and connected IDE devices.

Table 11. IDE Configuration

Feature	Options	Description
IDE Controller	<ul style="list-style-type: none"> • Disabled • Primary • Secondary • Both (default) 	Specifies the integrated IDE controller. <i>Primary</i> enables only the Primary IDE Controller. <i>Secondary</i> enables only the Secondary IDE Controller. <i>Both</i> enables both IDE controllers.
Hard Disk Pre-Delay	<ul style="list-style-type: none"> • Disabled (default) • 3 Seconds • 6 Seconds • 9 Seconds • 12 Seconds • 15 Seconds • 21 Seconds • 30 Seconds 	Specifies the hard disk drive pre-delay.
Primary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Master submenu.
Primary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Slave submenu.
Secondary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Master submenu.
Secondary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Slave submenu.

IDE Configuration Submenus

This submenu is used for configuring IDE devices, including:

- Primary IDE master
- Primary IDE slave
- Secondary IDE master
- Secondary IDE slave

Table 12. IDE Configuration Submenus

Feature	Options	Description
Type	<ul style="list-style-type: none"> • None • User • Auto (default) • CD-ROM • ATAPI Removable • Other ATAPI • IDE Removable 	<p>Specifies the IDE configuration mode for IDE devices.</p> <p><i>User</i> allows the cylinders, heads, and sectors fields to be changed.</p> <p><i>Auto</i> automatically fills in the values for the cylinders, heads, and sectors fields.</p>
LBA Mode Control	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables or disables the LBA mode control.
Multi-Sector Transfers	<ul style="list-style-type: none"> • Disabled • 2 Sectors • 4 Sectors • 8 Sectors • 16 Sectors (default) 	<p>Specifies number of sectors to be transferred in a single interrupt.</p> <p>Check the hard disk drive's specifications for optimum setting.</p>
PIO Mode	<ul style="list-style-type: none"> • Auto (default) • 0 • 1 • 2 • 3 • 4 	Specifies the PIO mode.
Ultra DMA	<ul style="list-style-type: none"> • Disabled (default) • Mode 0 • Mode 1 • Mode 2 • Mode 3 • Mode 4 	Specifies the Ultra DMA mode for the drive.

Diskette Configuration Submenu

This submenu is used for configuring the diskette drive.

Table 13. Diskette Configuration Submenu

Feature	Options	Description
Diskette Controller	<ul style="list-style-type: none"> Disabled Enabled (default) 	Disables or enables the integrated diskette controller.
Diskette A	<ul style="list-style-type: none"> Not Installed 360 KB 5¼ inch 1.2 MB 5¼ inch 720 KB 3½ inch 1.44/1.25 MB 3½ inch (default) 2.88 MB 3½ inch 	Specifies the capacity and physical size of diskette drive A.
Diskette Write Protect	<ul style="list-style-type: none"> Disabled (default) Enabled 	Disables or enables write protect for the diskette drive.

Event Log Configuration Submenu

This submenu is used for configuring the DMI event logging features.

Table 14. Event Log Configuration Submenu

Feature	Options	Description
Event Log	No options	Indicates if there is space available in the event log.
Event Log Validity	No options	Indicates if the contents of the event log are valid.
View Event Log	[Enter]	Displays the DMI event log.
Clear All Event Logs	<ul style="list-style-type: none"> No (default) Yes 	Clears the DMI event log after rebooting.
Event Logging	<ul style="list-style-type: none"> Disabled Enabled (default) 	Enables logging of DMI events.
ECC Event Logging	<ul style="list-style-type: none"> Disabled Enabled (default) 	Enables logging of ECC events.
Mark Events As Read	[Enter]	Marks all events as read.

Video Configuration Submenu

This submenu is used for configuring video features.

Table 15. Video Configuration Submenu

Feature	Options	Description
AGP Aperture Size	<ul style="list-style-type: none"> • 64 MB (default) • 256 MB 	Specifies the AGP aperture size.
Primary Video Adapter	<ul style="list-style-type: none"> • AGP (default) • PCI 	Specifies the type of video adapter.

Security Menu

This menu is used for setting passwords and security features.

Table 16. Security Menu

Feature	Options	Description
Supervisor Password Is	No options	Reports if there is a supervisor password set.
User Password Is	No options	Reports if there is a user password set.
Set Supervisor Password	Password can be up to seven alphanumeric characters.	Specifies the supervisor password.
Set User Password	Password can be up to seven alphanumeric characters.	Specifies the user password.

Power Menu

This menu is used for setting power management features.

Table 17. Power Menu

Feature	Options	Description
Power Management	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables or disables the BIOS power management feature.
Inactivity Timer	<ul style="list-style-type: none"> • Off • 1 Minute • 5 Minutes • 10 Minutes • 20 Minutes (default) • 30 Minutes • 60 Minutes • 120 Minutes 	Specifies the amount of time before the computer enters standby mode.
Hard Drive	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables power management for hard disks during standby and suspend modes.
Video Power Down	<ul style="list-style-type: none"> • Disabled • Standby • Suspend (default) • Sleep 	Enables or disables video power management and specifies the mode to place the monitor in when entering a low power state.
ACPI Suspend State	<ul style="list-style-type: none"> • S1 State (default) • S3 State 	Specifies the ACPI suspend state.

Boot Menu

This menu is used for setting the boot features and the boot sequence.

Table 18. Boot Menu

Feature	Options	Description
Quiet Boot	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	<p><i>Disabled</i> displays normal POST messages.</p> <p><i>Enabled</i> displays OEM logo instead of POST messages.</p>
Quick Boot	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables the computer to boot without running certain POST tests.
Scan User Flash Area	<ul style="list-style-type: none"> • Disabled (default) • Enabled 	Enables the BIOS to scan the flash memory for user binary files that are executed at boot time.
After Power Failure	<ul style="list-style-type: none"> • Stays Off • Last State (default) • Power On 	<p>Specifies the mode of operation if an AC/Power loss occurs.</p> <p><i>Power On</i> restores power to the computer.</p> <p><i>Stay Off</i> keeps the power off until the power button is pressed.</p> <p><i>Last State</i> restores the previous power state before power loss occurred.</p>
On Modem Ring	<ul style="list-style-type: none"> • Stay Off (default) • Power On 	In APM mode only, specifies how the computer responds to an incoming call on an installed modem when the power is off.
1st Boot Device 2nd Boot Device 3rd Boot Device 4th Boot Device	<ul style="list-style-type: none"> • Disabled • 1st IDE-HDD (Note 1) • 2nd IDE-HDD • 3rd IDE-HDD • 4th IDE-HDD • Floppy • ARMD-FDD (Note 2) • ARMD-HDD (Note 3) • ATAPI CDROM • SCSI • Network 	<p>Specifies the boot sequence from the available devices. To specify boot sequence:</p> <ol style="list-style-type: none"> 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device. <p>The operating system assigns a drive letter to each boot device in the order listed. Changing the order of the devices changes the drive lettering.</p> <p>Not all of the devices in this list are available as second, third, and fourth boot devices. The default settings for the first through fourth boot devices are, respectively:</p> <ul style="list-style-type: none"> • Floppy • 1st IDE-HDD • ATAPI CDROM • Disabled

Notes:

1. HDD = Hard Disk Drive
2. ARMD-FDD = ATAPI removable device - floppy disk drive
3. ARMD-HDD = ATAPI removable device - hard disk drive

Exit Menu

This menu is used for exiting the BIOS Setup program, saving changes, and loading and saving defaults.

Table 19. Exit Menu

Feature	Description
Exit Saving Changes	Exits and saves the changes in CMOS SRAM.
Exit Discarding Changes	Exits without saving any changes made in the BIOS Setup program.
Load Setup Defaults	Loads the factory default values for all the Setup options.
Load Custom Defaults	Loads the custom defaults for Setup options.
Save Custom Defaults	Saves the current values as custom defaults. Normally, the BIOS reads the Setup values from flash memory. If this memory is corrupted, the BIOS reads the custom defaults. If no custom defaults are set, the BIOS reads the factory defaults.
Discard Changes	Discards changes without exiting Setup. The option values present when the computer was turned on are used.

5 Motherboard Technical Reference

Motherboard Connectors

The motherboard's connectors can be divided into three groups, as shown in Figure 4.

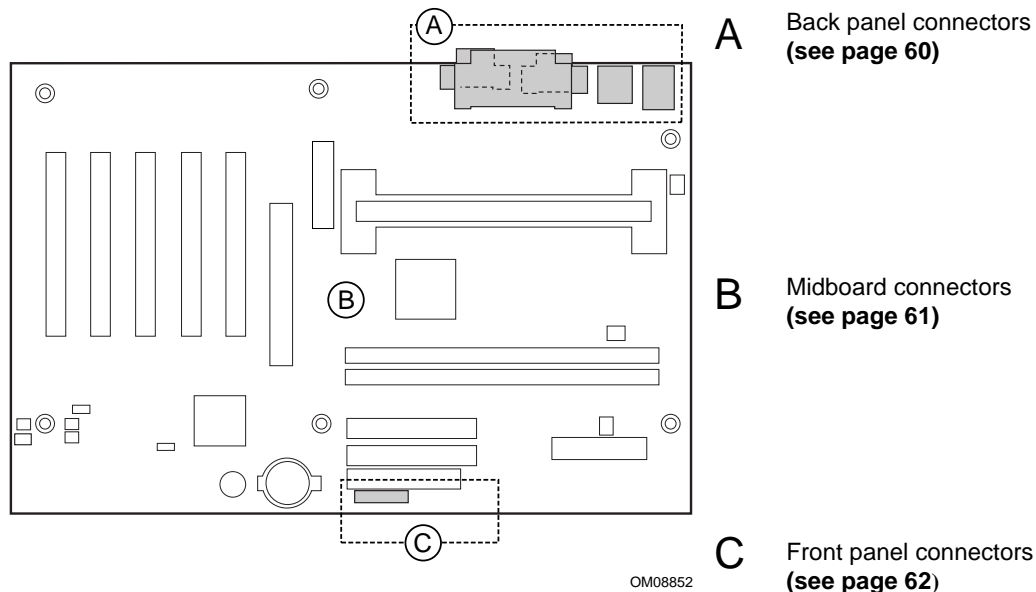


Figure 4. Connector Groups

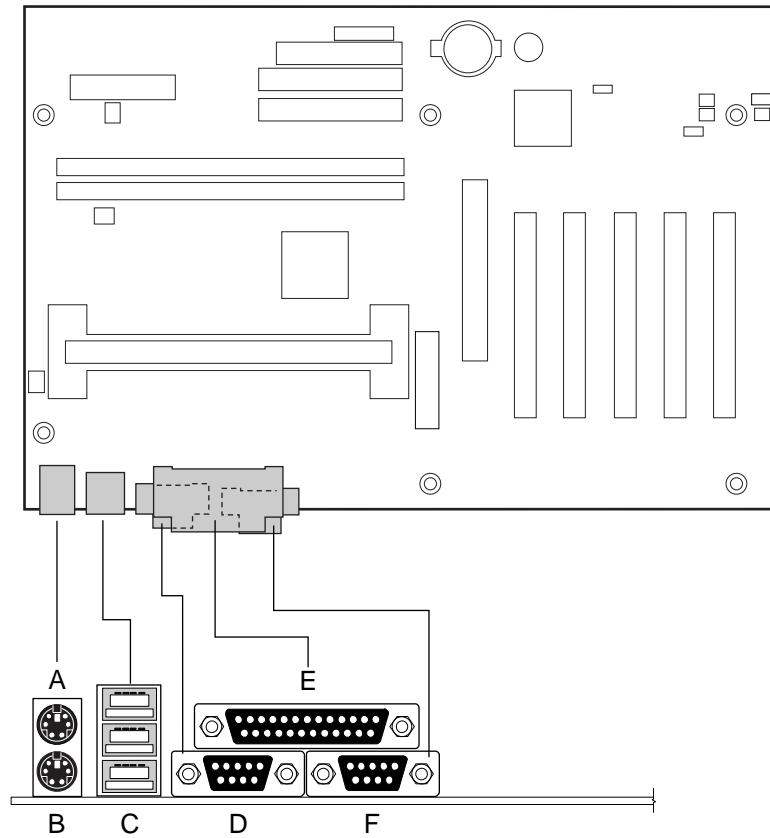


CAUTION

Many of the midboard and front panel connectors provide operating voltage (+5 V DC and +12 V DC, for example) to devices inside the computer chassis, such as fans and internal peripherals. These connectors are not overcurrent protected. Do not use these connectors for powering devices external to the computer chassis. A fault in the load presented by the external devices could cause damage to the computer, the interconnecting cable, and the external devices themselves.

Back Panel Connectors

Figure 5 shows the back panel connectors on the desktop board.



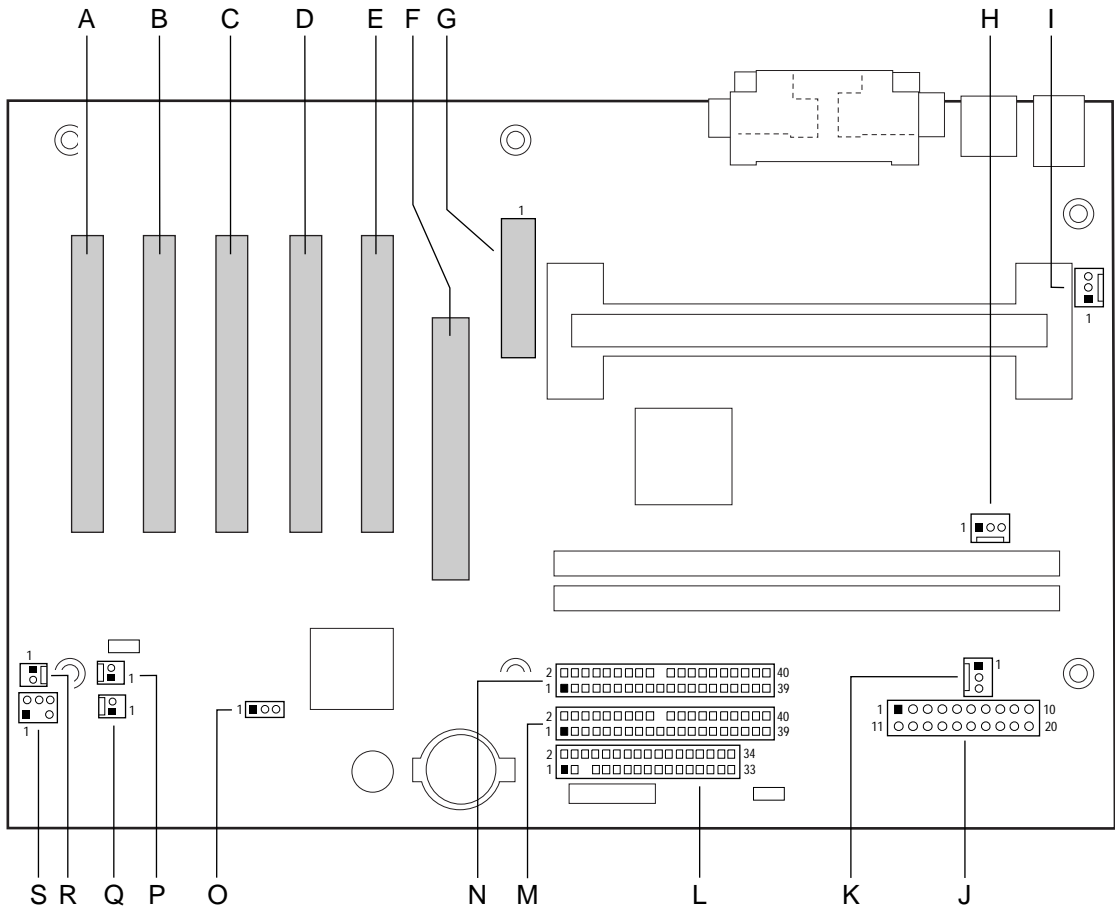
OM08853

A PS/2 mouse	D Serial port A
B PS/2 keyboard	E Parallel port
C USB ports	F Serial port B

Figure 5. Back Panel Connectors

Midboard Connectors

Figure 6 shows the location of the midboard connectors.



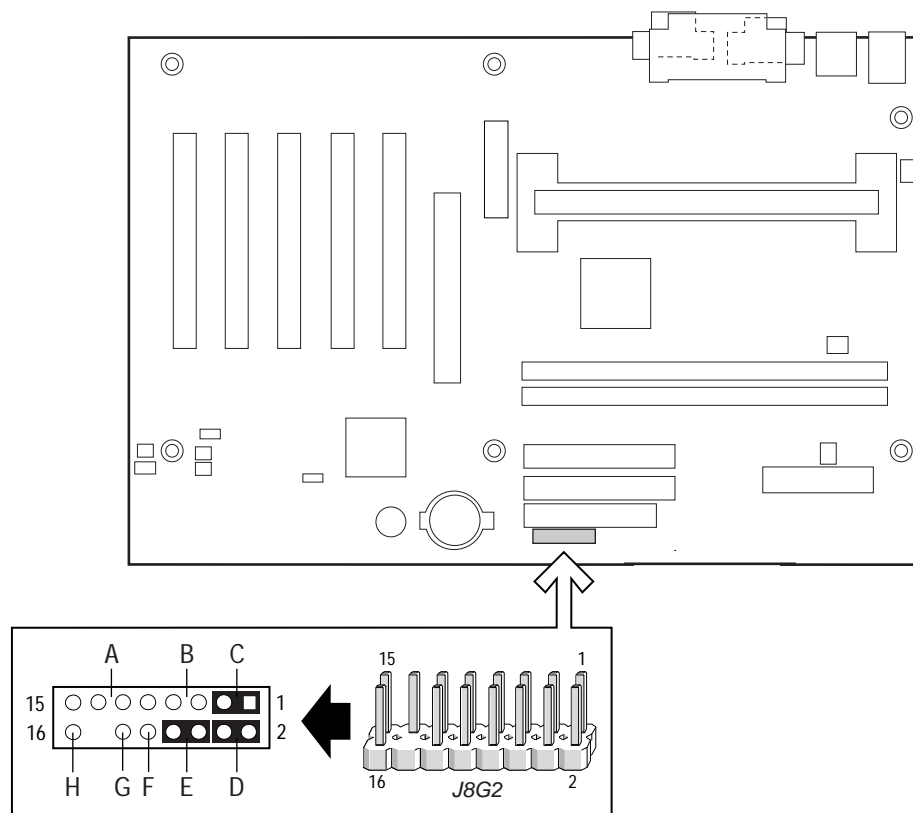
OM08854

- | | | | |
|---|---------------|---|------------------------------|
| A | PCI slot 5 | K | Chassis fan |
| B | PCI slot 4 | L | Diskette drive |
| C | PCI slot 3 | M | Primary IDE |
| D | PCI slot 2 | N | Secondary IDE |
| E | PCI slot 1 | O | Wake on LAN technology |
| F | Universal AGP | P | Wake on Ring |
| G | AMR | Q | SCSI hard drive activity LED |
| H | Chassis fan | R | PC/PCI |
| I | Processor fan | S | Chassis intrusion |
| J | Power | | |

Figure 6. Midboard Connectors

Front Panel Connectors

Figure 7 shows the location of the front panel connectors.



OM08855

J8G2: Front panel connector

- A Infrared port (not used)
- B Reset switch (not used)
- C Hard drive activity LED
- D Power LED
- E On/Off switch
- F Ground
- G No connect
- H +5 V (not used)

Figure 7. Front Panel Connectors

Motherboard Board Resources

Memory Map

Table 20. System Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 524288 K	100000 - 1FFFFFFF	511 MB	Extended Memory
960 K - 1024 K	F0000 - FFFFF	64 KB	Runtime BIOS
896 K - 960 K	E0000 - EFFFF	64 KB	Reserved
800 K - 896 K	C8000 - DFFFF	96 KB	Available high DOS memory (open to the PCI bus)
640 K - 800 K	A0000 - C7FFF	160 KB	Video memory and BIOS
639 K - 640 K	9FC00 - 9FFFF	1 KB	Extended BIOS data (movable by memory manager software)
512 K - 639 K	80000 - 9FBFF	127 KB	Extended conventional memory
0 K - 512 K	00000 - 7FFFF	512 KB	Conventional memory

DMA Channels

Table 21. DMA Channels

DMA Channel Number	Data Width	System Resource
0	8 or 16 bits	Audio
1	8 or 16 bits	Audio / parallel port
2	8 or 16 bits	Diskette drive
3	8 or 16 bits	Parallel port (for ECP or EPP)/audio
4		DMA controller
5	16 bits	Open
6	16 bits	Open
7	16 bits	Open

I/O Map

Table 22. I/O Map

Address (hex)	Size	Description
0000 - 000F	16 bytes	DMA controller
0020 - 0021	2 bytes	Programmable Interrupt Control (PIC)
0040 - 0043	4 bytes	System timer
0060	1 byte	Keyboard controller byte—reset IRQ
0061	1 byte	System speaker
0064	1 byte	Keyboard controller, CMD/STAT byte
0070 - 0071	2 bytes	System CMOS/Real-time clock
0072 - 0073	2 bytes	CMOS bank 1
0080 - 0090		DMA controller
0094 - 009F		DMA controller
00A0 - 00A1	2 bytes	PIC
00B2 - 00B3	2 bytes	APM control
00C0 - 00DE	31 bytes	DMA
00F0 - 00FF		Numeric data processor
0170 - 0177	8 bytes	Secondary IDE channel
01F0 - 01F7	8 bytes	Primary IDE channel
One of these ranges: 0200 - 0207 0208 - 020F 0210 - 0217 0218 - 021F	Can vary from 1 byte to 8 bytes	Audio/game port
0220 - 022F	16 bytes	Audio (Sound Blaster Pro [†] -compatible)
0240 - 024F	16 bytes	Audio (Sound Blaster Pro-compatible)
0240 - 024F	16 bytes	Audio (Sound Blaster-compatible)
0278 - 027F*	8 bytes	LPT2
0228 - 022F*	8 bytes	LPT3
02E8 - 02EF*	8 bytes	COM4/Video (8514A)
02F8 - 02FF*	8 bytes	COM2
One of these ranges: 0320 - 0327 0330 - 0337 0340 - 0347 0350 - 0357	8 bytes	MPU-401 (MIDI)
0376	1 byte	Secondary IDE channel command port

continued

Table 22. I/O Map (continued)

Address (hex)	Size	Description
0377, bits 6:0	7 bits	Secondary IDE channel status port
0378 - 037F	8 bytes	LPT 1
0388 - 038B	6 bytes	AdLib [†] (FM synthesizer)
03CC	1 byte	Video (VGA)
03CE - 03CF	2 bytes	Video (VGA)
03D4 - 03D5	2 bytes	Video (VGA)
03DA	1 byte	Video (VGA)
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5	6 bytes	Diskette channel 1
03F6	1 byte	Primary IDE channel command port
03F8 - 03FF	8 bytes	COM1
One of these ranges: 0530 - 0537 0E80 - 0E87 0F40 - 0F47	8 bytes	Windows Sound System
0800 - 087F		Desktop board resources
LPTn + 400h	8 bytes	ECP port, LPTn base address + 400h
0CF8 - 0CFB*	4 bytes	PCI configuration address register
0CF9**	1 byte	Turbo and reset control register
0CFC - 0CFF	4 bytes	PCI configuration data register
EF00 - EF3F	64 bytes	Windows Sound System
FFA0 - FFA7	8 bytes	Primary bus master IDE registers
FFA8 - FFAF	8 bytes	Secondary bus master IDE registers
Starting on a 64-byte divisible boundary	64 contiguous bytes	Onboard audio controller

* Dword access only

** Byte access only

Interrupts

Table 23. Interrupts

IRQ	System Resource
NMI	I/O channel check
0	Reserved, interval timer
1	Reserved, keyboard buffer full
2	Reserved, cascade interrupt from slave PIC
3	COM2* (user available if COM2 is not present)
4	COM1*
5	LPT2 (Plug and Play option) / audio / user available
6	Diskette drive controller
7	LPT1*
8	Real time clock
9	User available
10	User available
11	User available
12	Onboard mouse port (if present, else user available)
13	Reserved, math coprocessor
14	Primary IDE (if present, else user available)
15	Secondary IDE (if present, else user available)

* Default, but can be changed to another IRQ.

6 Installing Internal Options

You can expand the capabilities of your computer by adding memory, drives, or adapters. Use the instructions in this chapter along with the instructions that came with the option.

Removing and Replacing the Side Cover

In order to access motherboard components or adapter cards, or to remove the front cover, you must first remove the side cover.

To remove the side cover:

1. Shut down your operating system, remove any media (such as diskettes and CDs) from the drives, and turn off all attached devices and the computer.
2. Unplug all power cords from electrical outlets.
3. Disconnect all communication cables (such as modem and network cables) from communication outlets.
4. Disconnect all cables attached to the computer. This includes power cords, input/output (I/O) cables, and any other cables connected to the computer.
5. Remove the two screws that secure the side cover to the chassis frame. (See location A in Figure 8.)

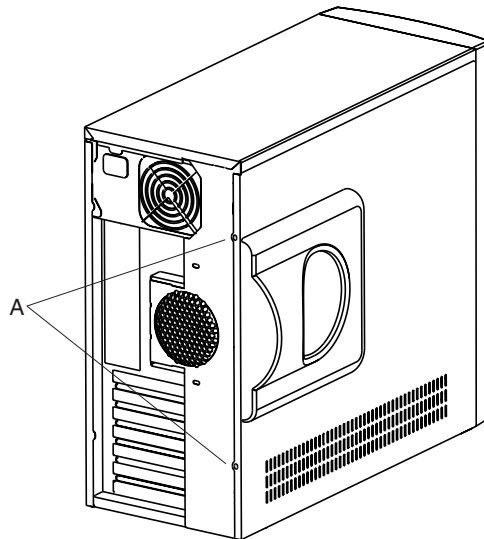


Figure 8. Removing the Side Cover

6. Slide the side cover straight toward the rear approximately one inch until the front edge of the side cover disengages from its slot on the front corner of the chassis frame.
7. Remove the side cover and set it aside.

 **NOTE**

Proper cooling is required for the reliable performance of internal components. Do not operate your computer with the side cover removed.

With the side cover removed, you can:

- install and remove adapters
- remove and replace the auxiliary fan assembly to access memory
- remove and replace the front cover to install and remove internal drives.

Following sections illustrate these processes.

Replacing the side cover is the reverse of removing it. To replace the side cover:

1. Align the side cover against the chassis frame, a few inches behind the normal position of the side cover when it is installed.
2. Slide the side cover forward until the front edge of the side cover is engaged in the slot in the front corner of the chassis frame.
3. Replace the two screws you removed when removing the side cover.
4. Connect all the cables you disconnected before removing the side cover.

Installing and Removing Adapters

When the side cover is removed, you can install and remove adapters.

Your system's motherboard has five expansion slots that support the peripheral component interconnect (PCI) architecture, as shown in Figure 3. When your system was delivered, three of these PCI slots were occupied, by the sound card, the LAN adapter, and the modem. Thus, two PCI slots are available in the standard configuration for additional adapters.

Your system's motherboard has one special expansion slot that supports the Accelerated Graphics Port (AGP) architecture, also shown in Figure 3. When your system was delivered, the AGP slot was occupied by the video adapter. Working with AGP adapters is fundamentally the same as working with PCI adapters, but an AGP adapter can be installed only in the AGP expansion slot, whereas a PCI adapter can be installed in any PCI expansion slot.

Most PCI adapters do not require any configuration before installation. However, always check the documentation provided with the adapter to see if any preparation has to be done to the adapter before it is installed. After the adapter is installed, it is recognized by the system and usually configured automatically.

Some adapters require device drivers and other support software, which usually ship with the adapter. The method of installing device drivers varies; so, always follow the instructions in the documentation provided with the adapter to install any device drivers and support software.

To install an adapter:

1. Remove the I/O slot cover on the back of the chassis that corresponds to the motherboard expansion slot that you intend to use.
2. Install the adapter into the expansion slot on the motherboard.

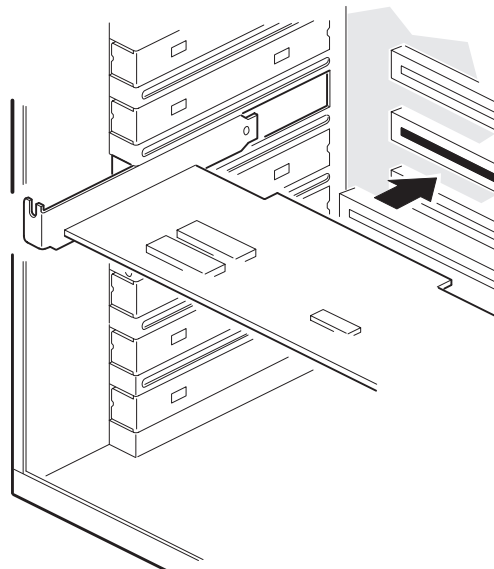


Figure 9. Installing an Adapter

3. Install the screw that secures the adapter.

4. Perform any additional installation tasks specified in the adapter documentation.

Removing an adapter is the reverse of installing it. Note that if you remove an adapter and you do not replace it with another one, you must install an I/O slot cover on the back of the chassis to ensure that your system continues to cool itself appropriately when it is running.

Removing and Replacing the Fan Assembly

When the side cover is removed, you can remove and replace the auxiliary fan assembly that cools the processor and memory. Removing the fan, or removing the complete fan assembly, is necessary to access memory. Before removing the fan or fan assembly, ensure that the safety precautions stated for removing the side cover have been observed.

1. To remove the auxiliary fan from its mounting bracket, disconnect the fan wiring harness, squeeze the fan mounting tabs toward the center of the fan, and withdraw the fan from the bracket.

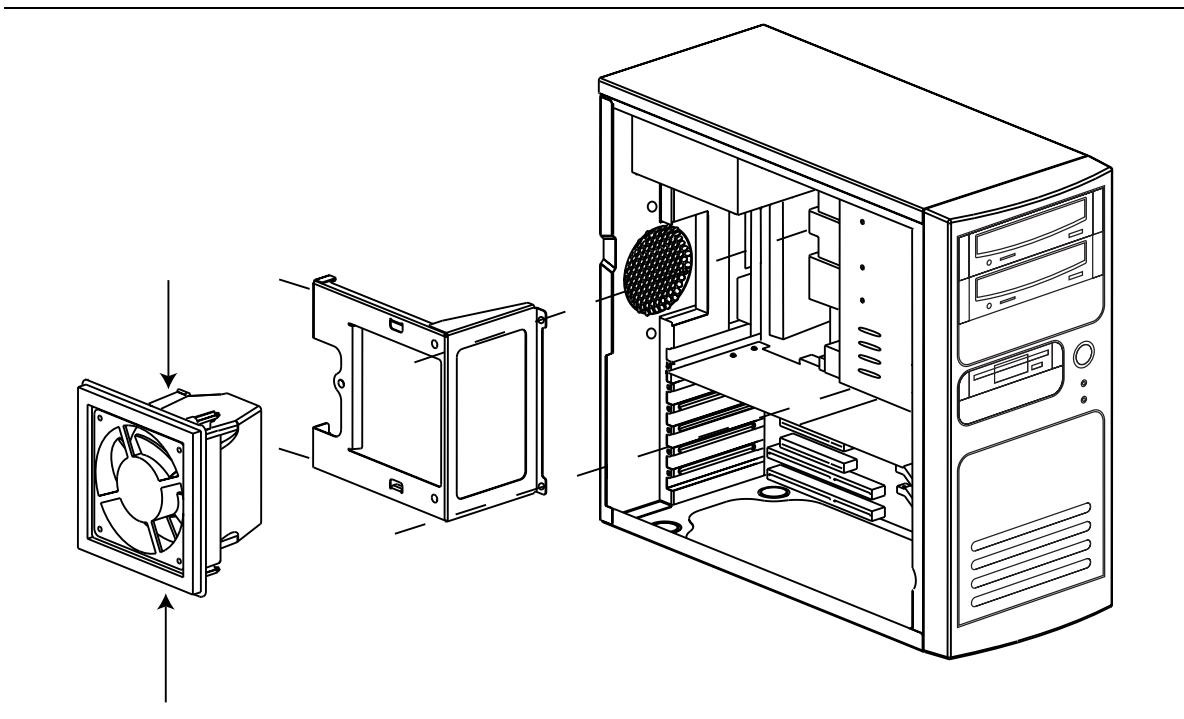


Figure 10. Removing and Replacing the Fan Assembly

2. To remove the fan bracket, remove four screws. Two screws hold the bracket to standoffs on the motherboard, and two screws hold the bracket to the back of the chassis.

Replacing the fan and fan assembly are the reverse of removing them. Ensure that the fan wiring harness is connected before replacing the side cover.

**CAUTION**

Do not attempt to operate the system without the auxiliary fan. Operating the system without the auxiliary fan assembly will cause it to overheat, resulting in damage to vital components.

Installing and Removing Memory

To install or remove memory, you must first remove the side cover and auxiliary fan. For maximum access to memory, you can also remove the auxiliary fan bracket.

How to Install Memory

The motherboard's two memory module sockets are arranged as banks 0 and 1. The socket closest to the processor is for bank 0, as shown in Figure 11. The memory module requirements are listed in the Main Memory section on page 10.

When adding memory, be aware that:

- If only one memory module is being installed, you can install it in either memory module socket.
- You can use different densities of memory modules in different banks.
- The BIOS detects the size and type of installed memory.

Figure 11 shows the location of the memory module sockets.

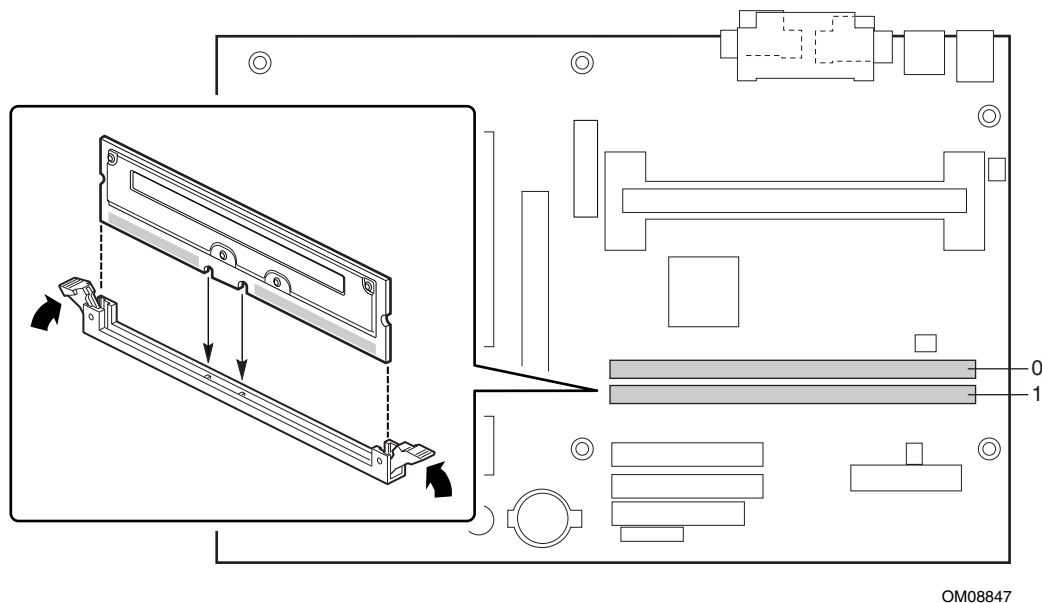


Figure 11. Installing a Memory Module

**CAUTION**

A Continuity RIMM must be installed in every unused memory socket or the system will not boot.

To install the memory modules, follow these steps:

1. Ensure that the safety precautions stated for removing the side cover and auxiliary fan assembly have been observed.
2. Holding the memory module by the edges, remove it from its antistatic package.
3. Make sure the clips at either end of the socket are pushed away from the socket.
4. Position the module above the socket. Align the two small notches in the bottom edge of the module with the keys in the socket.
5. Insert the bottom edge of the module into the socket.
6. When the module is seated, push down on the top edge of the module until the retaining clips snap into place. Make sure the clips are firmly in place.
7. Reinstall and reconnect any parts you removed or disconnected to reach the memory module sockets.

How to Remove Memory

To remove a memory module, follow these steps:

1. Ensure that the safety precautions stated for removing the side cover and auxiliary fan assembly have been observed.
2. Gently spread the retaining clips at each end of the socket. The memory pops out of the socket.
3. Hold the memory module by the edges, lift it away from the socket, and store it in an antistatic package.
4. Install a new memory module or a continuity module in the socket from which you removed the memory module.
5. Reinstall and reconnect any parts you removed or disconnected to reach the memory module sockets.

Replacing the Battery

To replace the battery, you must first remove the side cover.

When your computer is turned off, a lithium battery maintains the current time-of-day clock and the values in CMOS RAM current. Figure 12 shows the location of the battery.

The battery should last about seven years. When the battery begins to die, it loses voltage; when the voltage drops below a certain level, the BIOS Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one.

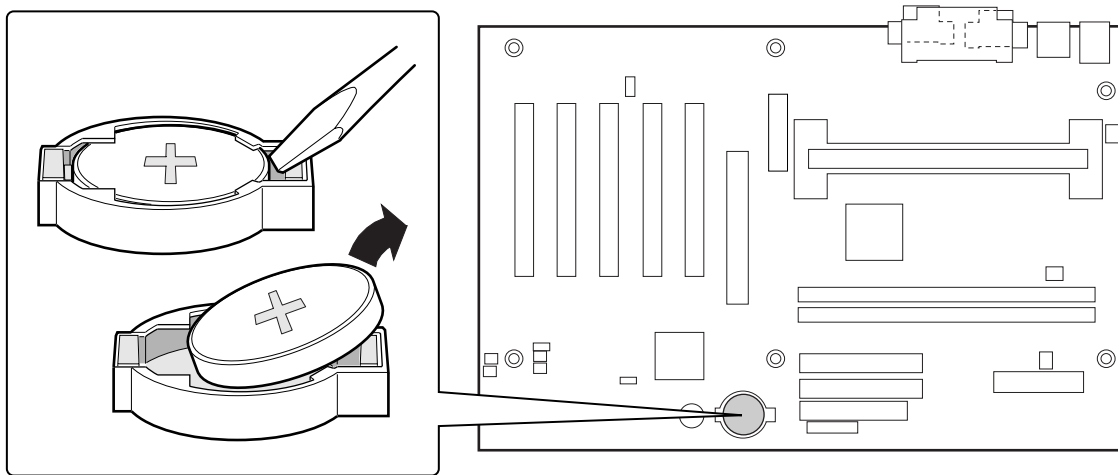


WARNING

Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.

To replace the battery, follow these steps:

1. Ensure that the safety precautions stated for removing the side cover has been observed.
2. Locate the battery on the motherboard.
3. With a medium flat-bladed screwdriver, gently pry the battery free from its connector. Note the orientation of the “+” and “-” on the battery.
4. Install the new battery in the connector, orienting the “+” and “-” correctly.
5. Reinstall and reconnect any parts you removed or disconnected to reach the battery.
6. Use the Configuration/Setup Utility program to set the date and time and any passwords.



OM08850

Figure 12. Removing the Battery

NOTES

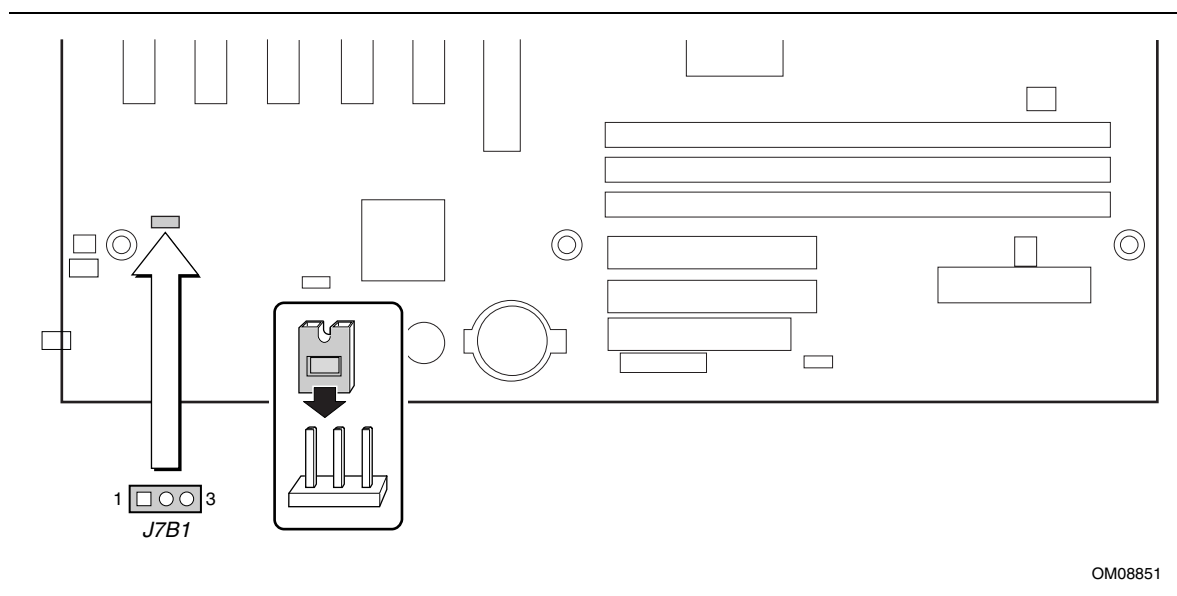
If your local ordinances permit, you may dispose of individual batteries as normal trash. Do not expose batteries to excessive heat or fire. Keep all batteries away from children.

When the system is turned on for the first time after battery replacement, an error message might be displayed. This is normal after replacing the battery.

Setting the BIOS Configuration Jumper

CAUTION

Always turn off the power and unplug the power cord from the computer before changing the jumper. Moving the jumper with the power on may result in unreliable computer operation.






OM08851

Figure 13. Location of the BIOS Configuration Jumper Block

This three-pin jumper block, shown in Figure 13, enables all desktop board configuration to be done in BIOS Setup. Table shows the jumper settings for the Setup program modes.

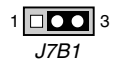
Table 24. Jumper Settings for the BIOS Setup Program Modes

Function / Mode	Jumper Setting	Configuration
Normal	1-2  J7B1	The BIOS uses current configuration information and passwords for booting.
Configure	2-3  J7B1	After the POST runs, the BIOS displays the maintenance menu. Use this menu to clear passwords.
Recovery	None  J7B1	The BIOS attempts to recover the BIOS configuration. A recovery diskette is required.

Clearing Passwords

This procedure assumes that the configuration jumper block is set to normal mode.

1. Turn off all peripheral devices connected to the computer. Turn off the computer. Disconnect the power cord from the AC power source (wall outlet or power adapter).
2. Remove the side cover.
3. Find the configuration jumper block, shown in Figure 13.
4. Place the jumper on pins 2-3 as shown below.



6. Replace the cover, plug in the computer, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the maintenance menu.
8. Use the arrow keys to select Clear Passwords. Press <Enter> and Setup displays a pop-up screen requesting that you confirm clearing the password. Select Yes and press <Enter>. Setup displays the maintenance menu again.
9. Press <F10> to save the current values and exit Setup.
10. Turn off the computer. Disconnect the power cord from the AC power source.
11. Remove the computer cover.
12. To restore normal operation, place the jumper on pins 1-2 as shown below.



13. Replace the cover, plug in the computer, and turn on the computer.

Installing Internal Drives

To install an internal drive, you must first remove the side cover and then remove the front cover.

To remove the front cover:

1. Push the plastic locking tabs (visible at the front corner of the system with the side cover removed) inward.
2. Rotate the front cover away from the front of the system.

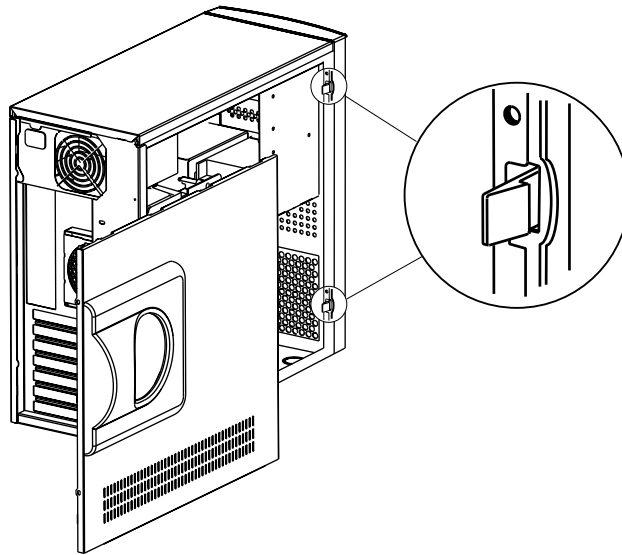


Figure 14. Removing the Front Cover

3. Disengage the tabs on the other side of the front cover from their slots on the chassis frame and set the front cover aside.

To install an external-access drive in the lower 3.5" bay:

1. Remove the cover plate from the empty drive bay.
2. Insert the new drive on its mounting rails (lower 3.5" external-access drive bay only).
3. Remove the filler panel from the front cover.
4. Connect any cables required by the drive.
5. Replace the front cover and side cover before operating the system.

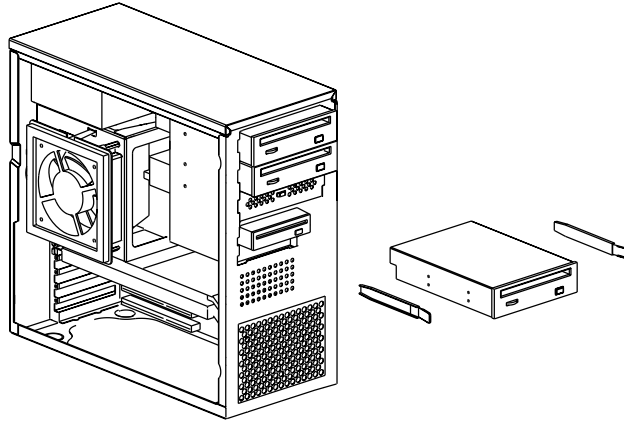


Figure 15. Installing an Internal Drive

NOTES

Installing a drive in the bottom 5.25" bay requires removal of the right side panel (seen from the front of the system). A drive can be installed in this bay with screws through the sides of the external-access drive bay. As with any additional external-access drive, you must also remove the cover plates in the front panel of the chassis and in the front cover.

Installing an additional hard drive requires removal and replacement of the hard drive carrier, under the external-access drive bay. This can be accomplished without removing the right side panel.

A POST Error Messages and Indicators

The motherboard reports POST errors in two ways:

- By sounding a beep code
- By displaying an error message on the monitor

BIOS Beep Codes

The BIOS beep codes are listed in Table 25. The BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails (a faulty video card or no card installed) or if an external ROM module does not properly checksum to zero.

Table 25. Beep Codes

Number of Beeps	Description
1	Refresh failure
2	Parity can not be reset
3	First 64 K memory failure
4	Timer not operational
5	Processor failure (Reserved; not used)
6	8042 GateA20 cannot be toggled (memory failure or not present)
7	Exception interrupt error
8	Display memory R/W error
9	(Reserved; not used)
10	CMOS Shutdown register test error
11	Invalid BIOS (such as, POST module not found)

BIOS Error Messages

When a recoverable error occurs during the POST, the BIOS displays an error message describing the problem.

Table 26. BIOS Error Messages

Error Message	Explanation
GA20 Error	An error occurred with Gate-A20 when switching to protected mode during the memory test.
Pri Master HDD Error Pri Slave HDD Error Sec Master HDD Error Sec Slave HDD Error	Could not read sector from corresponding drive.
Pri Master Drive - ATAPI Incompatible Pri Slave Drive - ATAPI Incompatible Sec Master Drive - ATAPI Incompatible Sec Slave Drive - ATAPI Incompatible	Corresponding drive is not an ATAPI device. Run Setup to make sure device is selected correctly.
A: Drive Error B: Drive Error	No response from diskette drive.
CMOS Battery Low	The battery may be losing power. Replace the battery soon.
CMOS Display Type Wrong	The display type is different than what has been stored in CMOS. Check Setup to make sure type is correct.
CMOS Checksum Bad	The CMOS checksum is incorrect. CMOS memory may have been corrupted. Run Setup to reset values.
CMOS Settings Wrong	CMOS values are not the same as the last boot. These values have either been corrupted or the battery has failed.
CMOS Date/Time Not Set	The time and/or date values stored in CMOS are invalid. Run Setup to set correct values.
DMA Error	Error during read/write test of DMA controller.
FDC Failure	Error occurred trying to access diskette drive controller.
HDC Failure	Error occurred trying to access hard disk controller.
Checking NVRAM.....	NVRAM is being checked to see if it is valid.
Update OK!	NVRAM was invalid and has been updated.
Updated Failed	NVRAM was invalid but was unable to be updated.
Keyboard Is Locked	The system keyboard lock is engaged. The system must be unlocked to continue to boot.
Keyboard Error	Error in the keyboard connection. Make sure keyboard is connected properly.
KB/Interface Error	Keyboard interface test failed.

continued

Table 26. BIOS Error Messages (continued)

Error Message	Explanation
Memory Size Decreased	Memory size has decreased since the last boot. If no memory was removed, then memory may be bad.
Memory Size Increased	Memory size has increased since the last boot. If no memory was added, there may be a problem with the system.
Memory Size Changed	Memory size has changed since the last boot. If no memory was added or removed, then memory may be bad.
No Boot Device Available	System did not find a device to boot.
Off Board Parity Error	A parity error occurred on an offboard card. This error is followed by an address.
On Board Parity Error	A parity error occurred in onboard memory. This error is followed by an address.
Parity Error	A parity error occurred in onboard memory at an unknown address.
NVRAM / CMOS / PASSWORD cleared by Jumper	NVRAM, CMOS, and passwords have been cleared. The system should be powered down and the jumper removed.
<CTRL_N> Pressed	CMOS is ignored and NVRAM is cleared. User must enter Setup.