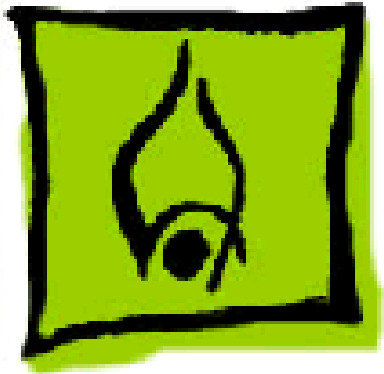




# Power Macintosh G3 Minitower

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## Hot Issues

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Power Macintosh G3 Minitower





## Introduction

This chapter is designed to highlight unique or high-priority product issues that you should be aware of before servicing the Power Macintosh G3 Minitower computer.

This chapter alerts you to important issues and provides links to other areas in the manual where more complete information can be found. This chapter is not intended to replace other parts of this manual; it merely provides a pointer to pertinent information in those chapters.

To familiarize yourself with a new product family, always read the Basics chapter in its entirety.





## Shared Logic Board

The Power Macintosh G3 Desktop and Minitower computers use the same logic board, but there are jumper settings that differ between them (see “Jumper Location J28” and “Jumper Location J16” in the Troubleshooting chapter).

## Processor Module Vs. Card

Whereas previous Power Macintosh computers featured a user-installable processor card, this logic board uses a processor module that must not be removed by the customer (see “Processor Module” in the Take-Apart chapter).





## Power Supply Jumper

The Power Macintosh G3 Minitower logic board has a power supply jumper installed at J28. The setting of this jumper differs between the Power Mac G3 Desktop and Minitower models. Failure to install this jumper in the correct position may result in a computer that won't boot up. (See "Jumper Location J28" in the Troubleshooting chapter.)

## Processor Module Jumper

The Power Macintosh G3 Minitower logic board has a processor module jumper installed at J16. The processor jumper is color coded for the speed of processor module used. Failure to install the correct jumper may result in a computer that won't boot up. (See "Jumper Location J16" in the Troubleshooting chapter.)





## Warranty Sticker

There is a warranty sticker that covers the processor module jumper. The customer's warranty is void if this sticker is tampered with. Service Providers must replace this sticker if they have removed it during servicing to protect the customer's warranty. (See "Processor Module" in the Take-Apart chapter.)

## Power Supply Voltage Setting

There is a switch on the back of the power supply that controls the voltage setting. The voltage switch **must** be set correctly to avoid damaging the computer. (See "Voltage Switch" in the Basics chapter for more information, including an international voltage chart.)





## Voltage Regulator

There is a removable voltage regulator on the logic board. If you are returning the logic board to Apple, do **not** remove this module. (See “Voltage Regulator” in the Troubleshooting chapter.)

## I/O Card

Some I/O functions on the Power Mac G3 logic board are handled through a removable I/O card that must be installed for the computer to operate properly. (See “I/O Cards” in the Troubleshooting chapter.)





## ROM DIMM

The Power Mac G3 Minitower logic board uses a ROM DIMM as opposed to soldered ROM. You should not remove the ROM DIMM from the logic board. (See “Logic Board” in the Take-Apart chapter for instructions on how to prepare the logic board for return to Apple Computer.)

## SDRAM DIMMs

The Power Macintosh G3 Minitower uses SDRAM DIMMs. DIMMs from older Macintosh computers, although they will fit, are not compatible and should never be used in the Power Macintosh G3 computers. (See “SDRAM DIMMs” in the Basics chapter and refer to the Power Macintosh G3 Minitower section of the Memory Guide.)







## SGRAM Video Memory

Power Macintosh G3 computers use SGRAM video memory. Use only SGRAM SO-DIMMs in these machines. Never install the 256K or 512K video memory DIMMs used in older Macintosh computers. (See “SGRAM Video Memory” in the Basics chapter.)





## Basics

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Power Macintosh G3 Minitower





## Overview

The Power Macintosh G3 Minitower chassis design allows you to access the logic board and its components without having to remove the power supply or any drives. This flexible design makes this computer easy to service and upgrade.

The Power Macintosh G3 Minitower has a unique PERCH slot that accepts an I/O card that determines the audio and video capabilities of the computer.





### Features of the Power Mac G3 Minitower include

- PowerPC G3 microprocessor running at 233 MHz or 266 MHz
- RAM expandable to 384 MB in three DIMM card slots using 64-bit, 168-pin, JEDEC-standard, 3.3 V, unbuffered, SDRAM DIMM cards
- 512K L2 cache on processor module
- Built-in 2D and 3D hardware graphics acceleration
- PERCH slot to support Apple I/O cards
- One modem slot on I/O cards for optional fax/modem card
- 4 GB or 6 GB ATA hard drive
- Three expansion bays for adding internal 3.5-inch SCSI devices
- Optional 100 MB SCSI Iomega Zip drive in one of the expansion bays
- CD-ROM ATAPI drive at 24X speed
- 1.4 MB SuperDrive
- One SCSI port





- Two GeoPort serial ports
- 10BASE-T Ethernet port
- One ADB port
- Three PCI expansion slots to accept three 12-inch PCI cards, or three 15-watt cards, or two 25-watt cards
- Voltage switch
- Fan speed thermally controlled
- Energy Saver control panel
- 2 MB video RAM expandable to 4 MB or 6 MB with 3.3 V, 83 MHz or faster SGRAM on a 144-pin small outline dual inline memory module (SO-DIMM)





## The Cuda Chip

The Cuda is a microcontroller chip. Its function is to

- Turn system power on and off
- Manage system resets from various commands
- Maintain parameter RAM (PRAM)
- Manage the Apple Desktop Bus (ADB)
- Manage the real-time clock

Many system problems can be resolved by resetting the Cuda chip (see Symptom Charts for examples). Press the Cuda reset button on the logic board to reset the Cuda chip. (The Cuda reset button is at the edge of the logic board near the PCI slots.) If you continue to experience system problems, refer to “Resetting the Logic Board” in this Basics chapter.





## Resetting the Logic Board

Resetting the logic board can resolve many system problems (refer to “Symptom Charts” for examples). Whenever you have a unit that fails to power up, you should follow this procedure before replacing any modules.

- 1 Unplug the computer.
- 2 Remove the battery from the logic board.
- 3 Disconnect the power supply cable from the logic board and then press the Power On button. (See “Logic Board Diagram” later in this chapter to locate the Power On button.)
- 4 Wait at least 10 minutes before replacing the battery.
- 5 Make sure the battery is installed in the correct +/- direction.





6 Reassemble the computer and test the unit.

**Note:** This procedure resets the computer's PRAM. Be sure to check the computer's time/date and other system parameter settings afterwards.







## Sound

The sound system for the Power Macintosh G3 computers is implemented entirely on the I/O cards. Each supports 16-bit stereo sound output and input, available simultaneously.

The sound circuitry on the I/O cards and system software can create sounds digitally and either play the sounds through speakers inside the enclosure or send the sound signals out through the sound output jacks. The sound circuitry digitizes and records sound as 16-bit samples. The computer can use 11.025K, or 22.050K, or 44.100K samples per second. The sound system plays samples at the sampling rate specified in the Monitors & Sound control panel.





The Power Macintosh G3 also records sound from several sources:

- A microphone connected to the line-level sound input jack
- The sound-in ports on the video input module
- Analog sound from optional communications cards
- A compact disc in the CD-ROM player
- Analog sound from the cross-platform card in a PCI slot

With each sound input source, sound playthrough can be enabled or disabled.





## Sound Output

All sound output features for the Power Macintosh G3 computer are provided by an I/O card. The Audio I/O card provides one mini jack for sound output on the back of the enclosure. The AV I/O card provides three sound output connectors—two RCA jacks for right and left sound out, and one 1/8-inch mini jack for a stereophonic phone plug.

The output jacks are connected to the sound amplifier. The mini jack is intended for connecting a pair of headphones or amplified external speakers. There is one built-in speaker. Inserting a plug into the sound output mini jack disconnects the internal speaker.

An optional front headphone jack requires an I/O card to connect the headphone jack to the sound system.





## Sound Input

The I/O cards provide a stereo sound input jack on the back of the enclosure for connecting an external Apple PlainTalk line-level microphone or other sound source pair of line-level signals. The sound input jack accepts a standard 1/8-inch stereophonic phone plug (two signals plus ground).

**Note:** The microphone for the Macintosh LC and LC II does not work with the I/O cards.

The AV I/O card provides an additional pair of RCA jacks for right and left sound input for an external source, such as a TV, VCR, or VTR.





Options in the Monitors & Sound control panel determine the interaction between the sound input and output devices. The sound circuitry normally operates in one of three modes:

- Sound playback—computer-generated sound is sent to the speaker and the sound output jacks.
- Sound playback with playthrough—computer sound and sound input are mixed and sent to the speakers and sound output jacks.
- Sound record with playthrough—input sound is recorded and also sent to the speakers and sound output jacks.





## Video Input and Output

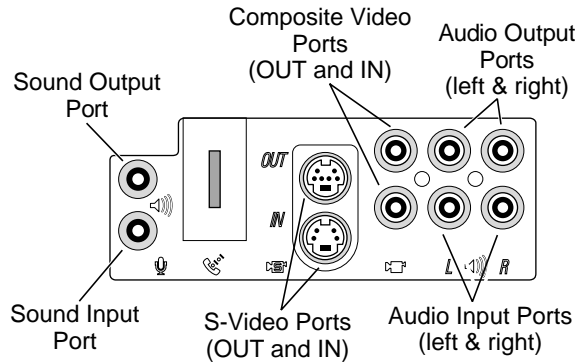
The AV I/O card supports video input and output of composite and S-video signals. The card supports input and output of NTSC, PAL, and SECAM video formats.

The AV I/O card accepts video from an external source and displays it in a window on the computer's display. The features of the video portion of the card include:

- Video display in a 320 X 240 pixel window
- Pixel expansion for 640 X 480 pixel maximum display
- Video overlay capability
- YUV format for digital video input
- A bi-directional digital audio video (DAV) connector for adding a video processor on a PCI expansion card

The card can accept video input from an external device, such as a VCR or camcorder.







## The DAV Connector

The AV I/O Personality card has a digital audio video (DAV) connector. The DAV connector allows a PCI expansion card to access the AV I/O card video input data bus and associated control signals. The PCI card can use the digital video bus on the AV I/O card to transfer real-time video data to the computer. The PCI expansion card can contain a hardware video compressor or other video processor.

The DAV connector is a 60-pin flat-ribbon connector located at the top edge of the AV I/O card. A PCI expansion card can connect to the AV I/O card with a 7-inch 60-conductor flat-ribbon cable that is installed between the DAV connector and the PCI card. The DAV connector accepts YUV video and analog sound from the PCI expansion card.

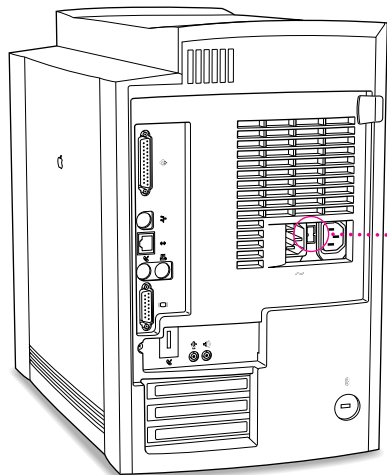




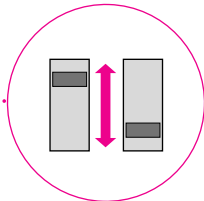


## Voltage Switch

The voltage switch must be set correctly to avoid damaging the computer. Insert a screw driver in the slot to set the switch to show “115” for voltages between 100 and 130. Set the switch to show “230” for voltages between 200 and 270. Some countries use two standardized voltages. If you aren’t sure which voltage is available, check with the electricity supply company before plugging in the computer.



Voltage  
Switch





Here is a table listing voltages for some countries:

<b>Country</b>	<b>Voltage</b>
Japan	100
South Korea	100 or 220
Jamaica, Taiwan	110
Peru	110 or 220
Brazil, Lebanon	110-220
Philippines	115
Bermuda, Canada, Puerto Rico, United States, Venezuela	120
Mexico	127
Saudi Arabia	127 or 220
Hong Kong	200





<b>Country</b>	<b>Voltage</b>
India, South Africa	220-250
Israel, Pakistan, Singapore	230
Australia, Kuwait, Malta, New Zealand, Northern Ireland, Papua New Guinea, Oman, Qatar, United Kingdom	240
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland	220-230
Bahrain, Chile, China (People's Republic), Czechoslovakia, Egypt, Greenland, Hungary, Iceland, Iran, Jordan, Liechtenstein, Nepal, Paraguay, Poland, Romania, United Arab Emirates, Russia and the Commonwealth of Independent States (CIS), Yemen, Yugoslavia	220





## SDRAM DIMMs

Three DRAM expansion slots on the logic board accept 3.3 V SDRAM unbuffered 8-byte DIMMs. The 168-pin DIMM has a 64-bit-wide data bus per bank. The minimum bank size supported is 2 MB, and the largest is 64 MB. The largest DIMM supported is a two-bank DIMM of 128 MB using 64 Mbit SDRAM devices. The Power Macintosh G3 Minitower accommodates a RAM DIMM height of 1.15 inches.

The DRAM DIMMs can be installed one or more at a time. The logic board supports only linear memory organization. Therefore, no performance gains are seen when two DIMMs of the same size are installed. Any supported size DIMM can be installed in any DIMM slot, and the combined memory of all the DIMMs installed will be configured as a contiguous array of memory.





**Important:** Power Macintosh G3 computers use SDRAM DIMMs. DIMMs from older Macintosh computers are not compatible and should not be used even though they fit into the Power Mac G3 DRAM DIMM slots.

## SGRAM Video Memory

The Power Macintosh G3 logic board comes with 2 MB of Synchronous Graphic RAM (SGRAM) video memory soldered on. The logic board also contains a video memory expansion slot that accepts a Small Outline DIMM (SO-DIMM) to increase video memory up to a maximum of 6 MB. Apple supports a 4 MB SGRAM SO-DIMM that is 32-bit wide, 144-pin, fast-paged, 83 MHz/12 ns cycle time or faster.

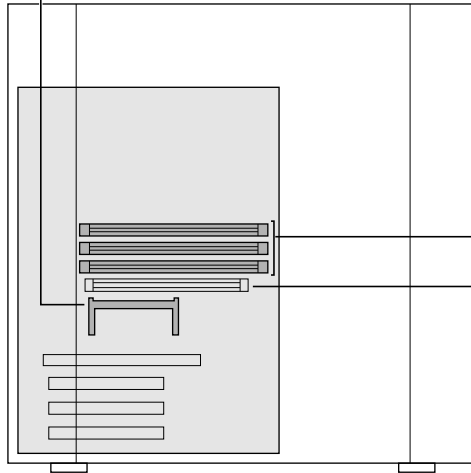
**Important:** Use only SGRAM SO-DIMMs. Never use the 256K or 512K video memory DIMMs used in older computers.





# DIMM Slots

Video Memory Expansion Slot



DRAM DIMM Slots

ROM Slot  
(Do not remove  
the ROM DIMM.)

(Front of computer)





## Peripheral Component Interconnect (PCI)

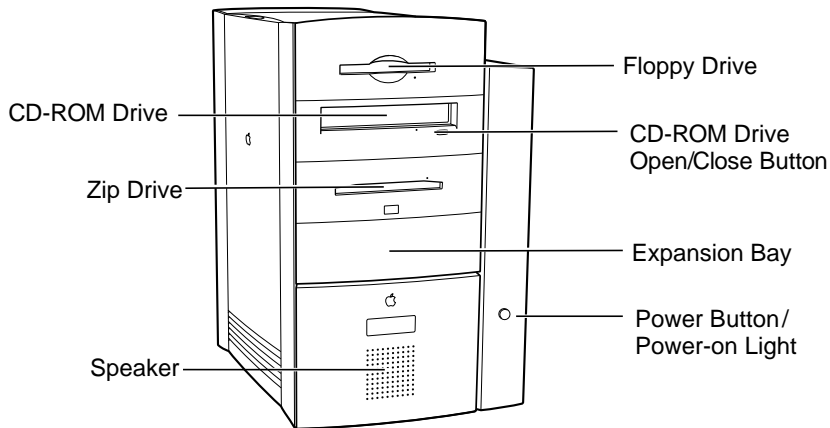
The Peripheral Component Interconnect (PCI) expansion slots accept 6.88-inch and 12.283-inch PCI cards. Because the PCI bus is an industry standard, most existing PCI 2.0-compliant cards (with the addition of a Mac OS-specific software driver) will work in these computers.

PCI offers significantly higher performance than the NuBus architecture used in previous Macintosh models. Running at 33 MHz, the PCI bus is up to three times faster than NuBus, offering overall enhanced system performance, particularly in the areas of video and networking.





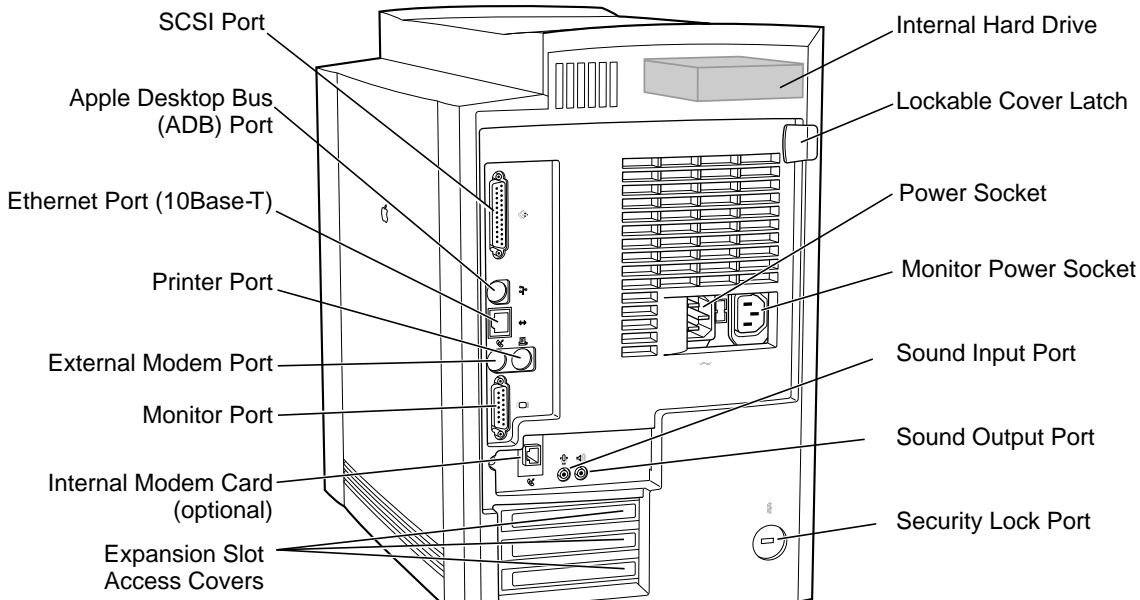
## Front View





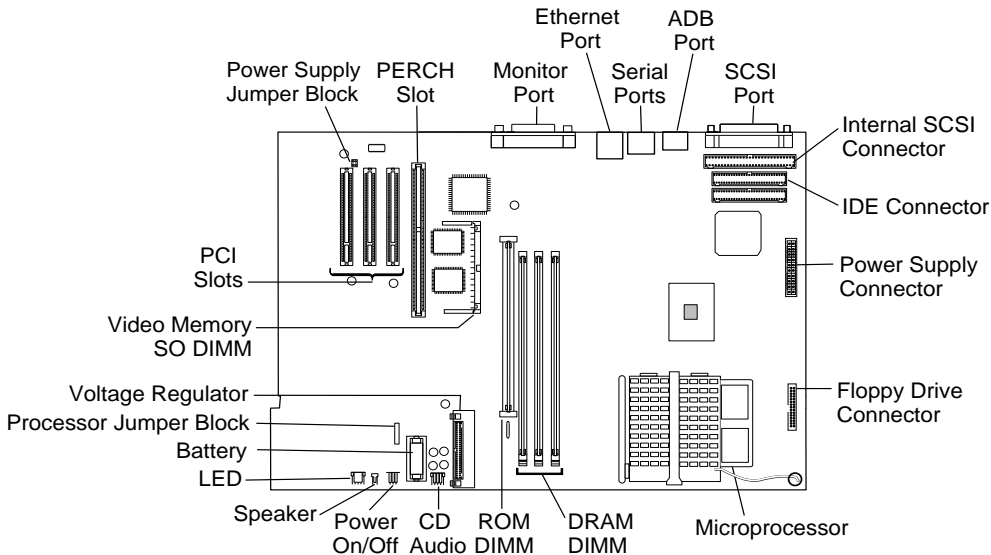


# Rear View





# Logic Board

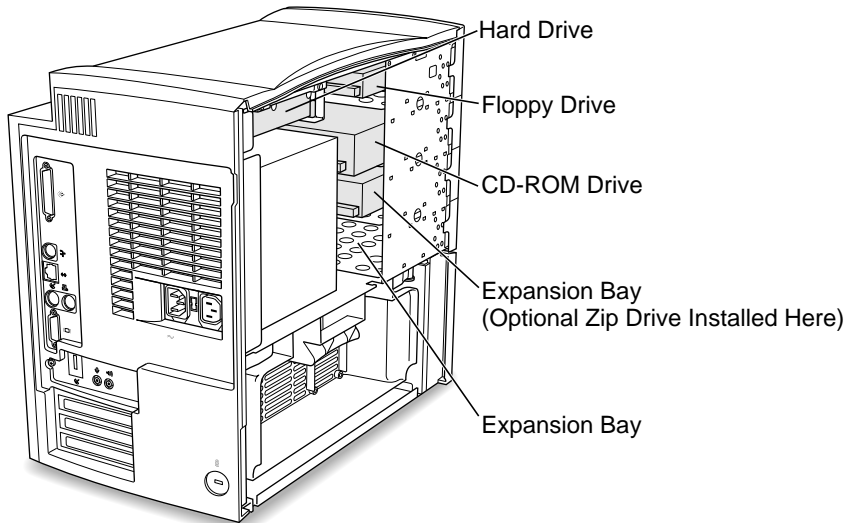




## Expansion Bays

When replacing drives in the Power Macintosh G3 Minitower, a customer may upgrade their drives or have different types of drives installed in the drive bays. You can replace the hard drive with a 3.5-inch hard drive (1-inch high). You can replace the floppy drive with a 5.25-inch or smaller device (maximum 1 inch high). The CD-ROM drive, Zip drive, and lower expansion bays accept a 5.25-inch or smaller device (maximum 1.625 inches high).





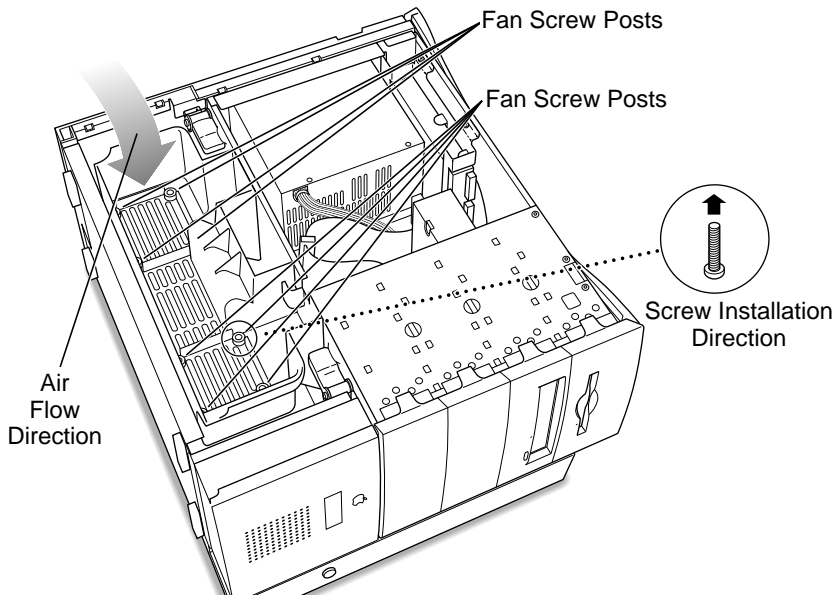


## Fan Installation

One or two auxiliary fans may be installed in the baffle handle. Third-party PCI card manufacturers may suggest these fans be installed based on the thermal characteristics of their cards.

Two sets of four fan screw posts indicate where you can install these fans. Fans must be positioned so they pull air into the computer, not push air out. Be sure the screws don't extend down into the space where PCI cards or cables may be present.







## Repair Strategy

Service the Power Macintosh G3 computers through module exchange and parts replacement. Customers can request on-site service from an Apple Authorized Service Provider Plus (AASP+) or Apple Assurance. They can also choose carry-in service from an AASP.

### Ordering

Apple Service Providers planning to support the computer systems covered in this manual may purchase Service modules and parts to develop servicing capability. To order parts, use the AppleOrder system and refer to the Power Macintosh G3 “Service Price Pages.”

Large businesses, universities, and K-12 accounts must provide a purchase order on all transactions, including





orders placed through the AppleOrder system. Service providers not enrolled in AppleOrder may fax their orders to Service Provider Support (512-908-8125) or mail them to

Apple Computer, Inc.  
Service Provider Support  
MS 212-SPS  
Austin, TX 78714-9125

If you have further questions, please call Service Provider Support at 800-919-2775 and select option #1.







## Warranty and AppleCare

The Power Macintosh G3 computers are covered under the Apple One-Year Limited Warranty. The AppleCare Service Plan is also available for these products. Service Providers are reimbursed for warranty and AppleCare repairs made to these computers. For pricing information, refer to “Service Price Pages.”





# The Power Macintosh G3 Series: Innovative Product Design for Affordable High Performance

## A little background

Two decades ago, Apple made its name by bringing advanced technology to mainstream users through extraordinarily easy-to-use products. In particular, we gained a reputation for success in pioneering the educational use of computers and championing the advancement of multimedia technology.

Although that reputation has remained remarkably unchanged through the years—Apple is still regarded as the industry leader in both education and multimedia—the technology behind it has been altered practically beyond recognition, as have customer expectations. Today's mainstream computer users want affordable high-performance systems that provide outstanding communications and multimedia capabilities. The Power Macintosh G3 series was developed to satisfy that need—and to exceed customer expectations about price/performance value.

## The Power Macintosh G3 series product design

When you talk about overall system design, you are really talking about a number of things—from the processor to the physical enclosure to the system software to the logic board—whose interrelationships are central to the user experience. The Power Macintosh G3 products were designed to meet the needs of our customers for performance, flexibility, and expandability through a streamlined development process in which a single logic board design provides a variety of capabilities. This approach simplifies testing, speeding development and increasing system reliability. In addition, the use of greater numbers of industry-standard parts than in previous Apple systems makes Power Macintosh G3 computers even more affordable.

**Logic board.** A computer's logic board design is the ultimate determinant of its functionality, involving such key features as processor, memory setup (controller and expansion capabilities), graphics support, and storage capabilities. The Power Macintosh G3 series systems use a mini-ATX board, which features, among other innovations, a faster system bus (66 megahertz as opposed to 50 megahertz, with room for further growth as processor speeds continue to increase) to support higher performance. This relatively tiny board, roughly the size of this fact sheet, allows for outstanding expandability—for example, by permitting the hard disk drive to fit within the base of the desktop model, so that it can also easily accommodate a Zip drive. In addition, it features an easy-to-access audio/video card slot that gives Apple the flexibility of offering a single product that provides a range of communications and multimedia capabilities to meet the varying needs of our users. For example, the Power Macintosh G3 is currently available in two versions: one system with stereo-quality audio capabilities and the other a full-featured, multimedia-optimized computer that also provides video-input/output capabilities and is suitable for content authoring.

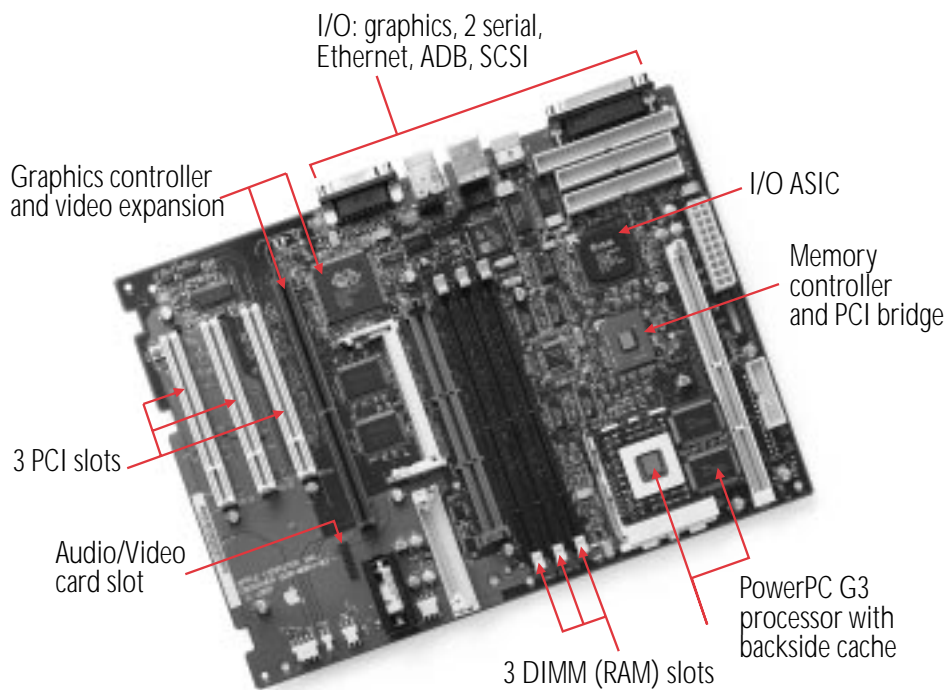
**Enclosure.** The board's efficient use of space is also the key to our ability to use the same logic board in two very different physical enclosures. The Power Macintosh G3 series is currently available in a sleek, low-lying desktop model and a convenient, space-saving minitower. Both enclosures reflect Apple's tradition of user-centered design—offering exceptionally easy access to the board for expansion and servicing.

**System software.** These systems run Apple's latest and already outstandingly successful system software: Mac OS 8. Providing significant enhancements in the areas of user interface (including true multitasking and virtual memory capabilities) and Internet access and publishing (including integrated support for Java, and software tools that let users easily publish information on the Internet or a local intranet), Mac OS 8 has quickly gained a reputation for providing the industry's best overall user experience.

<http://www.apple.com>

In addition, the logic board design of the Power Macintosh G3 systems exhibits the following characteristics in these vital areas:

**Processor.** These computers use the innovative, next-generation PowerPC G3 processor, which was designed specifically to provide increased power at affordable cost. It does so through three major innovations: a state-of-the-art 0.25-micron manufacturing process, optimization for the Mac OS, and a new, more efficient approach to level 2 cache known as backside cache. Backside cache boosts performance far above the performance of earlier systems—even those with higher clock speeds—by positioning the cache directly on the processor module and making it directly accessible through a faster, dedicated bus. This bus can run at varying speeds in proportion to the processor speed. So, for example, the Power Macintosh G3 system based on a 266-megahertz PowerPC G3 processor features a 133-megahertz dedicated backside bus—more than twice the speed of the system bus.



**Memory.** The memory controller and PCI bridge support the Power Macintosh G3 systems' three memory slots and three PCI expansion slots. These systems make use of a faster, industry-standard memory, SDRAM, which adds to both their economy and their availability.

**Graphics controller.** The Power Macintosh G3 series systems incorporate an ATI RAGE II + graphics controller, which not only provides outstanding performance, but also enables far greater expandability (2MB to 6MB) than was previously available, so users can choose the level of graphics performance that meets their needs.

**I/O ASIC.** This component provides support for the input and output of all standard Macintosh

graphics functionality and Apple Desktop Bus (ADB), serial, and SCSI connections. It also efficiently incorporates 10BASE-T Ethernet, to meet users' growing demands for easy and immediate access to high-performance networking capabilities.

### The "why"

The motivation behind this innovative product design is the same simple idea that drives all of Apple's efforts: bringing truly outstanding computing performance to our users more and more easily and economically. So when you're looking for the computer that's just right for you, don't just look at the numbers (things such as processor speed and hard disk capacity). Because today, it's more important than ever to consider *overall* product design.

Apple Computer, Inc. 1 Infinite Loop Cupertino, CA 95014 (408) 996-1010 [www.apple.com](http://www.apple.com)

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November 1997. Product specifications are subject to change without notice. Printed in the U.S.A.

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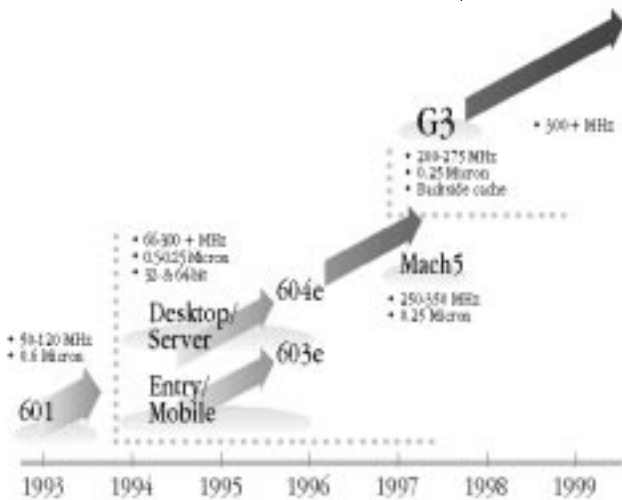


# The PowerPC G3 Processor: Taking the Macintosh to the Next Level

## A little background

Nearly six years ago, Apple, IBM, and Motorola joined forces to create a new processor technology that would bring the performance advantages of the RISC (Reduced Instruction Set Computing) architecture—at that time limited to costly workstations—to personal computers. The result of this initiative was the development of PowerPC processor technology, which Apple debuted in 1994 with the introduction of the Power Macintosh line.

The initial Power Macintosh models were based on the first implementation of the new chip technology: the PowerPC 601, which was intended for use in high-end personal computers. In early 1995, Apple introduced products based on the PowerPC processor technology's second generation—the PowerPC 603, which utilized a chip design optimized for use in low-end to midrange desktop systems and portables. This was quickly followed by the introduction of the second-generation high-end PowerPC processor: the PowerPC 604. Since then, both IBM and Motorola have made enhancements to the PowerPC 603 and 604 (now the 603e and 604e), and these enhanced chips have been used in subsequent Apple systems.



PowerPC Processor Roadmap

A roadmap for the development of PowerPC processor technology, from its inception to the end of the century.

## The PowerPC G3 performance story

The emergence of the PowerPC G3 processor marks the third phase in the development of this advanced processor technology. Touted by *Microprocessor Report* (February 17, 1997) as “an outstanding combination of high performance and low cost,” the PowerPC G3 builds on many of the features pioneered by the PowerPC 603 and 604. However, this innovative chip differs from the earlier implementations of PowerPC processor technology in several significant ways:

- The PowerPC G3 is the first processor specifically optimized for the Mac OS.
- It incorporates an innovative backside cache design that speeds access to level 2 cache.
- It contains large (32K) on-chip level 1 data and instruction caches, for a total of 64K level 1 cache.
- It's produced using an industry-leading 0.25-micron manufacturing process.

## PowerPC G3 optimization features include the following:

- Addition of a second integer ALU (arithmetic and logic unit), which allows the processor to execute two successive integer operations in parallel
- The ability to fetch four instructions per cycle from the cache
- A “hardware tablewalk” feature, which allows the CPU to access virtual page tables directly
- Adoption of a dynamic prediction method for improving the efficiency of branch handling

These four innovations share one very important characteristic: the capacity to provide significant performance gains. Following is a more detailed breakdown of the advantages offered by each.

**Mac OS optimization.** Because the earlier PowerPC processor models were essentially developed simultaneously with Apple's Power Macintosh line, there was no opportunity to optimize these chips' performance for running Mac OS-based applications. But that was more than half a decade ago. Today, the Power Macintosh line is well established and Mac OS-based software abounds, placing the developers of the PowerPC G3 processor in the unique position of having the luxury to consider—and optimize—chip design in light of actual software performance.

<http://www.apple.com>

### Learning to look beyond megahertz

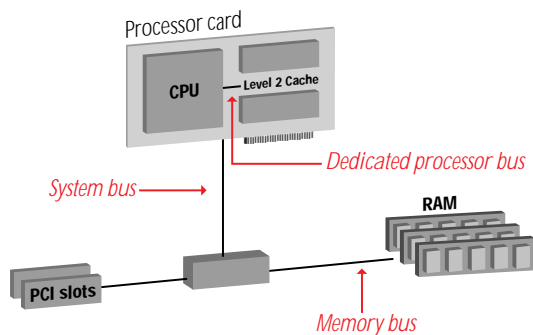
The performance enhancements of the PowerPC G3 processor significantly reduce the usefulness of clock speed in attempting to compare computer performance. Apple systems based on this processor consistently outperform systems with higher clock speeds—in fact, they also outperform Pentium II–based systems. Some examples follow.

- A 250-megahertz Macintosh PowerBook G3 is faster than a 266-megahertz Pentium II desktop.\*
- A 233-megahertz Power Macintosh G3 is faster than the Power Macintosh 6500/300 and the Power Macintosh 8600/300.\*\*
- A 266-megahertz Power Macintosh G3 provides performance that is on average 30 percent faster than that of a comparable 266-megahertz Pentium II system.\*

All of which means that when you're looking for the computer that's right for you, it's more important than ever to consider overall product design—megahertz alone does not tell the whole story.

\* Based on Apple internal tests running 15 separate Adobe Photoshop filters.

\*\* Based on Apple internal testing using MacBench 4.0 processor performance scores. Actual performance on applications may vary. MacBench is a subsystem-level benchmark that measures the relative performance of Mac OS–based systems.



### Backside Cache

*The backside cache design allows the CPU to access the cache directly at speeds that vary proportionally to the CPU speed*

**Level 2 backside cache.** By far the biggest boost to performance that the PowerPC G3 offers can be credited to its incorporation of an approach to level 2 cache memory known as backside cache. This approach effectively bypasses limitations on the speed at which transactions between the processor and the level 2 cache can occur. Earlier PowerPC processors used the system bus to access both the level 2 cache memory and the main memory, which could result in conflicts. For example, under the previous approach, at processor clock speeds above 200 megahertz, the CPU would often stall as it waited for data to arrive from the level 2 cache. To prevent such slowdowns, the PowerPC G3 processor features a new dedicated bus that handles only the CPU/cache transactions. This bus can operate at higher speeds than the system bus—speeds that relate incrementally to the clock speed of the processor. This enables the more effective use of level 2 cache, because even the relatively large amounts of data it can store can be accessed by the processor rapidly and efficiently. In fact, as clock speeds increase, so does the performance value offered by the backside cache design.

**Large level 1 (on-chip) data and instruction caches.** In comparison with the 8K on-chip caches incorporated into the design of the original PowerPC 603, the PowerPC G3 processor includes 32K of instruction cache and 32K of data cache, for a total of 64K level 1 cache. These relatively large on-chip caches support—and add to—the overall performance gains offered by the PowerPC G3 processor.

**New manufacturing process.** Finally, the industry-leading 0.25-micron process used to produce the PowerPC G3 processors does more than merely boost performance; it also enables the creation of smaller, cooler processors with extremely low power requirements. In essence, it represents a brand-new approach to chip design, one that brings workstation-class performance not only to desktop systems, but even to notebook computers—using the same processor.

### Benefits to the user

As the PowerPC G3 processor becomes central to Apple system designs, increasing numbers of Macintosh users will enjoy these benefits:

- Significant performance gains, which enhance the power available to handle such resource-intensive tasks as video editing, Internet authoring, and Windows emulation through software alone, rather than requiring more costly and complex hardware add-ons
- Even more affordable higher performance—in particular, providing a radical improvement in the value proposition offered by our entry-level and midrange systems
- The ability to purchase a notebook system that can *truly* offer the performance of a desktop computer

### The “why”

The rationale for Apple's introduction of the PowerPC G3 processor is strikingly simple. It's the same concept that led us to embark on the PowerPC effort initially: At Apple, we are committed to developing and supporting processor technology that can offer our entire range of users truly outstanding performance—so they can spend less time dealing with the mechanics of computing and more time exploring their creative potential.

Apple Computer, Inc. 1 Infinite Loop Cupertino, CA 95014 (408) 996-1010 [www.apple.com](http://www.apple.com)

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November 1997. Product specifications are subject to change without notice. Printed in the U.S.A.

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## Specifications

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Power Macintosh G3 Minitower





## Processor

### **CPU**

PowerPC G3 RISC microprocessor running at 233 MHz or  
266 MHz

Built-in FPU

Requires system software version 8.0 or later with appropriate  
Enabler version

### **Processor Bus**

64-bit wide, 66 MHz, supporting split address and data tenures





## Memory

### **SDRAM**

32 MB standard, expandable to 384 MB

Uses 168-pin, 64-bit, 70 ns or faster, 3.3 V, unbuffered synchronous dynamic access memory (SDRAM) DIMMs (1K, 2K, or 4K refresh rate)

### **Cache**

Supports 512K cache module, 3.3 V with SRAM and 178-pin card

### **ROM**

4 MB ROM on 160-pin DIMM, 64-bit ROM data bus width

### **Video RAM**

2 MB expandable to 4 MB or 6 MB using 32-bit wide, 144-pin, 3.3 V, fast-paged SGRAM SO-DIMM connector with 70 ns RAM access time or faster







## I/O Interfaces

### **SCSI Port**

External SCSI connector is 25-pin D-type connector; supports up to seven SCSI devices

### **Serial Port**

Two serial ports support AppleTalk and GeoPort serial protocols; accept 8-pin or 9-pin plugs

### **ADB Port**

One Apple Desktop Bus port for a keyboard, mouse, etc.

### **Ethernet Port**

10Base-T, RJ-45



**Expansion**

Three PCI expansion slots, compatible with all PCI 2.0 specification-compliant cards with the addition of Mac OS-specific software driver (not NuBus compatible); accepts three PCI cards (6.88" or 12.283"), or three 15 W cards, or two 25 W cards

Three SCSI expansion bays for 3.5" devices; one bay may be occupied by optional Zip drive. 50-pin connectors for internal SCSI devices





## I/O Devices

### **Keyboard**

AppleDesign Keyboard

### **Mouse**

ADB Mouse II

### **Microphone**

Apple PlainTalk microphone standard





## Disk Storage

**Hard Drive**

4 GB or 6 GB internal ATA hard drive

**Floppy Drive**

One Apple SuperDrive 1.4 MB floppy drive

**CD-ROM Drive**

One internal 24x ATAPI CD-ROM drive

**Zip Drive**

Optional 100 MB SCSI Iomega Zip drive





## Video

### **Video Display Modes**

Built-in monitor port supports:

- 640 x 480, 800 x 600, 832 x 624 at 32 bits per pixel
- 1024 x 768, 1152 x 870, 1280 x 1024, 1600 x 1200 at 16 bits per pixel

### **Graphics Acceleration**

Built-in graphics controller, 2D and 3D hardware graphics acceleration of 2D QuickDraw graphics





## I/O Cards

### PERCH Slot

182-pin microchannel connector (PERCH slot connector) that supports Apple Audio I/O or AV I/O cards; **Note:** PERCH slot does **not** accept PCI cards

### Audio/Video

#### Sound

Optional front jack for headphones  
Rear jack for stereophonic speakers  
One built-in speaker  
Supports 16 bits/channel stereo input and output  
External 1/8" jack for sound in  
Sample rates of 11.025, or 22.050, or 44.100 kHz





**Video**

Video input and output through RCA or S-Video connectors  
Accepts NTSC, PAL, or SECAM format  
YUV format for digital video input  
Video display in 320 x 240 pixel window  
Pixel expansion for 640 x 480 pixel maximum display  
Video overlay capability  
Bi-directional digital audio video (DAV) 60-pin connector for adding video processor on PCI card

**Modem Slot**

112-pin connector to accept optional fax/modem card  
**Note:** Does **not** carry PCI signals





## Electrical

<b>Line Voltage</b>	100–130 V or 200–240 V depending on voltage switch setting
<b>Frequency</b>	50—60 Hz
<b>Maximum Power</b>	161 W, 1.5 A







# Physical

## Dimensions

<b>Height:</b>	385 mm; 15.15 in
<b>Width:</b>	245 mm; 9.64 in
<b>Depth:</b>	435 mm; 17.75 in
<b>Weight:</b>	15 kg; 33.1 lbs





## Environmental

**Operating  
Temperature**

50 to 104° F (10 to 40° C)

**Storage  
Temperature**

-40 to 116° F (-40 to 47° C)

**Relative Humidity**

5-95% noncondensing

**Maximum Altitude**

10,000 ft. (3,048 m)





# Power Macintosh G3 Series

## Features

### Next-generation PowerPC processor technology

- Introduces the first processor specifically optimized for the Mac OS—the PowerPC G3, running at 233 or 266 MHz
- Uses a leading-edge, 0.25-micron process, for a smaller, lower-power chip design
- Features an innovative backside cache architecture to increase performance

### Innovative system architecture

- Debuts a new, more efficient logic board design
- Increases the system bus speed to maximize processor performance gains

### High-quality communications and multimedia support

- Makes communications fast and easy through built-in Ethernet networking
- Offers 16-bit stereo audio input/output, professional-quality video input/output\*, and a digital audio/video connector\*
- Includes a 24x-speed (maximum) CD-ROM drive
- Is available with a Zip drive for easy file transfer and backup\*

### Outstanding flexibility

- Provides three standard 12-inch PCI slots for easy expansion of system functionality
- Includes expansion bays for additional storage devices (varies by configuration)
- Speeds system expansion and servicing through an exceptionally easy-to-access design

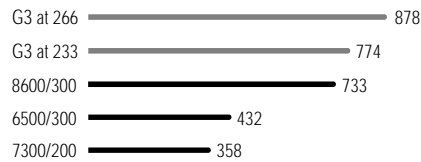
### Mac OS 8 system software

- Enhances productivity through multitasking and rapid system response
- Provides innovative user-interface features that speed and simplify file and folder manipulation
- Makes Internet access and publishing as easy and enjoyable as using a Macintosh
- Scales easily to accommodate users from novice to expert

The Power Macintosh G3 series features exciting Apple innovations in processor technology and system architecture that significantly increase both performance and flexibility, to enhance your productivity and encourage your creativity. Like the processors that power them, these systems are designed to turn your ideal vision of powerful computing into affordable reality.

### Power Macintosh Performance Comparisons

Based on MacBench Processor Scores\*\*



Built upon the PowerPC G3—the next-generation of PowerPC technology, and the first processor optimized for the Mac OS—these computers dramatically alter the price/performance equation. And by incorporating a new approach to cache memory, the Power Macintosh G3 models can provide nearly twice the performance of systems based on the PowerPC 603e processor—an improvement that far exceeds the increases in

clock speed alone. In addition, these computers feature a new logic board design with a faster system bus, to maximize their power—and yours.

Power Macintosh G3 systems include the latest in communications and multimedia features: high-quality audio and video input/output\*, a 24x-speed (maximum) CD-ROM drive, Ethernet networking, and a communications slot for adding a modem. So it's easy to work collaboratively with colleagues, whether they're just across the hall or clear across the country. Finally, to complement their hardware innovations, these advanced computers run Mac OS 8—the latest system software from Apple—which combines an appealing new look with even more exciting new capabilities.

Factor in these systems' three PCI expansion slots for further enhancing functionality, and you'll reach only one conclusion: The Power Macintosh G3 series offers an outstanding value—now and in the future.

*\*See chart on reverse for details about currently available configurations.*

*\*\*Based on Apple internal testing using MacBench 4.0 processor performance scores. Actual performance on applications will vary. MacBench is a subsystem-level benchmark that measures the relative performance of Mac OS-based systems.*





# Power Macintosh G3 Series

## Technical Specifications

(For detailed information about currently available configurations, see the chart below)

### Processor and memory

- 233- or 266-MHz PowerPC G3 processor
- 512K level 2 backside cache on processor module
- 117- or 133-MHz dedicated 64-bit backside bus
- Integrated floating-point unit and 32K level 1 on-chip data and instruction caches
- 66-MHz system bus
- 32MB of RAM; 3 DIMM slots support up to 192MB or 384MB
- 4MB of ROM
- 64-bit memory bus

### Storage

- Internal 4GB or 6GB IDE hard disk drive
- Internal high-capacity floppy disk drive  
—Accepts high-density 1.44MB disks and 800K disks  
—Reads, writes, and formats Mac OS, Windows, MS-DOS, OS/2, and ProDOS disks
- Internal 24x-speed (maximum) ATAPI CD-ROM drive
- Internal 100MB Zip drive for fast, easy storage or backup (some configurations)
- Expansion bays available for additional storage devices:  
—Desktop models: One or two 3.5-in. SCSI bays (varies by configuration)  
—Minitower model: One 5.25-in. SCSI bay

### Interfaces

- Three 12-inch PCI expansion slots compatible with PCI 2.1-compliant cards
- Two high-speed DMA serial (RS-232/RS-422) ports compatible with LocalTalk and GeoPort cables
- Built-in 10BASE-T Ethernet connector
- Internal SCSI bus (up to 5MB/second)
- External SCSI bus (up to 5MB/second)
- Apple Desktop Bus (ADB) expansion port
- DB-15 connector for monitor
- Communications slot for modem card
- Mini jacks for 16-bit stereo audio input/output; up to 44.1-kHz sampling rate
- Composite and S-video connectors for video input/output (minitower configuration)

### Graphics support

- 2MB of SGRAM video memory; supports up to 6MB
- ATI 3D RAGE II+ 64-bit graphics and multimedia accelerator chip
- Supports thousands of colors at up to 1,024- by 768-pixel resolution (24-bit); supports millions of colors at up to 832- by 624-pixel resolution (32-bit)
- Refresh rate of up to 85 Hz

### Video capabilities (minitower configuration)

- 24-bit video input  
—Support for NTSC, PAL, and SECAM
- Up to 320- by 240-pixel capture at 30 frames per second
- Maximum capture size of 640 by 480 pixels
- 24-bit video output  
—Support for NTSC and PAL
- High sample rate on output signal eliminates need for external and analog filtering
- Digital audio/input (DAV) connector

### Electrical requirements and agency approvals

- Line voltage: 100 to 125/200 to 240 V AC, RMS single phase, automatically configured
- Frequency: 50 to 60 Hz, single phase
- Power: 230 W maximum for desktop, 240 W maximum for minitower; not including display
- EPA Energy Star and Blue Angel compliant (desktop models only)

### ADB power requirements

- Maximum current draw for all devices: 500 mA (maximum of three ADB devices recommended)
- Mouse draws 10 mA
- Keyboard draws 25 to 80 mA

### Environmental requirements

- Operating temperature: 50° to 104° F (10° to 40° C)
- Storage temperature: -40° to 116° F (-40° to 47° C)
- Relative humidity: 5% to 95% noncondensing
- Maximum altitude: 10,000 ft. (3,048 m)

### Size and weight

#### Desktop models:

- Height: 6.2 in. (15.6 cm)
- Width: 14.4 in. (36.5 cm)
- Depth: 16.9 in. (43.0 cm)
- Weight: 22.7 lb. (10.2 kg)—will vary based on configuration

#### Minitower model:

- Height: 15.2 in. (38.6 cm)
- Width: 9.6 in. (24.3 cm)
- Depth: 17.8 in. (45.2 cm)
- Weight: 33.1 lb. (15.0 kg)

## Available Configurations

### Power Macintosh G3 desktop computer



Order no.	M6141LL/A	M6202LL/A
<b>Processor speed</b>	233 MHz	266 MHz
<b>Memory</b>	32MB; supports up to 192MB	32MB; supports up to 192MB
<b>System bus speed</b>	66 MHz	66 MHz
<b>Backside bus speed</b>	117 MHz	133 MHz
<b>Hard disk drive</b>	4GB	4GB
<b>CD-ROM drive</b>	24x-speed (maximum)	24x-speed (maximum)
<b>Zip drive</b>	—	100MB
<b>Video capabilities</b>	—	—
<b>Agency approvals</b>	EPA Energy Star; Blue Angel	EPA Energy Star; Blue Angel

### Power Macintosh G3 minitower computer



Order no.	M6142LL/A
<b>Processor speed</b>	266 MHz
<b>Memory</b>	32MB; supports up to 384MB
<b>System bus speed</b>	66 MHz
<b>Backside bus speed</b>	133 MHz
<b>Hard disk drive</b>	6GB
<b>CD-ROM drive</b>	24x-speed (maximum)
<b>Zip drive</b>	100MB
<b>Video capabilities</b>	✓
<b>Agency approvals</b>	—

All models also include internal 1.44MB floppy disk drive; keyboard and mouse; Mac OS 8 (which includes Internet access software); complete setup, learning, and reference documentation; and limited warranty. Product specifications are subject to change. For the most current information about product specifications and configurations, visit the Apple web site at [www.apple.com](http://www.apple.com) or check with your Apple reseller.

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October 1997. Product specifications are subject to change without notice. Printed in the U.S.A.  
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Take Apart

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Power Macintosh G3 Minitower





## Side Access Panel

No preliminary steps are required before you begin this procedure.





- 1 Press the release button and pull the side access panel away from the computer.

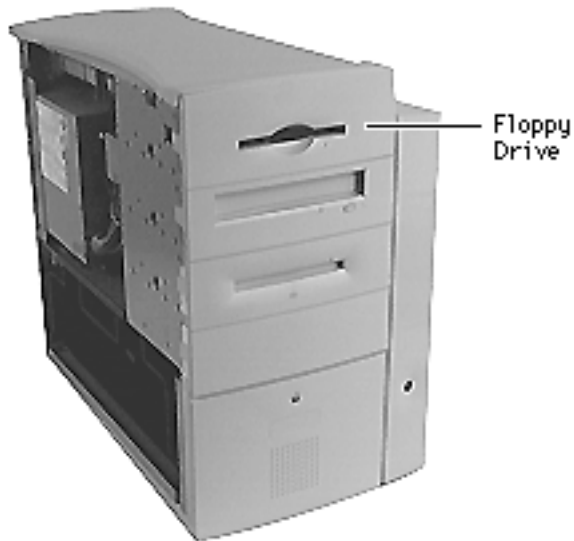




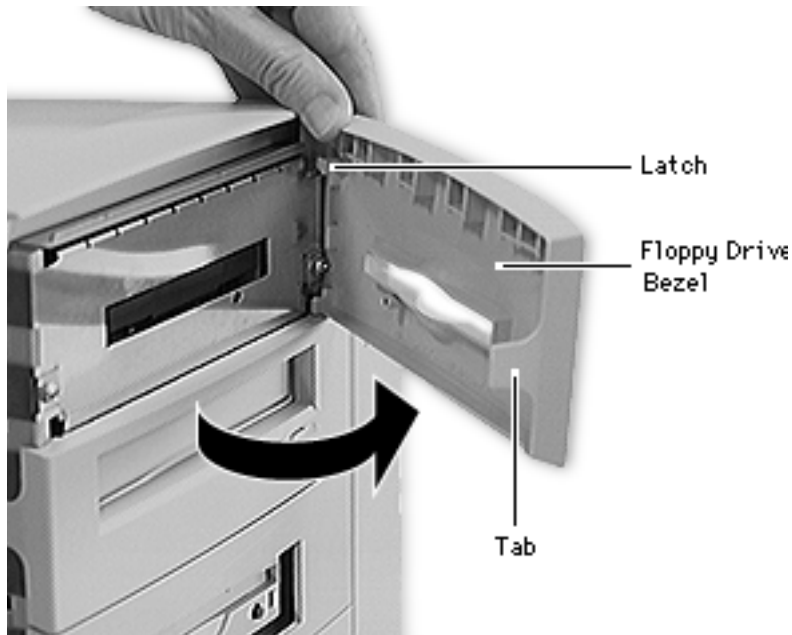
## Floppy Drive

**Note:** This topic includes instructions for removing the floppy drive bezel, floppy drive shield, drive carrier, and floppy drive.

Before you begin, remove the side access panel.





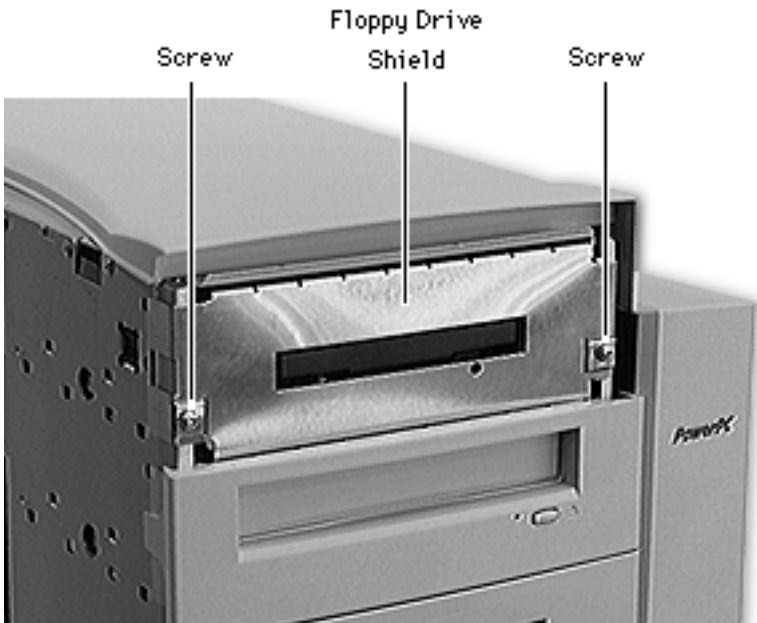


- 1 Gently pry up the tab on the left side of the floppy drive bezel, swing the bezel open, and remove the bezel from the right edge of the floppy drive.

**Replacement Note:**

Place the two latches on the right side of the bezel into the two slots in the right side of the bezel shield before connecting the bezel to the left edge of the drive.





- 2 Using a Phillips screwdriver, remove the two floppy drive shield screws.
- 3 Remove the floppy drive shield.



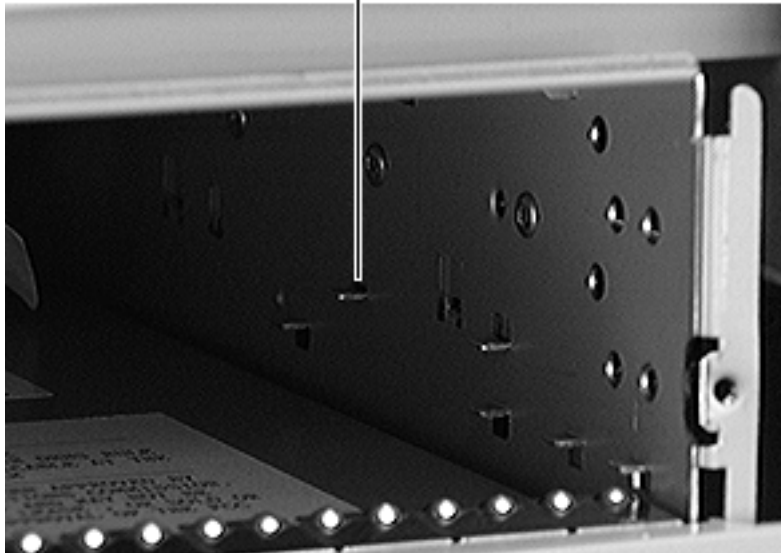


- 4 Disconnect the floppy drive cable from the back of the floppy drive.
- 5 Slide the floppy drive carrier and drive out of the front of the computer.





Drive Carrier  
Tab



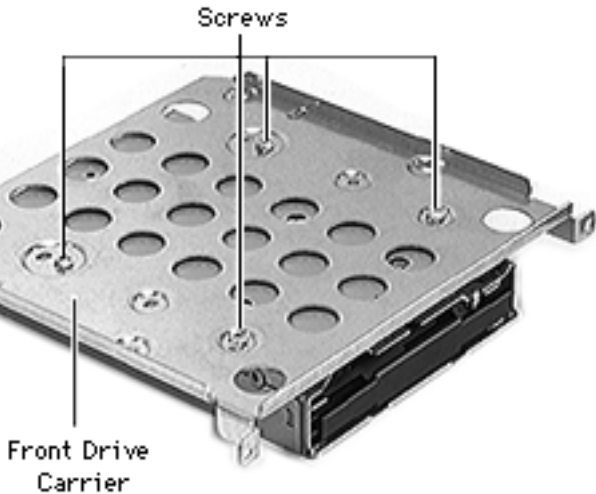
**Replacement Note:** When inserting the drive into the computer, make sure the drive carrier aligns with the carrier guides. The carrier should slide between five metal tabs below and two metal tabs above the left and right edges of the carrier.





**Note:** Perform the following procedure if you are replacing the floppy drive.

- 6 Using a Phillips screwdriver, remove the four carrier mounting screws.
- 7 Lift the drive off the carrier.

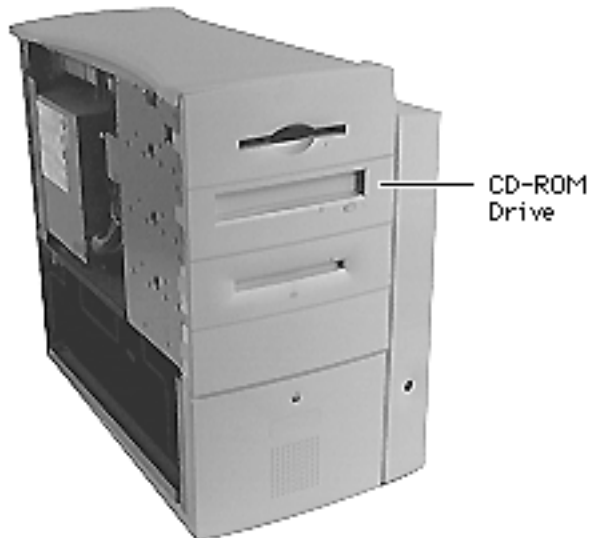


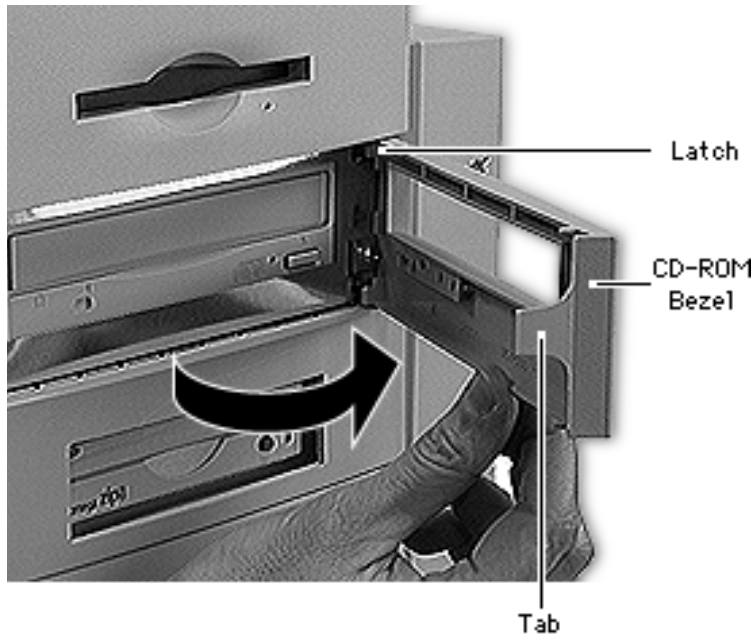


## CD-ROM Drive

**Note:** This topic includes instructions for removing the CD-ROM drive bezel, CD-ROM drive shield, drive carrier, and CD-ROM drive.

Before you begin, remove the side access panel.





- 1 Gently pry up the tab on the left side of the CD-ROM drive bezel, swing the bezel open, and remove the bezel from the right edge of the CD-ROM drive.

**Replacement Note:**

Place the two latches on the right side of the bezel into the two slots in the right side of the bezel shield before connecting the bezel to the left edge of the drive.





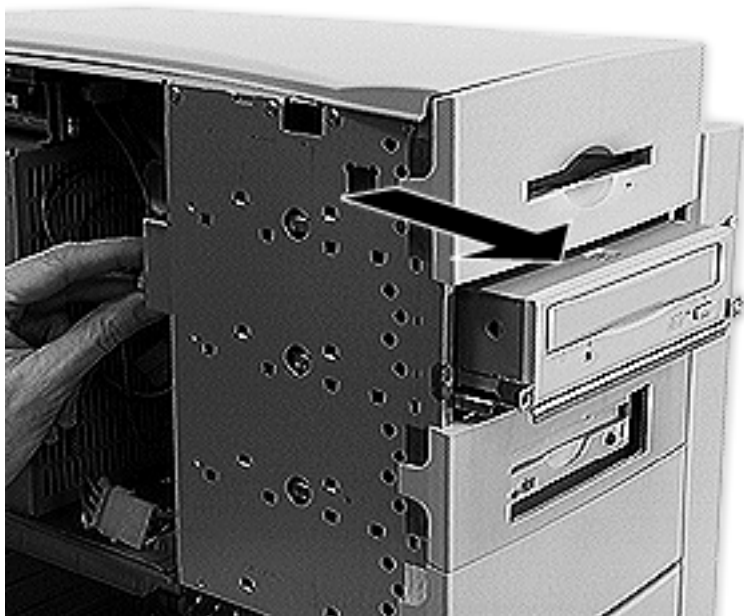
Screw

CD-ROM Drive  
Shield

- 2 Using a Phillips screwdriver, remove the two CD-ROM drive shield screws.
- 3 Remove the CD-ROM drive shield.





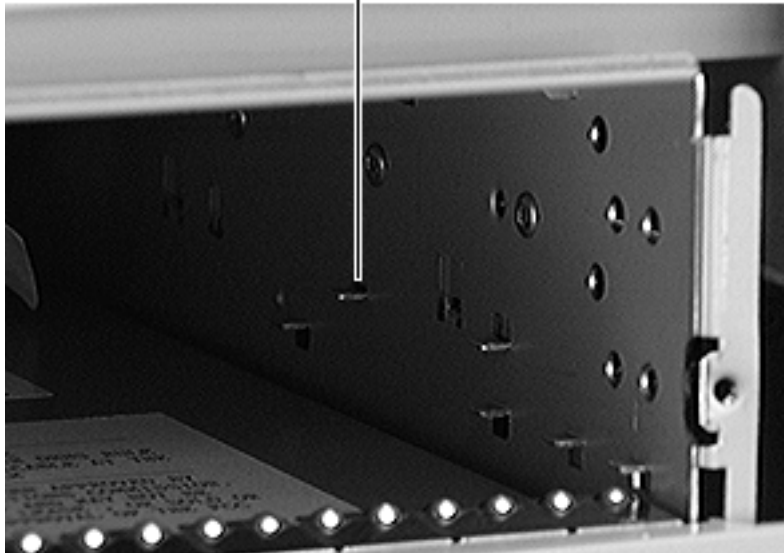


- 4 Disconnect the following cables from the back of the CD-ROM drive:
  - Power cable
  - IDE data cable
  - CD audio cable
- 5 Slide the CD-ROM drive and carrier out of the computer.



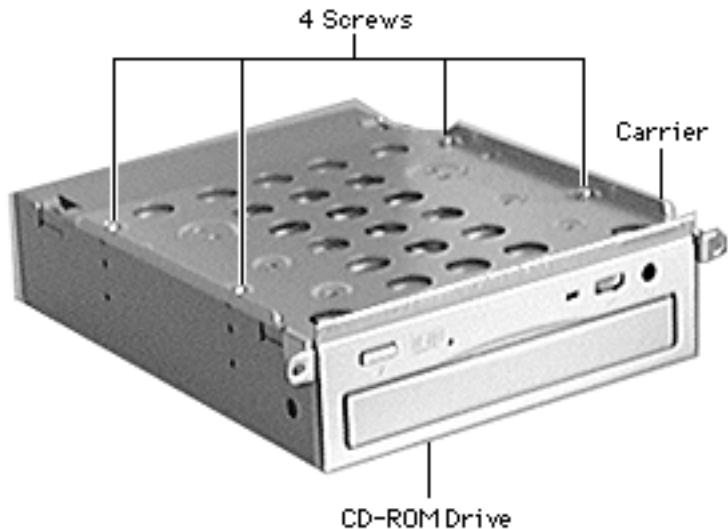


Drive Carrier  
Tab



**Replacement Note:** When inserting the drive into the computer, make sure the drive carrier aligns with the carrier guides. The carrier should slide between five metal tabs below and two metal tabs above the left and right edges of the carrier.





**Note:** Perform the following procedure if you are replacing the CD-ROM drive.

- 6 Using a Phillips screwdriver, remove the four carrier mounting screws.
- 7 Lift the drive off the carrier.



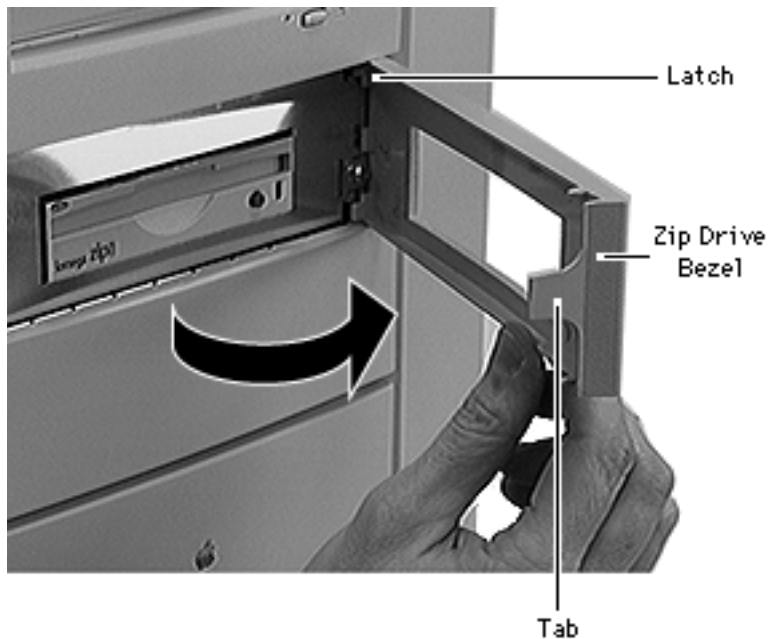


## Zip Drive

**Note:** This topic includes instructions for removing the Zip drive bezel, Zip drive shield, drive carrier, and Zip drive.

Before you begin, remove the side access panel.





- 1 Gently pry up the tab on the left side of the Zip drive bezel, swing the bezel open, and remove the bezel from the right edge of the Zip drive.

**Replacement Note:**

Place the two latches on the right side of the bezel into the two slots in the right side of the bezel shield before connecting the bezel to the left edge of the drive.



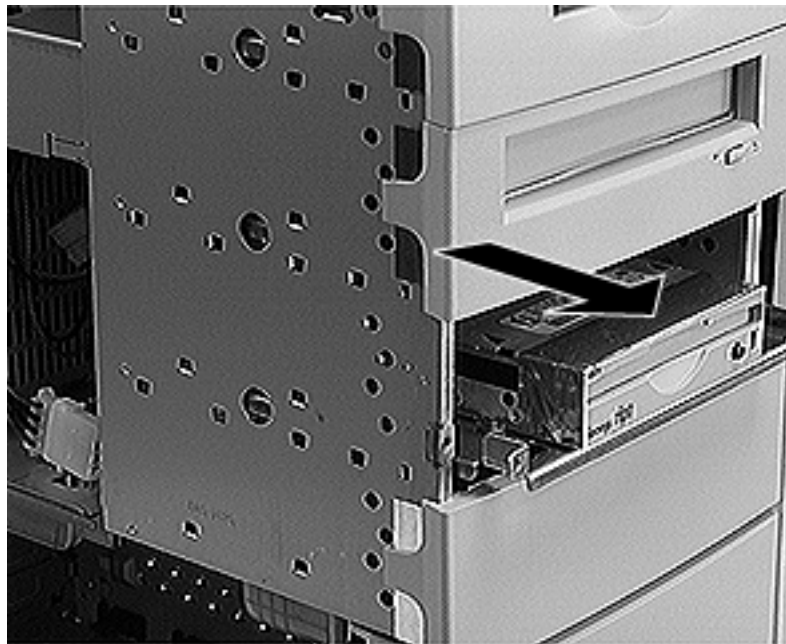


Screw

Zip Drive  
Shield

- 2 Using a Phillips screwdriver, remove the two Zip drive shield screws.
- 3 Remove the Zip drive shield.



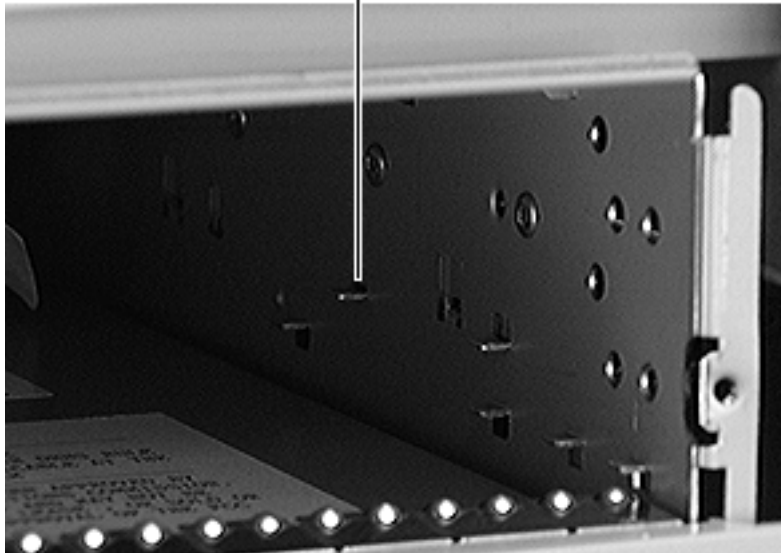


- 4 Disconnect the power cable and SCSI cable from the back of the Zip drive.
- 5 Slide the Zip drive carrier and drive out of the front of the computer.





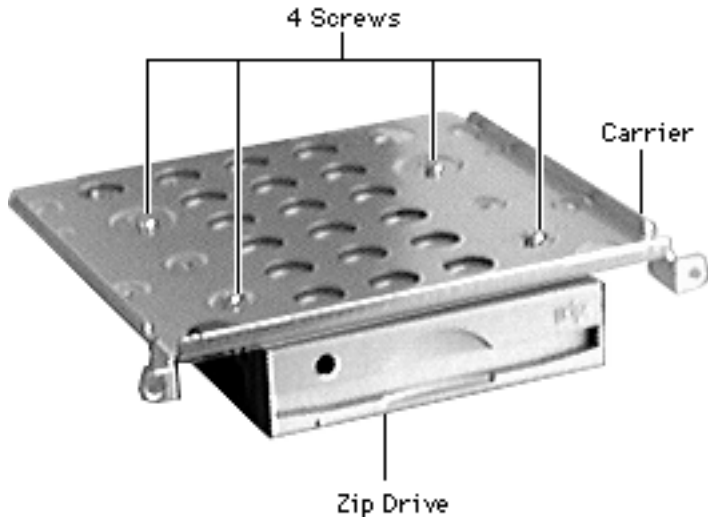
Drive Carrier  
Tab



**Replacement Note:** When inserting the drive into the computer, make sure the drive carrier aligns with the carrier guides. The carrier should slide between five metal tabs below and two metal tabs above the left and right edges of the carrier.







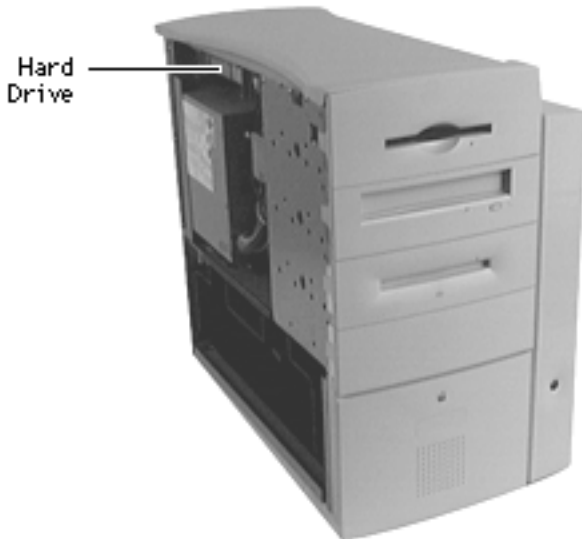
**Note:** Perform the following procedure if you are replacing the Zip drive.

- 6 Using a Phillips screwdriver, remove the four carrier mounting screws.
- 7 Lift the drive off the carrier.





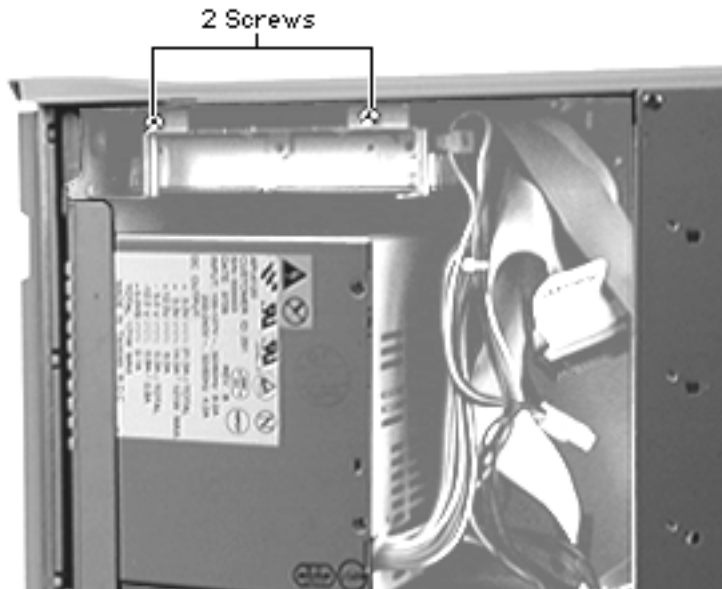
## Hard Drive



**Note:** This topic includes instructions for removing the drive carrier and hard drive.

Before you begin, remove the side access panel.



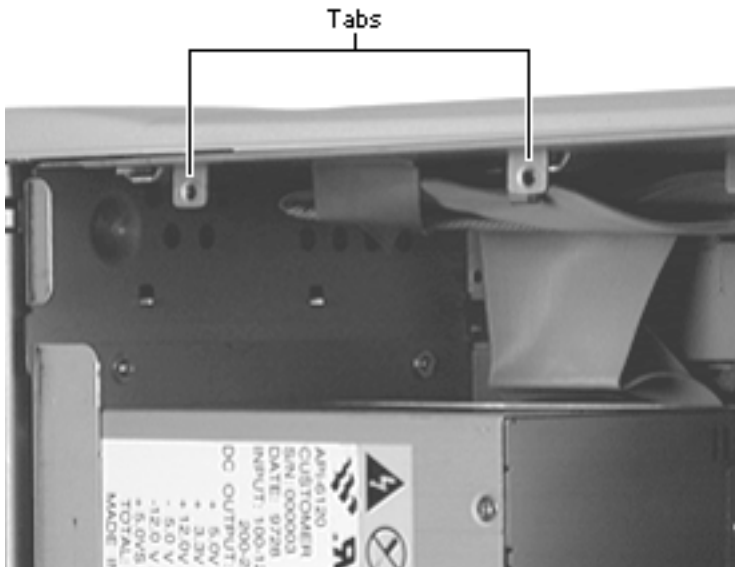


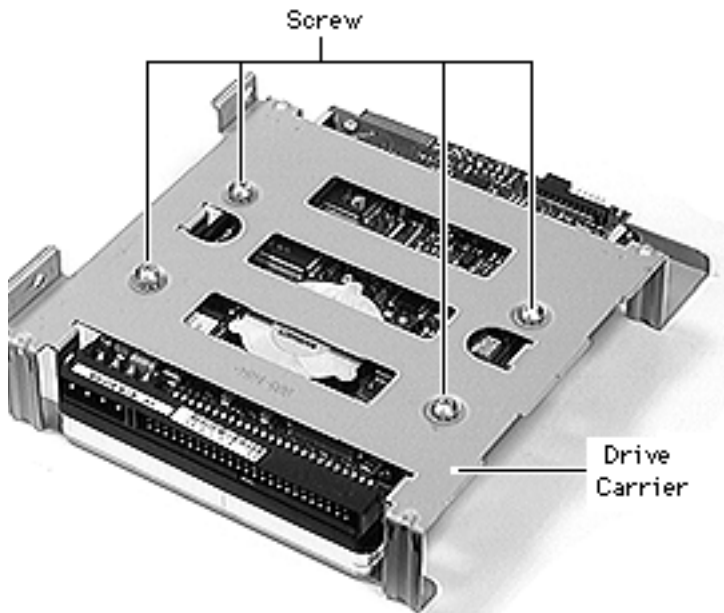
- 1 Using a Phillips screwdriver, remove the two hard drive screws.
- 2 Disconnect the power cable and IDE data cable from the back of the hard drive.
- 3 Slide the hard drive carrier and drive out of the computer.





**Replacement Note:** When inserting the drive into the computer, make sure the drive carrier aligns with the metal tabs in the drive bay.

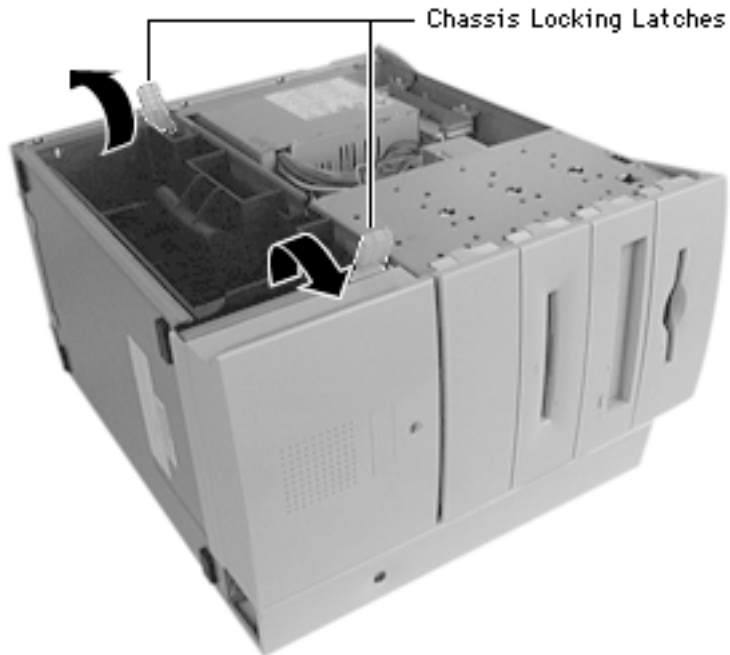




**Note:** Perform the following procedure if you are replacing the hard drive.

- 4 Using a Phillips screwdriver, remove the four carrier mounting screws.
- 5 Slide the drive forward out of the carrier.



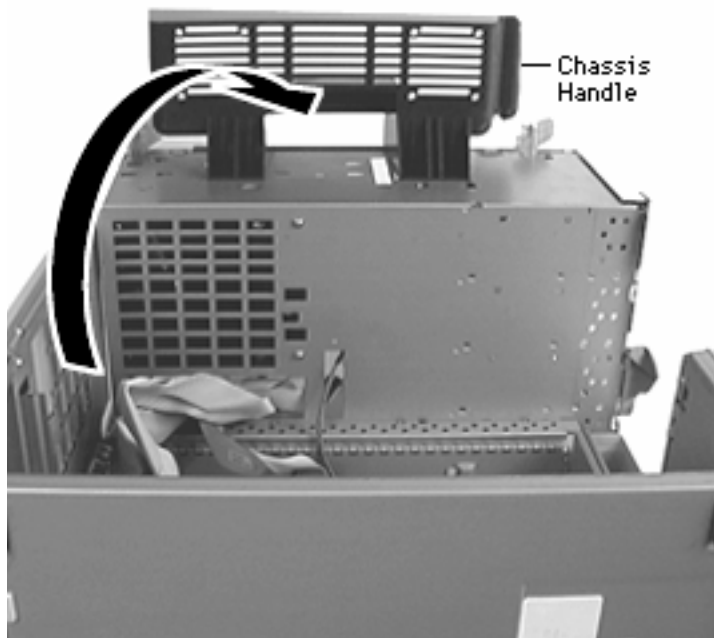


## Open the Chassis

Before you begin, carefully lay the computer on its side with the side access panel facing up.

- 1 Unlock the top chassis by moving the two green locking latches upward and outward.





- 2 Using the handle, gently swing the top chassis up and out until it rests firmly on the work surface.





## Power Supply

Before you begin, remove the following:

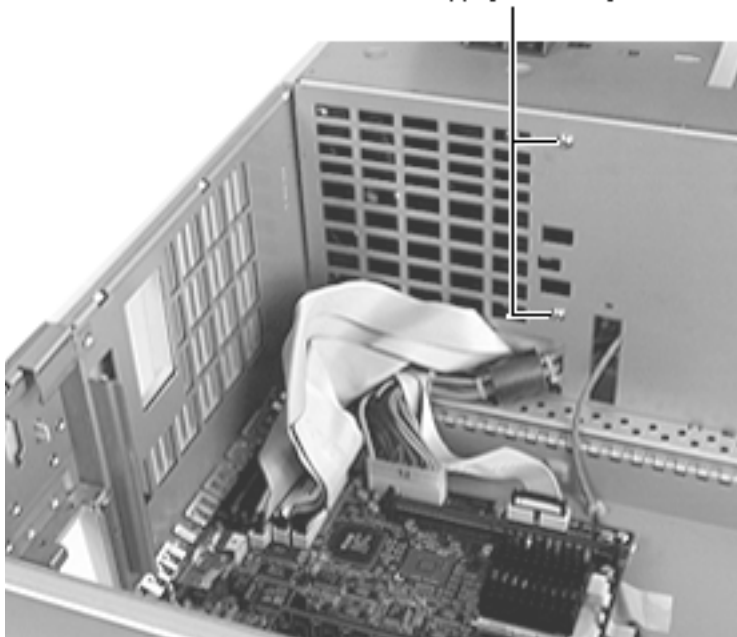
- Side access panel
- Hard drive





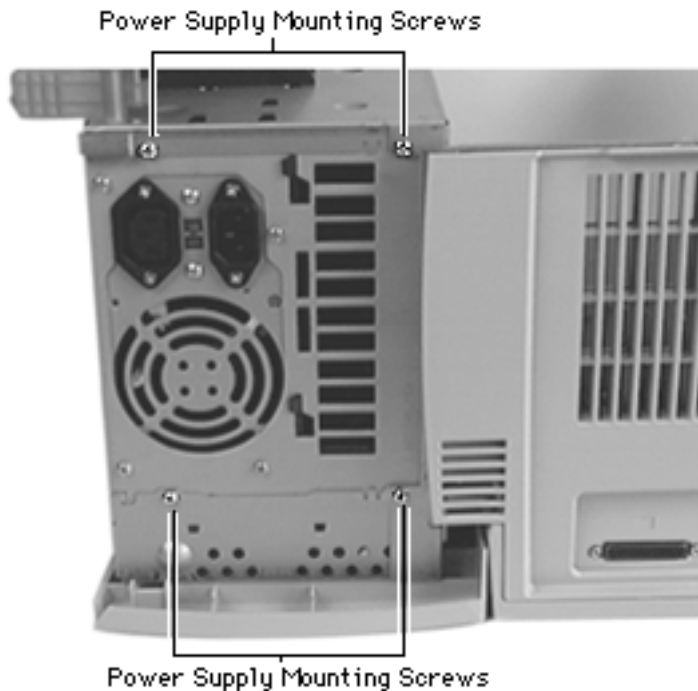


Power Supply Mounting Screws



- 1 Disconnect the power cables from the logic board.
- 2 Release the power cables from the cable tie wrap.
- 3 Using a Phillips screwdriver, remove the two power supply fan mounting screws.



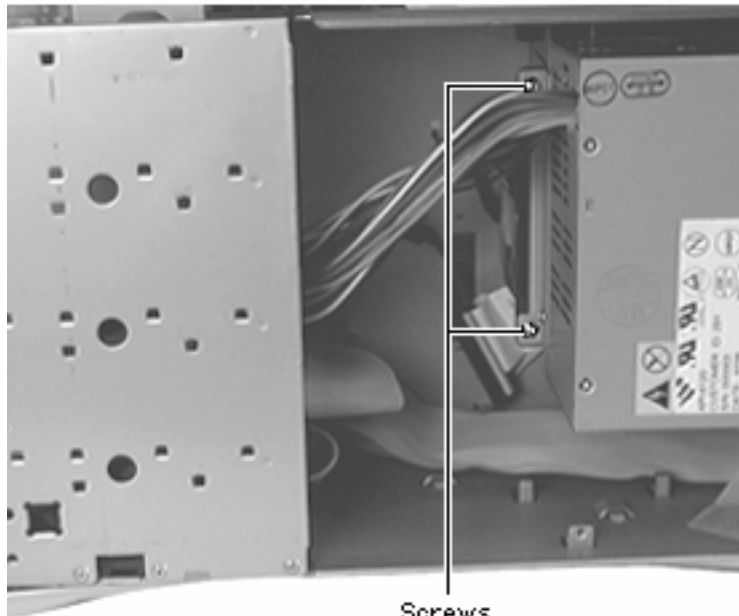


- 4 Using a Phillips screwdriver, remove the four power supply mounting screws.



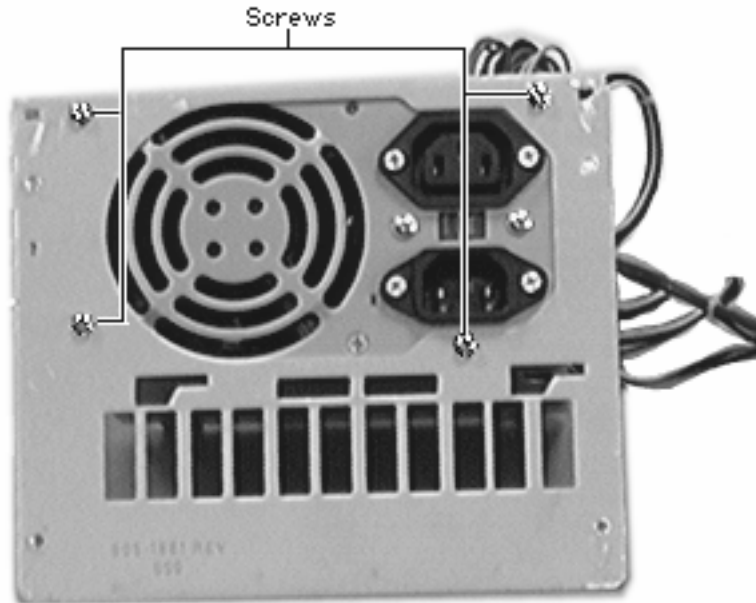


- 5 Remove the interior power supply screws.
- 6 Thread the power cables through the opening in the top chassis and lift the power supply and fan assembly from the computer.



Screws





- 7 Remove the two screws securing the power supply to the mounting bracket.

**Replacement Note:** When replacing the power supply and fan assembly, you must tie up the power supply cables with a tie wrap and secure the tie wrap to the internal chassis. Also, be sure that all cables are pulled through the chassis opening as far as possible to prevent interference with the fan assembly.





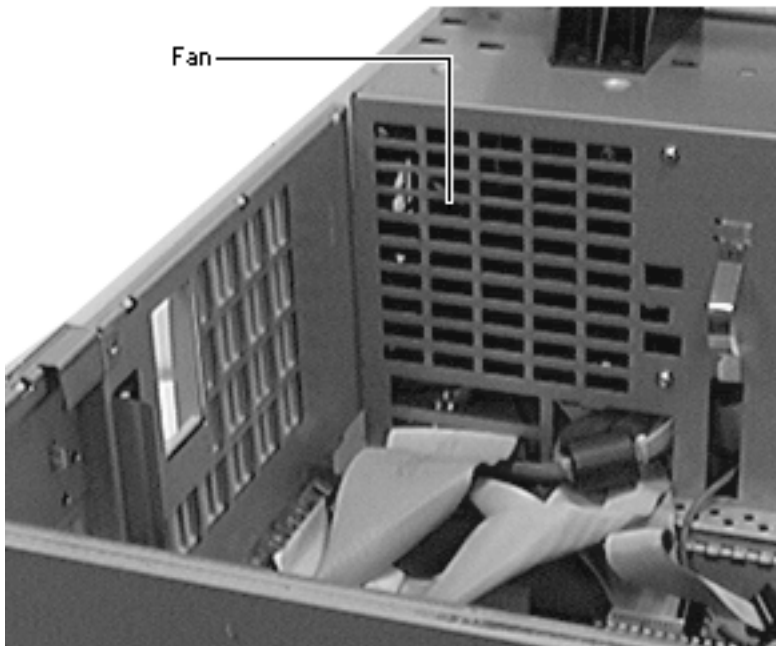
**IMPORTANT:** You must set the power supply voltage switch to the correct setting (115V in the U.S.) to avoid damaging the computer. See “Voltage Switch” in Basics for instructions and an international voltage chart. The switch is accessible through the computer’s rear panel when the power supply is installed.

**IMPORTANT:** There is a power supply jumper on the logic board located next to the PCI slots. If the logic board is installed in the PM G3 Minitower, the power supply jumper must cover the pins marked “PS”. If the logic board is installed in the PM G3 Desktop model, the jumper must cover the pins marked “Mac”. The logic board comes from the factory preset for the Desktop model (i.e. the power supply jumper covers the pins marked “Mac”).





Fan

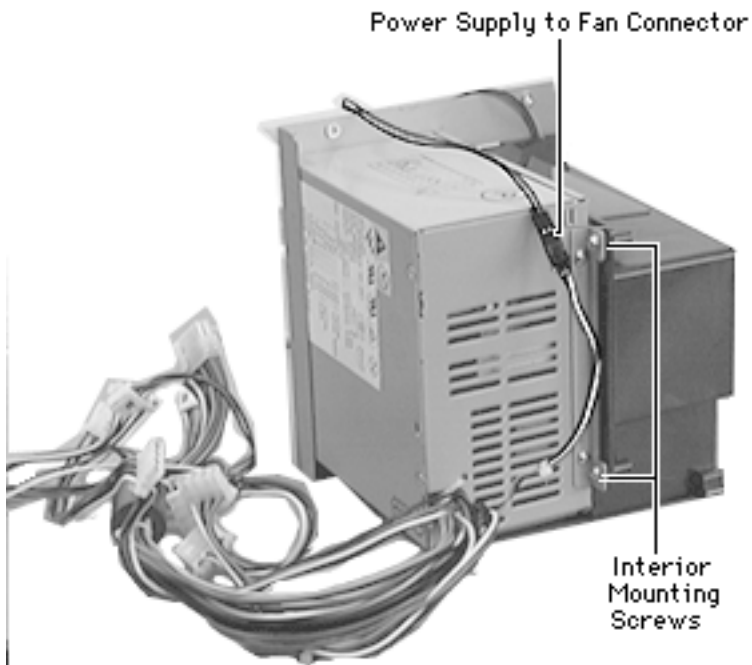


## Fan

Before you begin, remove the following:

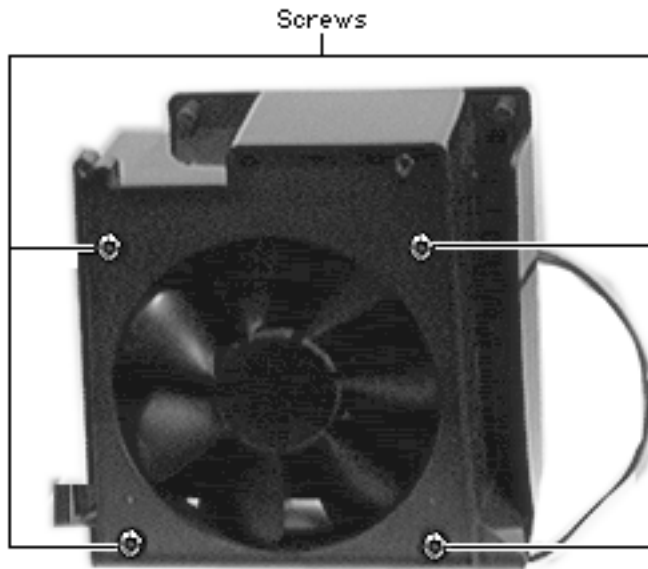
- Side access panel
- Hard drive
- Power supply





- 1 Using a Phillips screwdriver, remove the interior power supply mounting screws and disconnect the power supply-to-fan connector.





**Replacement Note:** Before removing the fan, notice the direction in which the fan is installed. Replace the fan in the same direction (i.e. insert the fan into the housing so that 1) the fan cable is nearest the open end of the housing, and 2) the label on the fan is not visible).

- 2 Remove the four screws securing the fan to the fan housing and lift out the fan.





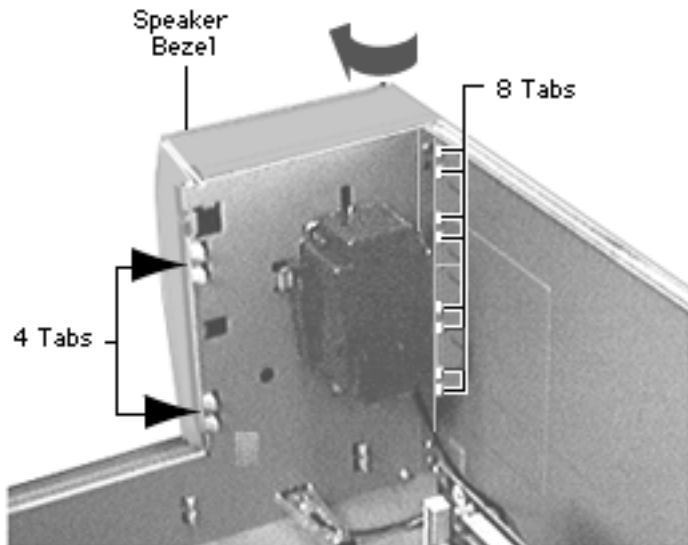


## Speaker Bezel

Before you begin, do the following:

- Remove the side access panel
- Open the chassis





- 1 Gently pry up the four tabs on the top side of the speaker bezel and swing it open.
- 2 Release the eight tabs on the bottom side of the speaker bezel and remove the bezel from the computer.



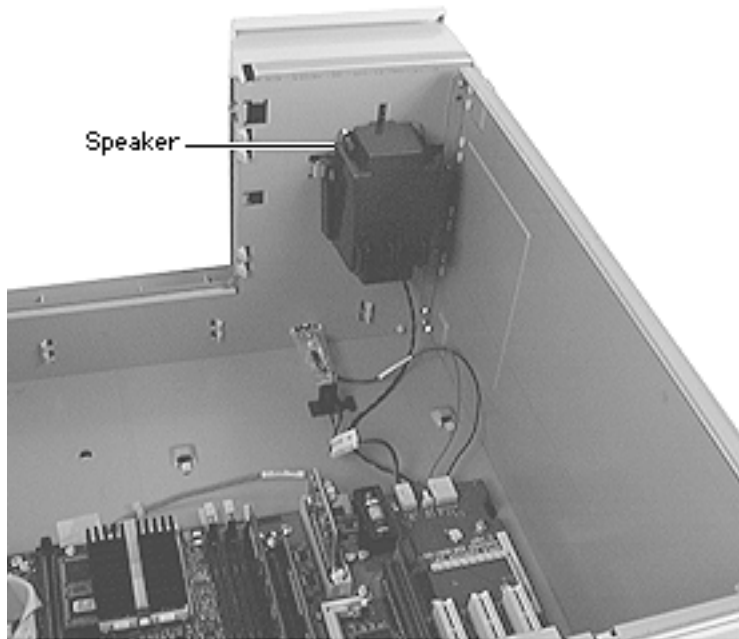


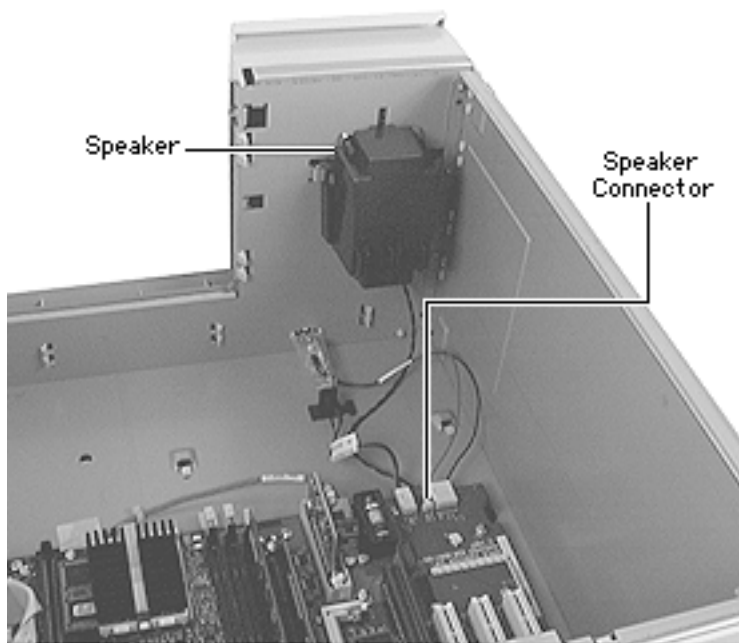
## Speaker

**Note:** This topic includes instructions for removing the speaker housing, speaker, and fan cable.

Before you begin, do the following:

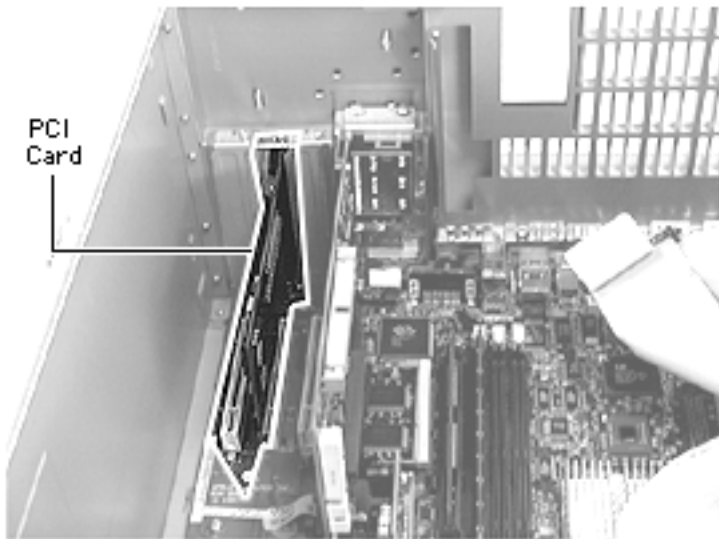
- Remove the side access panel
- Open the chassis





- 1 Carefully lay the computer on its side.
- 2 Disconnect the speaker cable from the logic board.
- 3 Press in the two latches on the sides of the speaker housing and slide the housing straight up out of the computer.



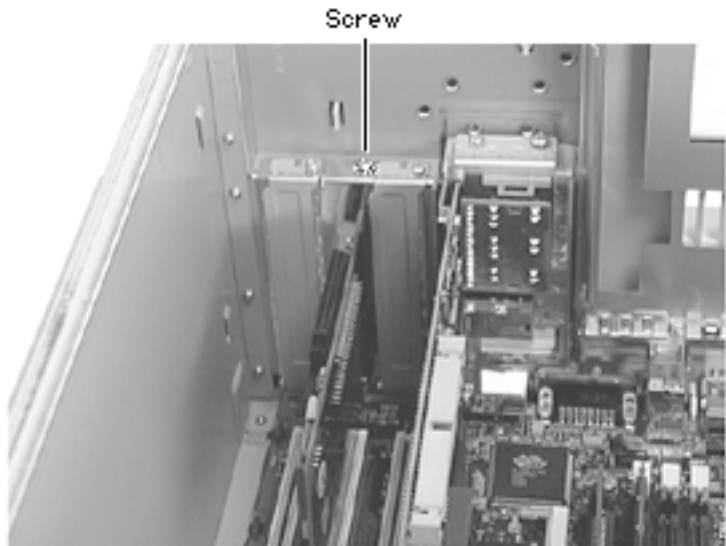


## PCI Cards

Before you begin, do the following:

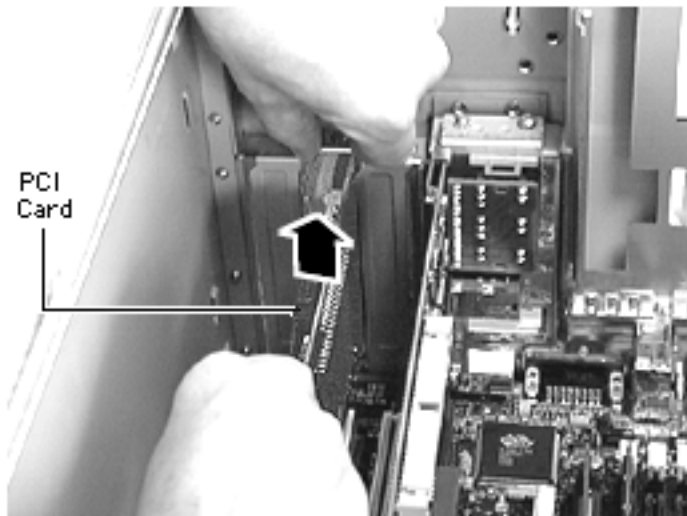
- Remove the side access panel
- Open the chassis





- 1 Using a Phillips screwdriver, remove the screw securing the PCI card to the rear panel.





- 2 Using both hands, gently pull straight out on the card to remove it.

**Replacement Note:** Align the PCI card with the expansion slot and press in firmly until the connector is seated. Do not force the card or you may damage the connector pins. If you feel resistance, remove the card and try installing it again. Once the card is securely inserted into the PCI slot, replace the screw that holds the PCI card frame to the rear panel.

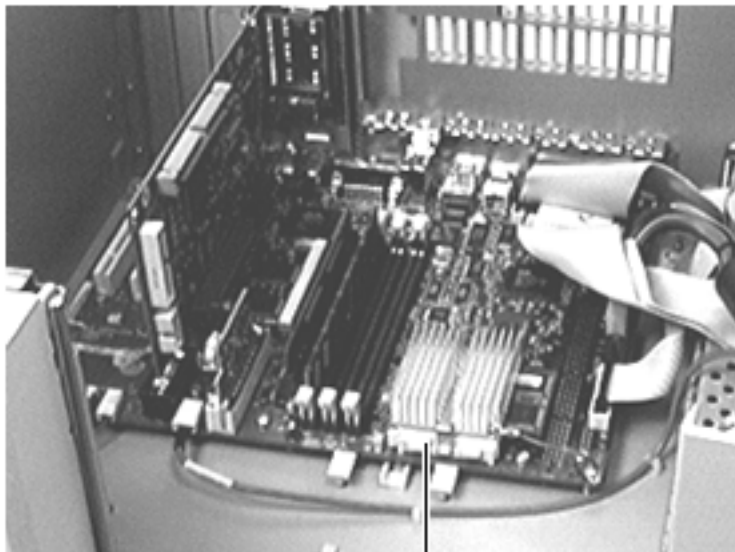




## Processor Module

Before you begin, do the following:

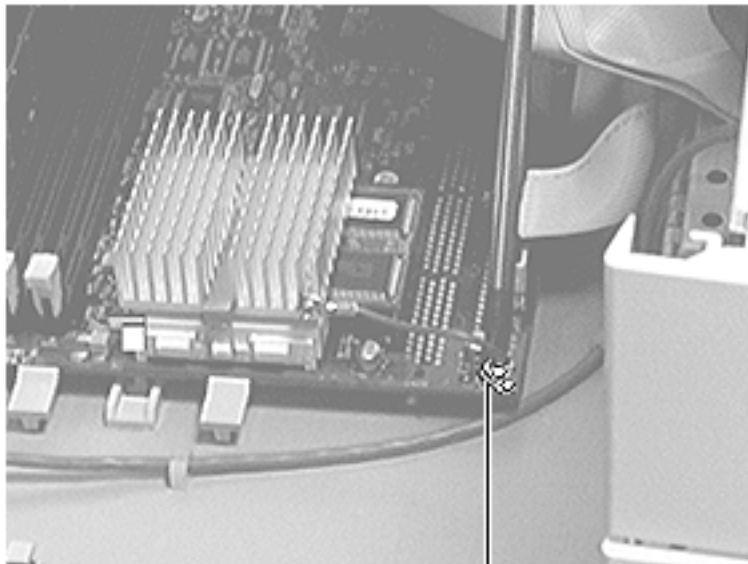
- Remove the side access panel
- Open the chassis



Processor Module







Screw

- 1 Remove the screw that holds the processor module wire to the logic board.

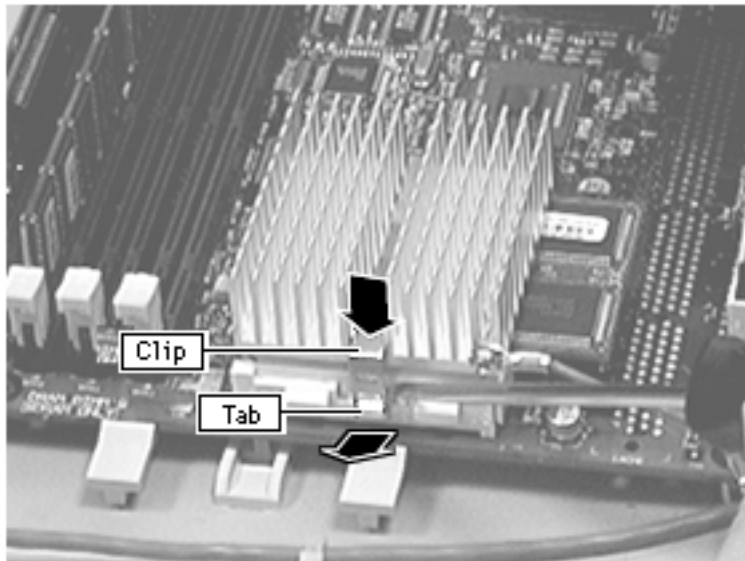
**Replacement Note:** The processor module wire attaches to the top of the logic board (**not** underneath). When screwing down the wire, be careful not to damage the capacitor that is next to the screw hole. Use a manual screw driver to avoid damaging the capacitor.





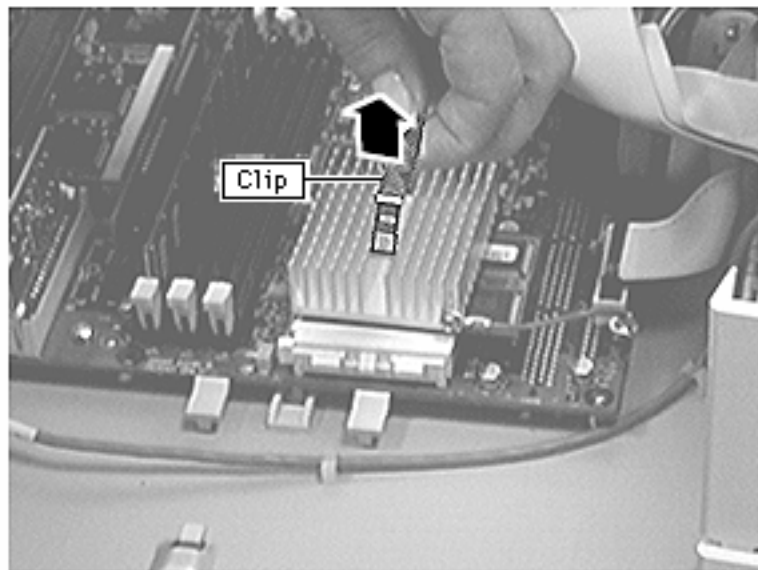
**Warning:** The heat sink may be hot to the touch.

- 2 While pressing down on the top of the clip that secures the heatsink, use a small flatblade screwdriver to lift up on the front tab of the clip to release it.



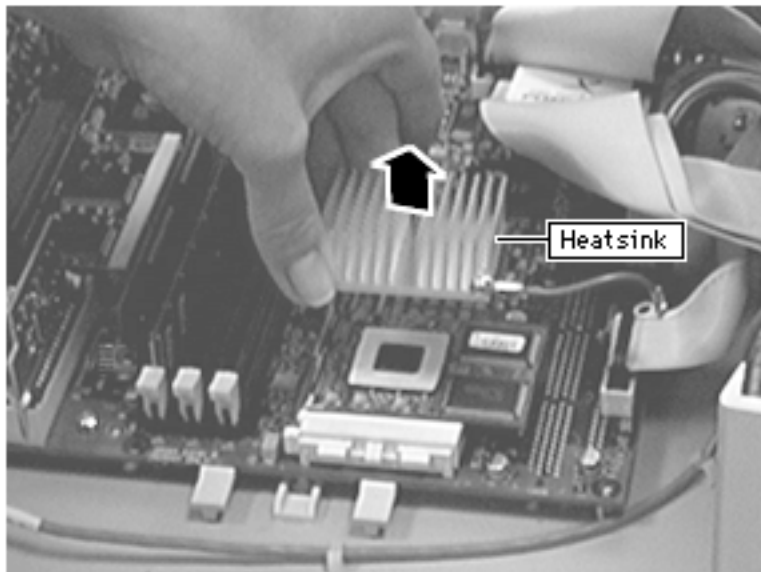


- 3 Lift up the clip and remove it from heatsink.



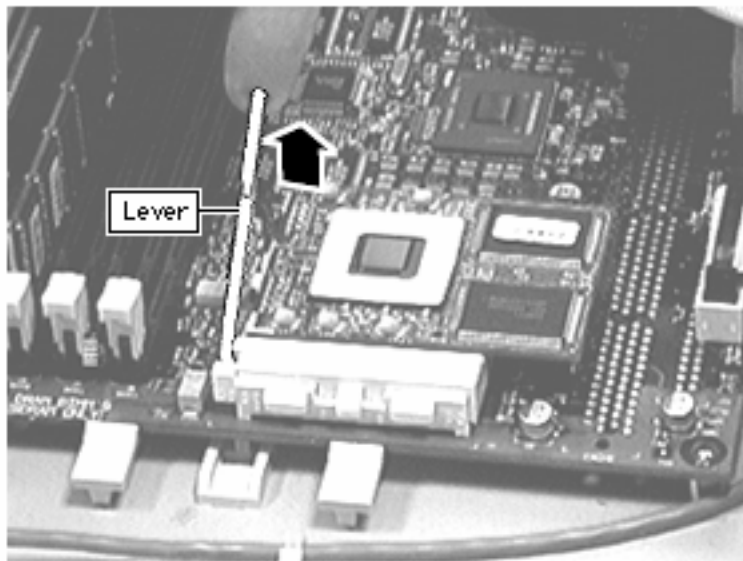


- 4 Lift up the heatsink to remove it from the processor module.



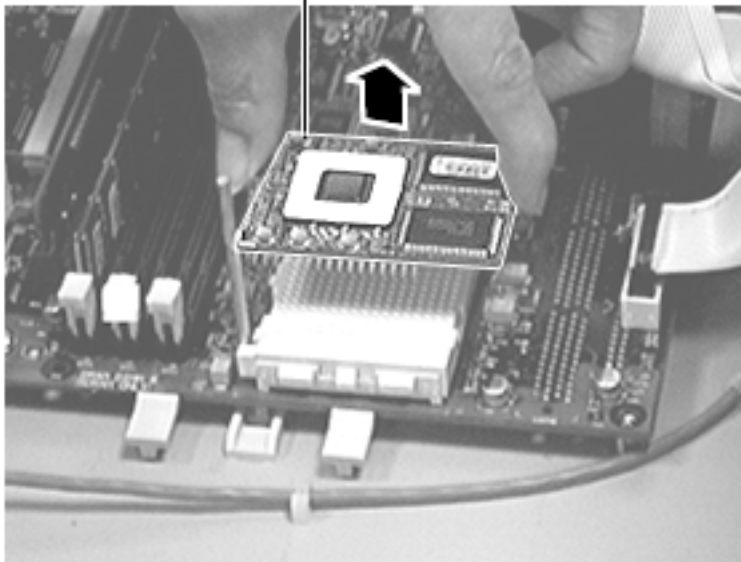


- 5 Lift the metal lever at the left of the processor module.





Processor Module

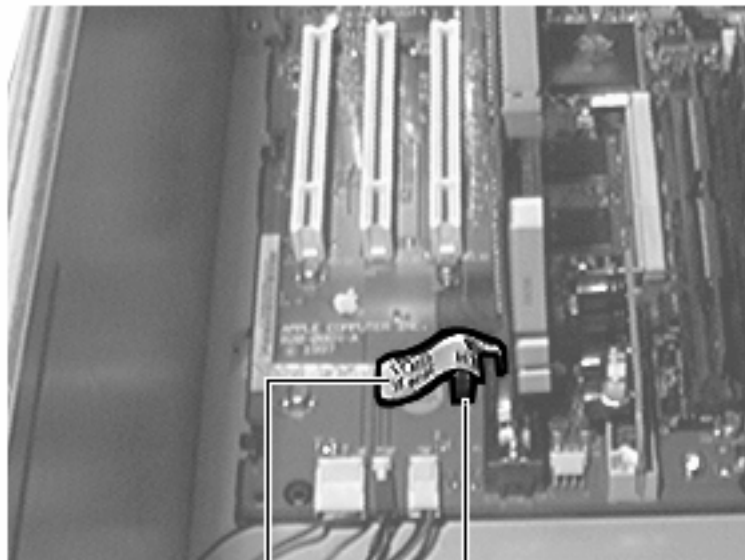


- 6 Pick up the processor module by the edges and gently lift straight up to remove it. Be careful not to bend the pins underneath the module.

**IMPORTANT:** If you are only replacing the processor module, stop here. If, however, you are removing the processor module in order to replace the logic board, continue on to the next page.

**Replacement Note:** Don't force the processor module.

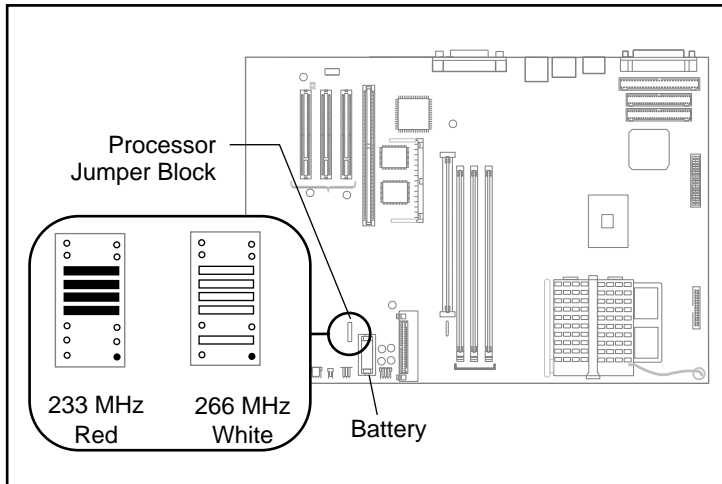


Warranty  
StickerJumper  
Block

- 7 Remove the warranty sticker and red jumper block located next to the battery if replacing the logic board only.

**IMPORTANT:** When replacing the processor module, you must change the processor jumper block and warranty sticker to be compatible with the processor module you are installing. Failure to install the jumper block properly will result in a unit that does not power on. See the instructions on the following page.





- 8 The graphic at left shows the proper installation for the processor module jumper. Depending on the unit, you will either install a red jumper block (for the 233 MHz configuration) or a white jumper block (for the 266 MHz configuration). Be sure to cover the pins as shown and to install the jumper block with the gold connector pins facing down towards the board.







**Replacement Note:** Position the processor module evenly over the processor module slot and make sure the card is seated evenly. Press down gently on the processor module to install it. Never force the module into place or you may damage the gold connector pins on the underside. Flip down the metal lever that secures the processor module to the board.

Replace the heat sink on top of the processor module. Secure the heat sink by inserting the clip into the slot at the rear of the processor and then swinging the clip down over the heat sink. Press the clip into the front latch to fasten in place.

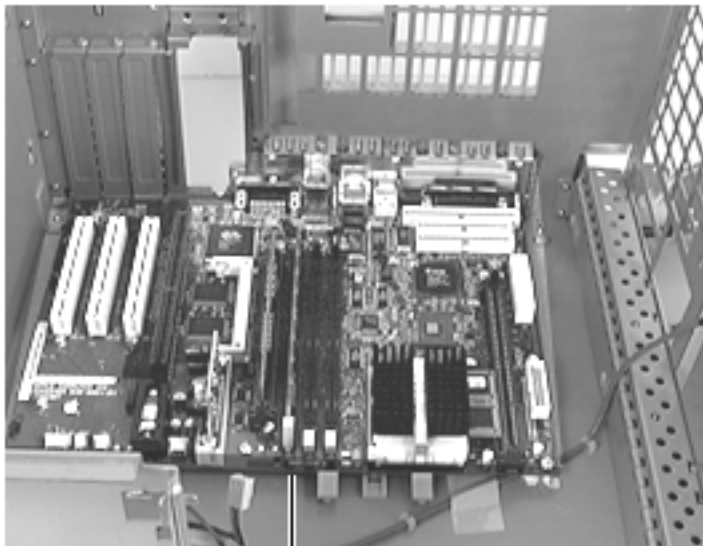




## Logic Board

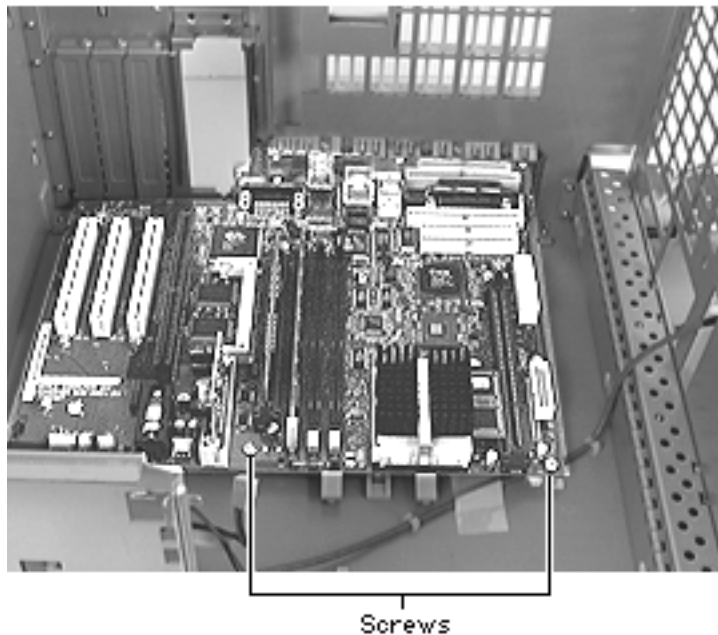
Before you begin, do the following:

- Remove side access panel
- Remove PCI cards (if present)
- Remove I/O card
- Open chassis



Logic Board

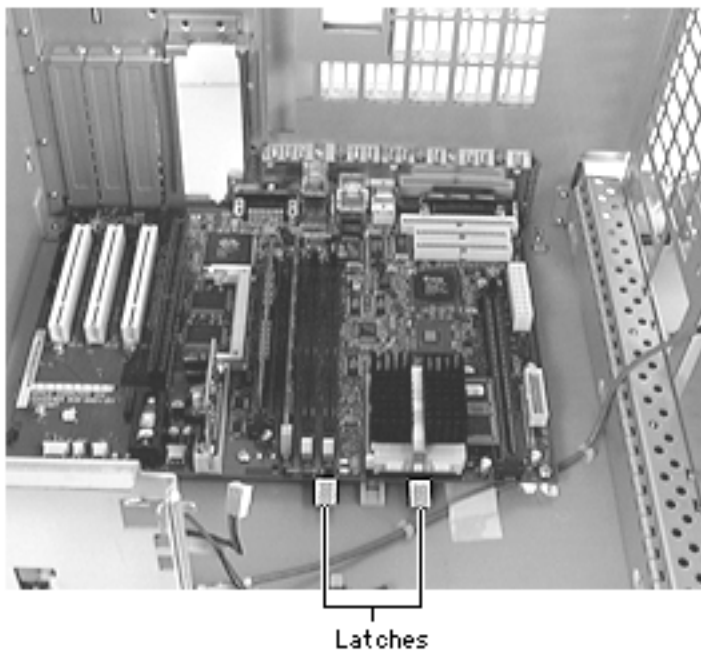




- 1 Disconnect all cables from the logic board.
- 2 Using a Phillips screwdriver, remove the logic board mounting screws, one of which attaches the processor module wire to the logic board.

**Replacement Note:** The processor module wire attaches to the top of the logic board (**not** underneath). Be careful not to damage the nearby capacitor when screwing down the processor wire.





- 3 Release the two plastic latches on the front of the logic board.

**Replacement Note:** Make sure the latches re-engage the logic board.

- 4 Slide the logic board forward far enough for the ports to clear the openings in the I/O panel.
- 5 Lift the board out of the computer.

**IMPORTANT:** There is a power supply jumper on the logic board at J28 (near





the PCI slots). If the logic board is installed in the PM G3 Minitower, this jumper must cover the pins marked “PS”. If the logic board is installed in the PM G3 Desktop model, this jumper must cover the pins marked “Mac”. When replacing the logic board, be sure to check the power supply jumper setting. If this jumper is missing or set incorrectly for the computer model, the computer will not boot up.

**IMPORTANT:** If you are replacing the logic board, you must transfer the processor module and processor jumper from the original logic board to the replacement board. See the take-apart instructions for the “Processor Module” for more information. You must also cover the processor jumper with a new warranty sticker, which comes with the replacement logic board. This sticker must be in place to protect the customer’s product warranty.

**Note:** Before returning the logic board to Apple, remove the





processor module, processor jumper block and warranty sticker, DRAM, SGRAM, the I/O card, and any PCI cards (if present). Do NOT remove the voltage regulator or ROM DIMM.



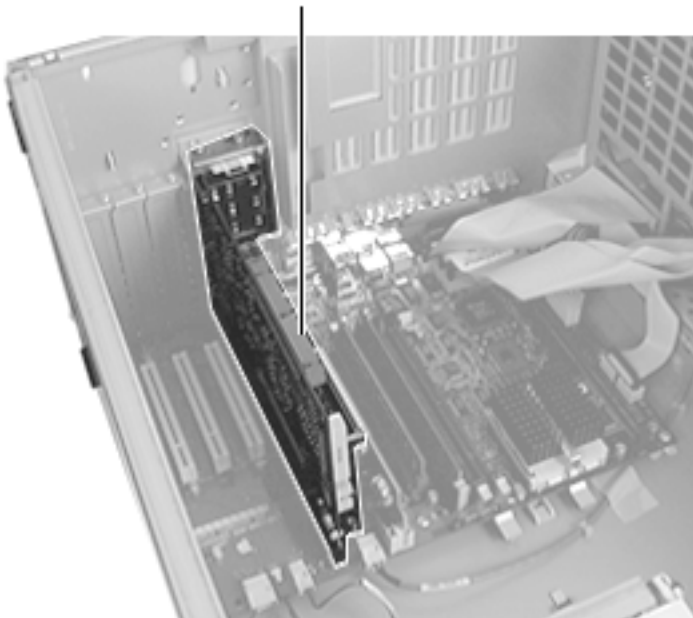


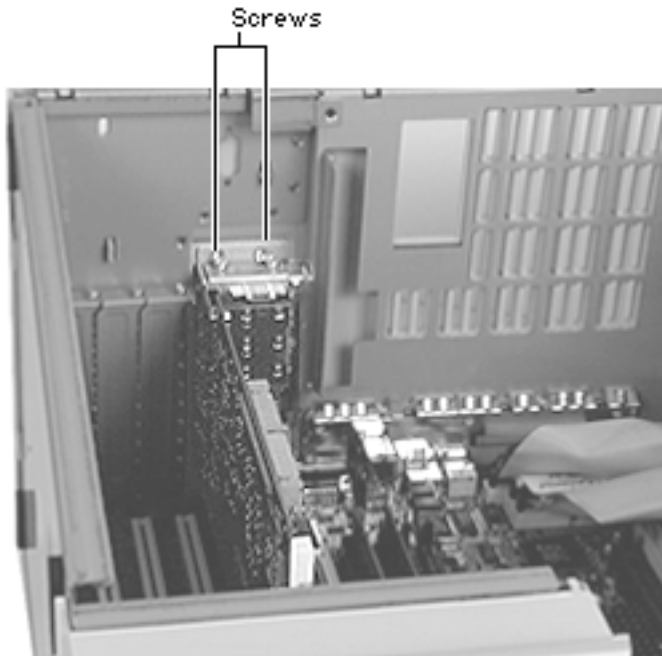
## I/O Card

Before you begin, do the following:

- Remove the side access panel
- Open the chassis

I/O Card





- 1 Remove the two I/O card mounting screws.
- 2 Gently lift up on the I/O card to remove it from the computer.







## Voltage Regulator

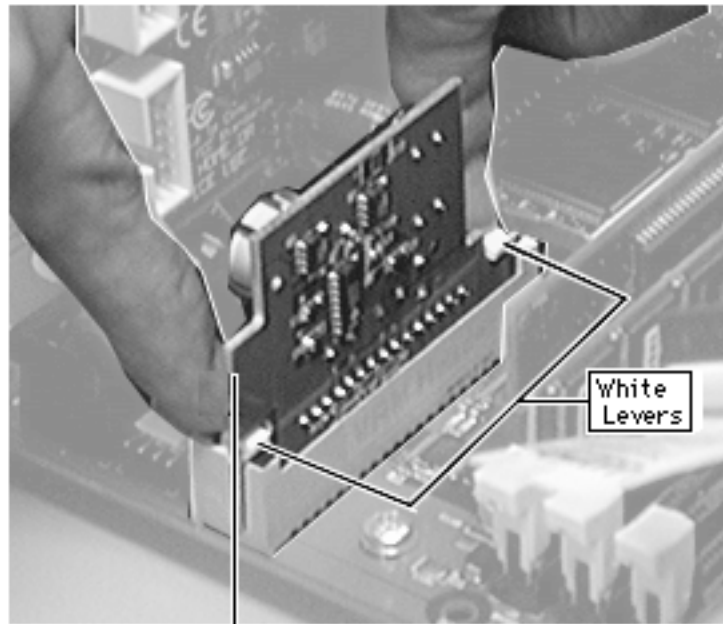
Before you begin, do the following:

- Remove the side access panel
- Open the chassis



Voltage Regulator





Voltage Regulator

- 1 Press down on the two white levers on either side of the voltage regulator to release it. Lift up on the voltage regulator to remove it from the logic board.

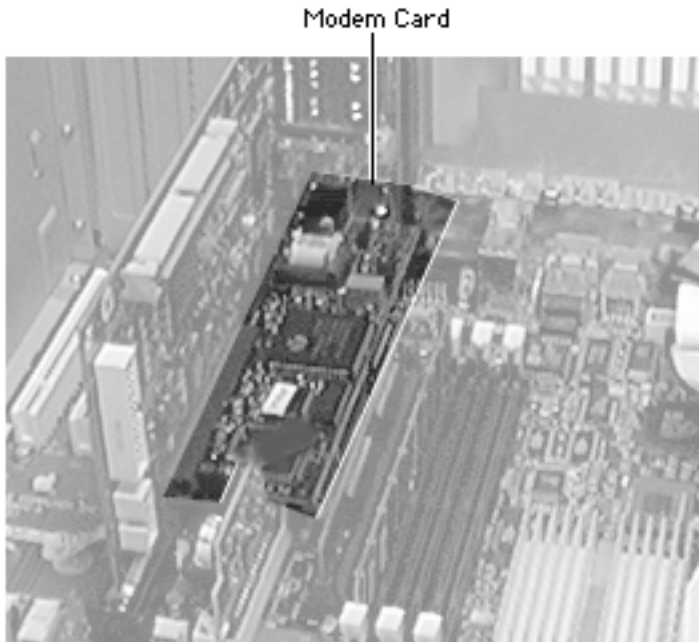


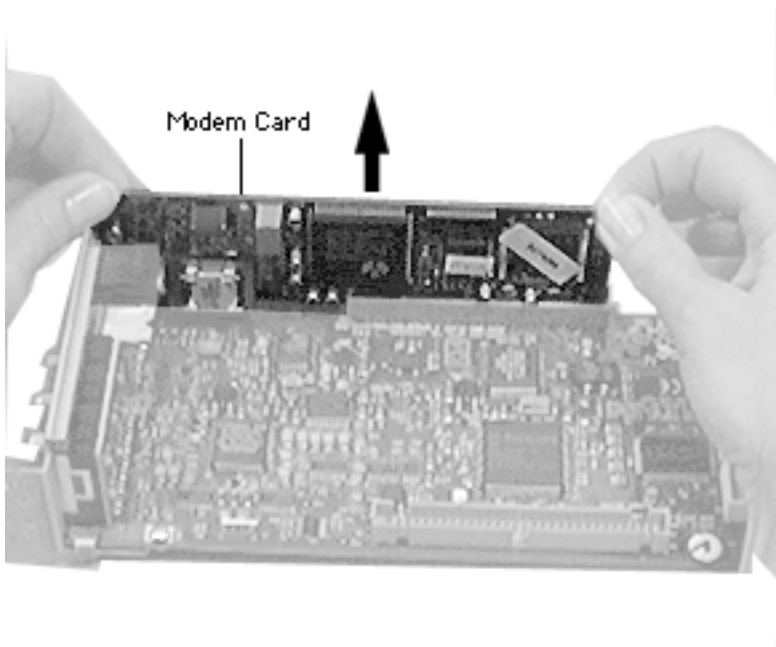


## Modem Card

Before you begin, do the following:

- Remove the side access panel
- Open the chassis
- Remove the I/O Card





- 1 Lay the I/O card on a flat surface and gently lift up on the modem card to remove it.

**Replacement Note:** Align the modem card evenly over the modem slot on the I/O card and press down gently to install the card. Do not force the modem card into the slot.

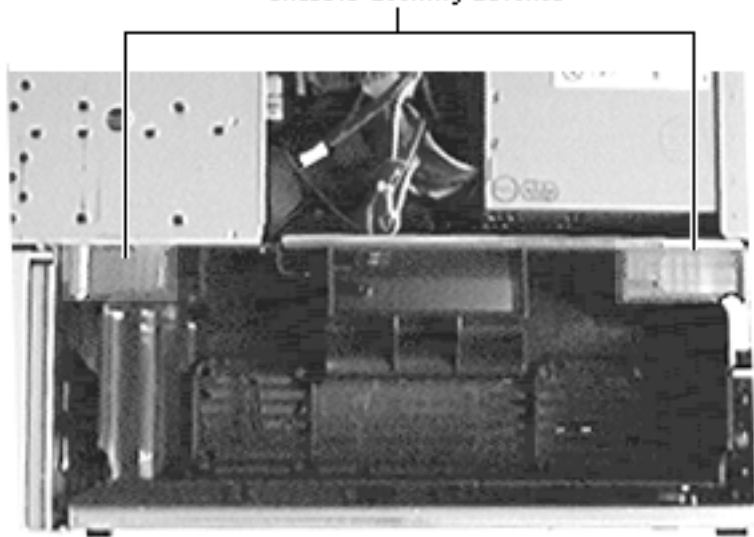




## Chassis Locking Latches

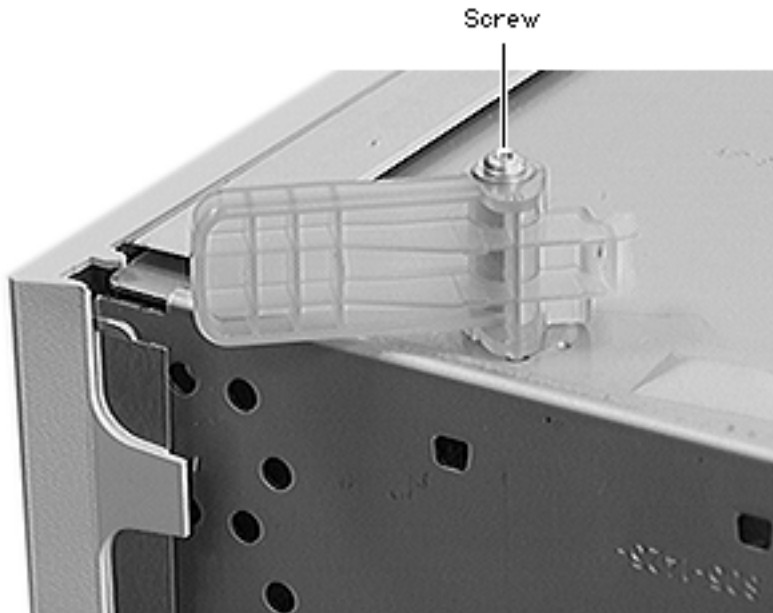
Before you begin, remove the side access panel.

Chassis Locking Latches





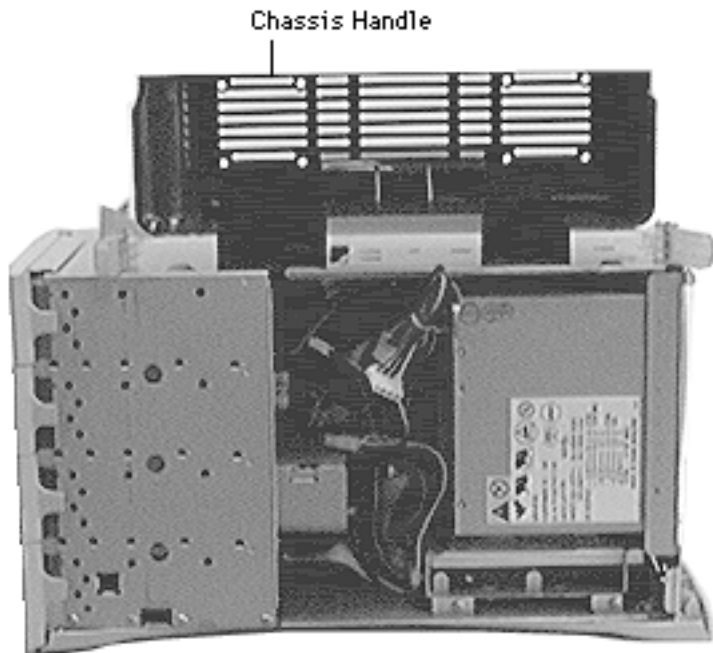
- 1 Remove the screw and washer and remove the locking latch.

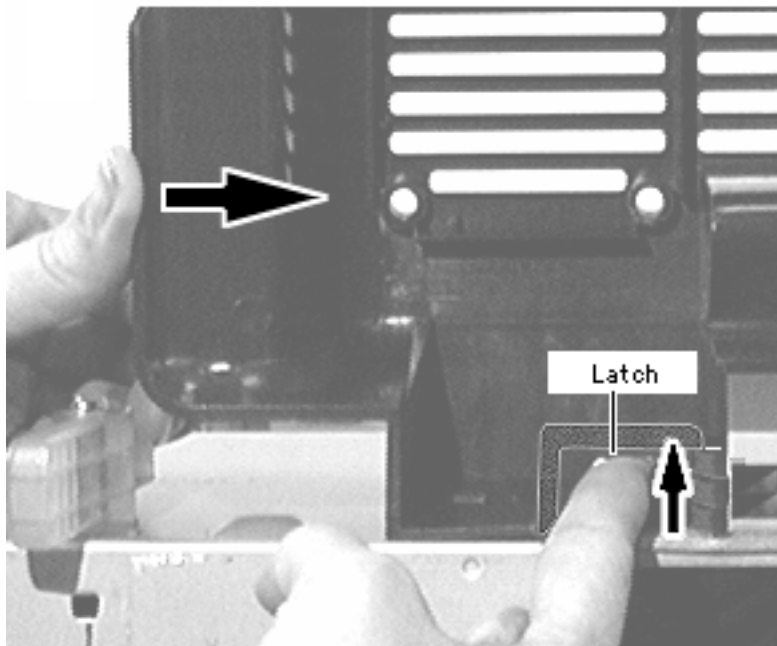




## Chassis Handle

Before you begin, remove the side access panel.





- 1 Lift the retainer latch while sliding the handle toward the back of the computer.





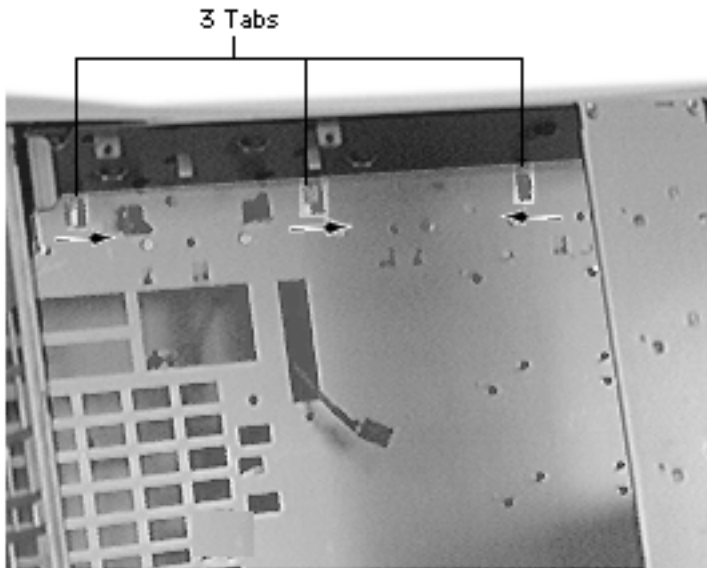


## Top Cover

Before you begin, remove the following:

- Side access panel
- Floppy drive
- Hard drive





- 1 Release the three tabs holding the top cover by pushing the front tab toward the back of the unit and the back two tabs toward the front of the unit (see arrows).
- 2 Slide the top cover toward the stationary panel side to remove it from the chassis.

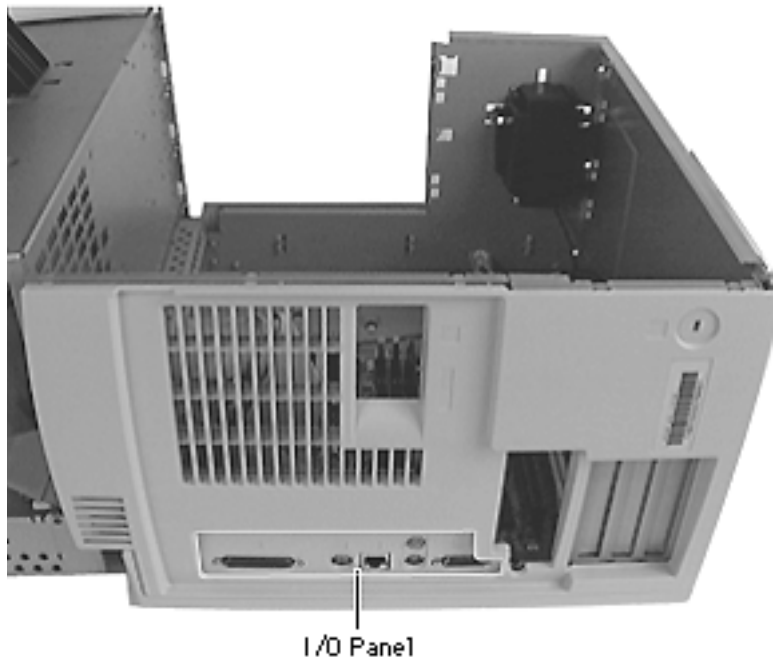


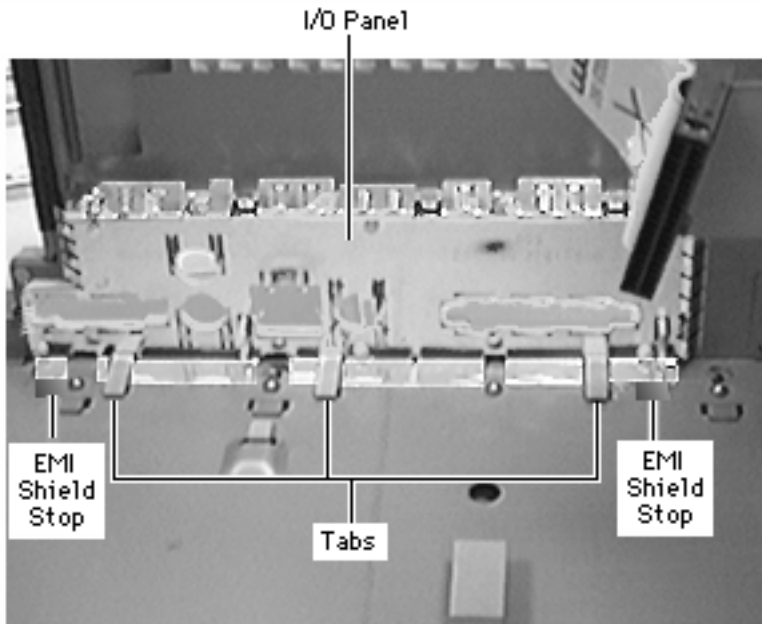


## I/O Panel

Before you begin, remove the following:

- Side access panel
- PCI cards (if present)
- I/O card
- Logic board





- 1 Using a small flatblade screwdriver, lift up on the two EMI shield stop tabs at either end of the I/O panel shield to release the tabs.
- 2 Using the same flatblade screwdriver, gently lift up on the three plastic tabs at the bottom of the I/O panel to release them.
- 3 Swing the panel up, release the top two tabs, and remove the I/O panel and shield from the computer.

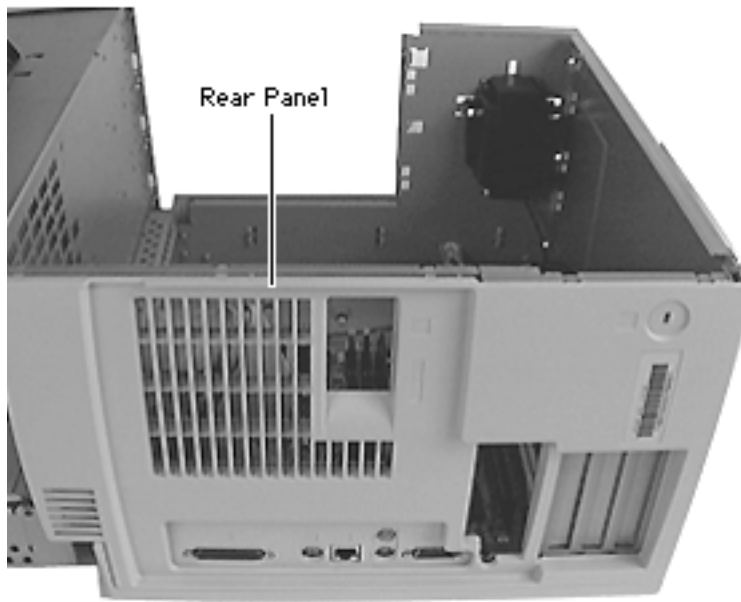


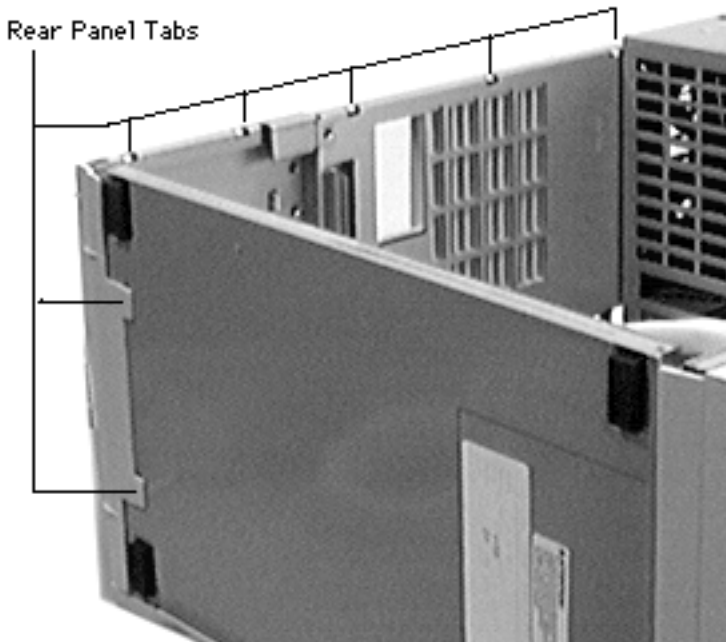


## Rear Panel

Before you begin, remove the following:

- Side access panel
- PCI cards (if present)
- I/O card





- 1 Using a small flatblade screwdriver, gently release the top five tabs and two bottom tabs on the rear panel.
- 2 Lift the rear panel from the computer to remove it.





## Stationary Panel

Before you begin, remove the following:

- Side access panel
- PCI cards (if present)
- I/O card
- Logic board
- I/O panel
- Rear panel
- Speaker bezel



Stationary Panel





- 1 Using a flatblade screwdriver, release the six latches holding the stationary panel to the chassis.







- 2 Lift the chassis slightly and slide the stationary panel forward.
- 3 Push the light/power actuator in toward the case so that it is released from the stationary panel.
- 4 Remove the panel from the computer.

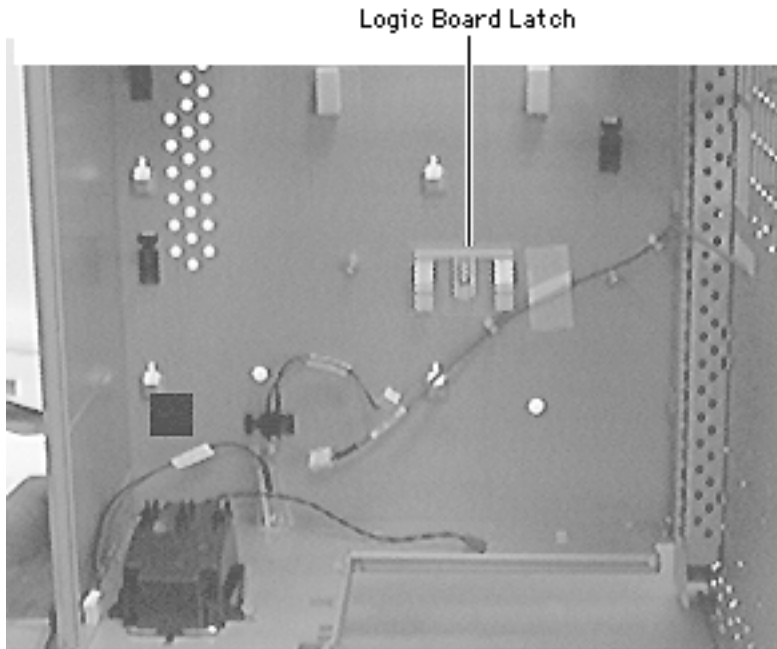




## Logic Board Latch

Before you begin, remove the following:

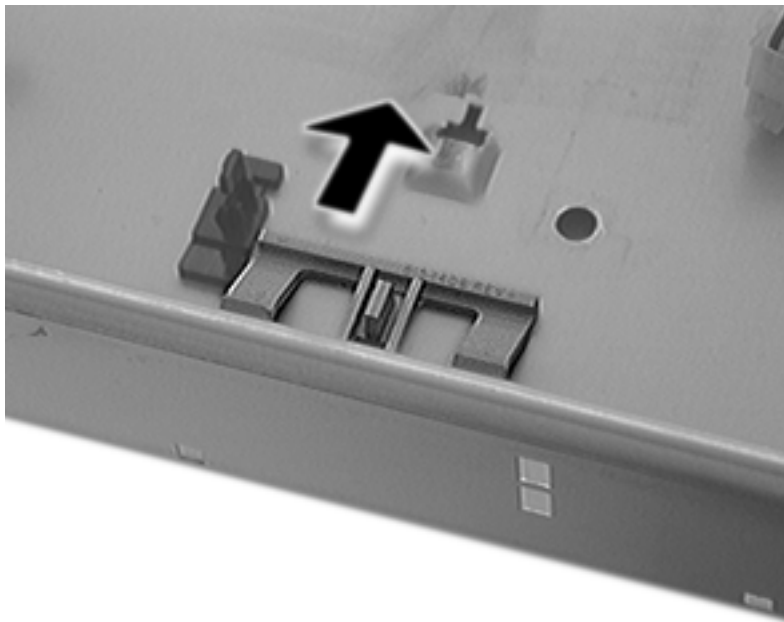
- Side access panel
- PCI cards (if present)
- Logic board
- I/O panel
- AV module video in/out
- Rear panel
- Speaker bezel
- Stationary panel





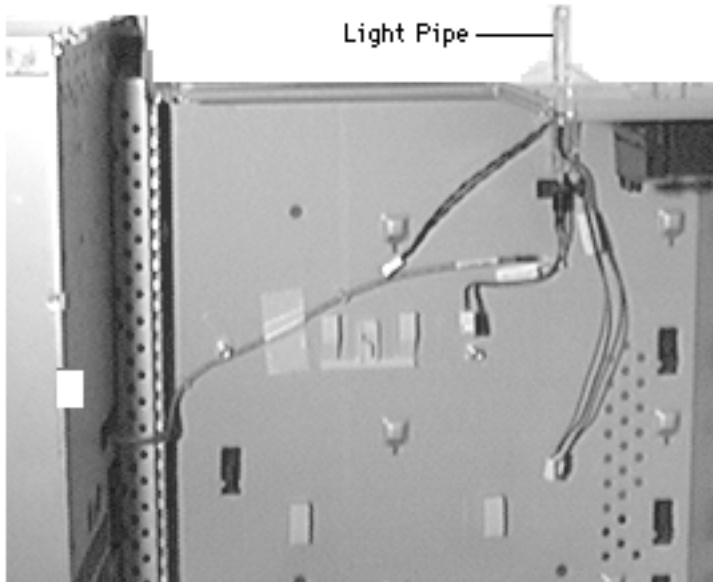
- 1 Carefully lay the computer on its side so the bottom of the chassis is exposed.
- 2 Using a flatblade screwdriver, release the tab holding the logic board latch to the underside of the chassis.





- 3 Slide the logic board latch forward and remove it from the computer.





## Light Pipe/Power Actuator

Before you begin, remove the following:

- Side access panel
- PCI cards (if present)
- I/O card
- Logic board
- I/O panel
- Rear panel
- Speaker bezel
- Stationary panel





Light Pipe Lamp

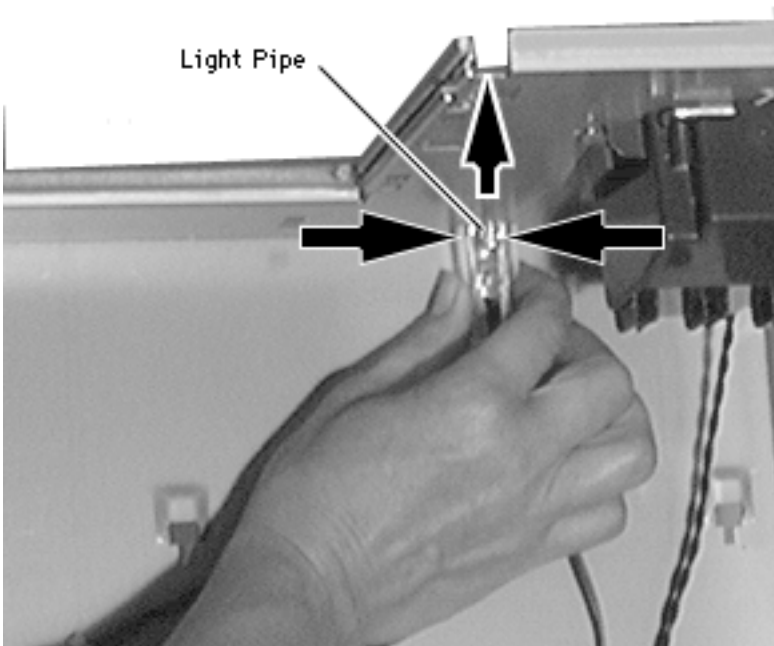


- 1 Lift the end of the LED cable slightly and remove the light pipe lamp from the light pipe/power actuator.





Light Pipe

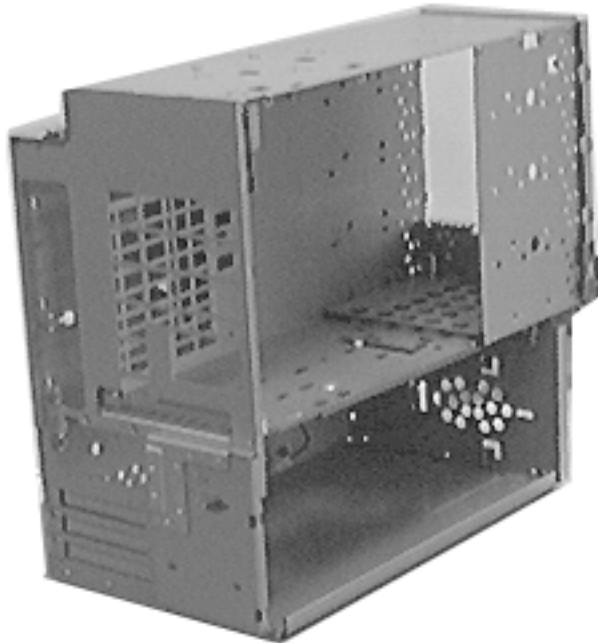


- 2 Press in the two latches on the sides of the actuator and slide it forward out of the chassis.





## Chassis

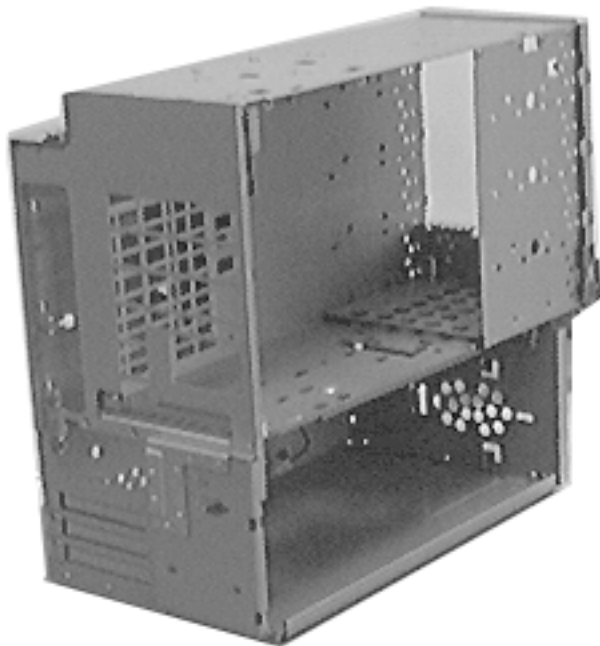


Remove the following:

- Side access panel
- PCI cards (if present)
- I/O card
- Logic board
- I/O panel
- Rear panel
- Speaker bezel
- Stationary panel
- Light/Power actuator
- Speaker
- Floppy drive
- CD-ROM drive
- Zip drive
- Hard drive
- Bottom drives







- Power supply
- Locking chassis latches
- Chassis handle





Upgrades

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Power Macintosh G3 Minitower



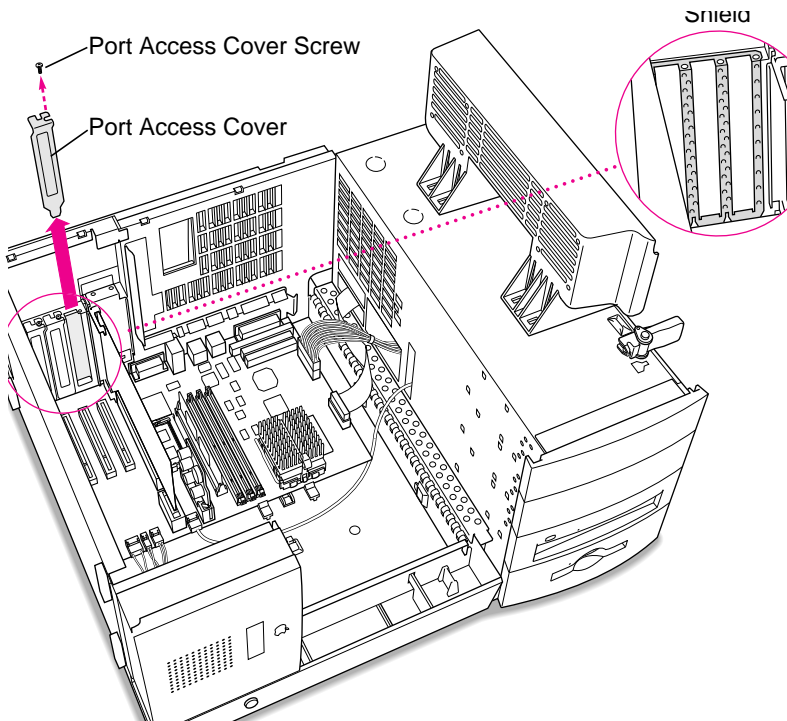


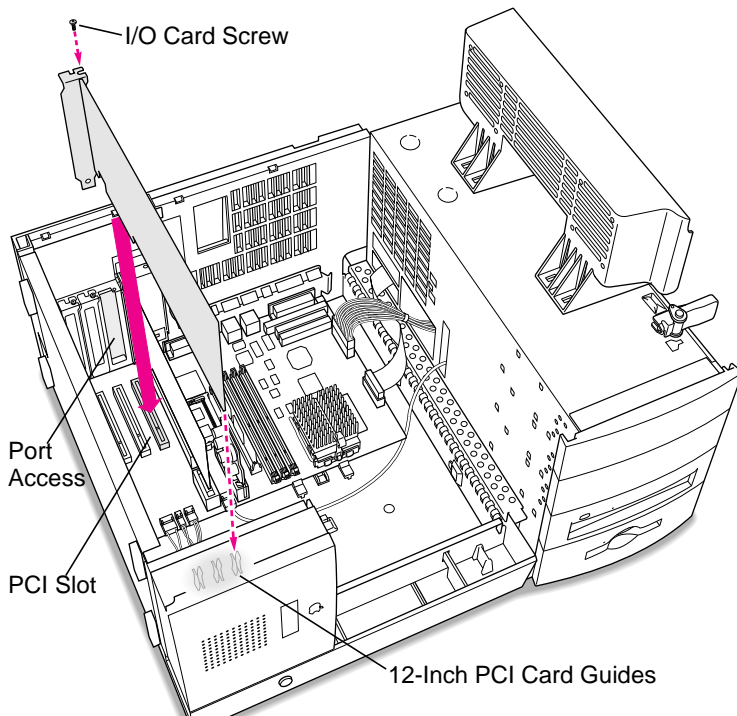
## PCI or I/O Cards

Before you begin, open the chassis.

- 1 Remove the screw that holds the port access cover in place.
- 2 Pull out the access cover.

**Note:** If you remove all three port access covers, be sure the sheet metal shield remains under the edge of the logic board.



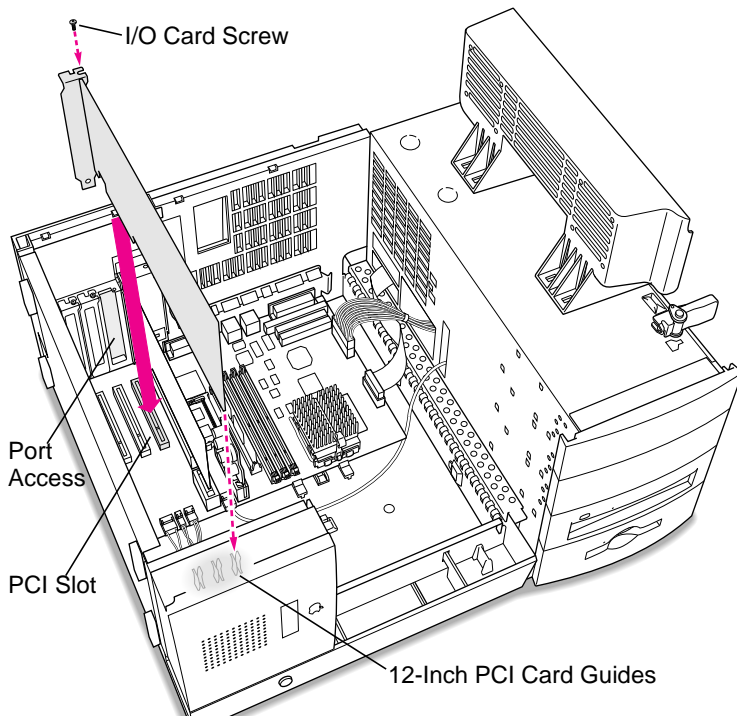


- 3 Align the card connector with the expansion slot and press straight down until the connector inserts all the way into the slot.

**Note:** It may be helpful to hold the card slightly away from the port access opening until the card fits into the slot.

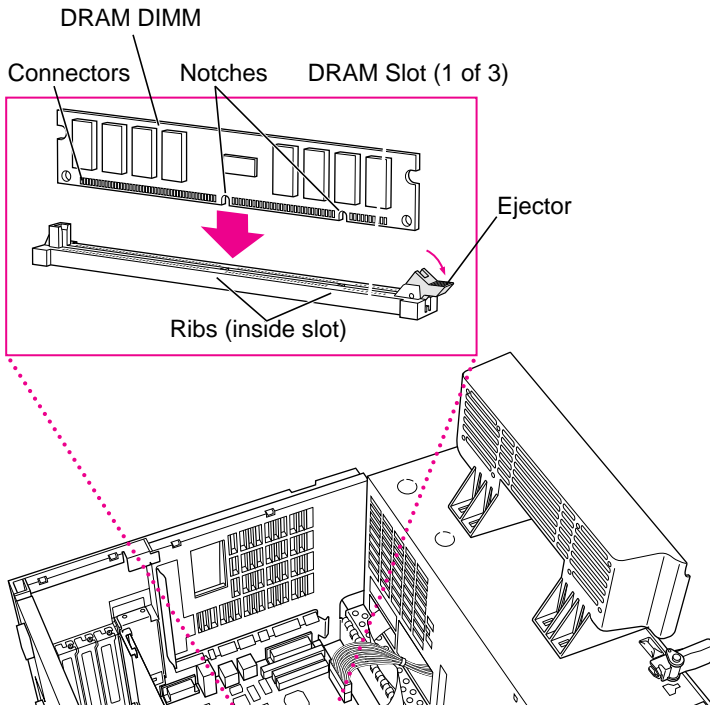
**Note:** If the PCI card is a full 12 inches, be sure it fits into one of the three card guides at the front of the computer.





- 4 If you meet resistance, pull the card out and try again.
- 5 To test the connection, pull the card up gently. The card should remain firmly in place.
- 6 Reinstall the screw to secure the card in place.





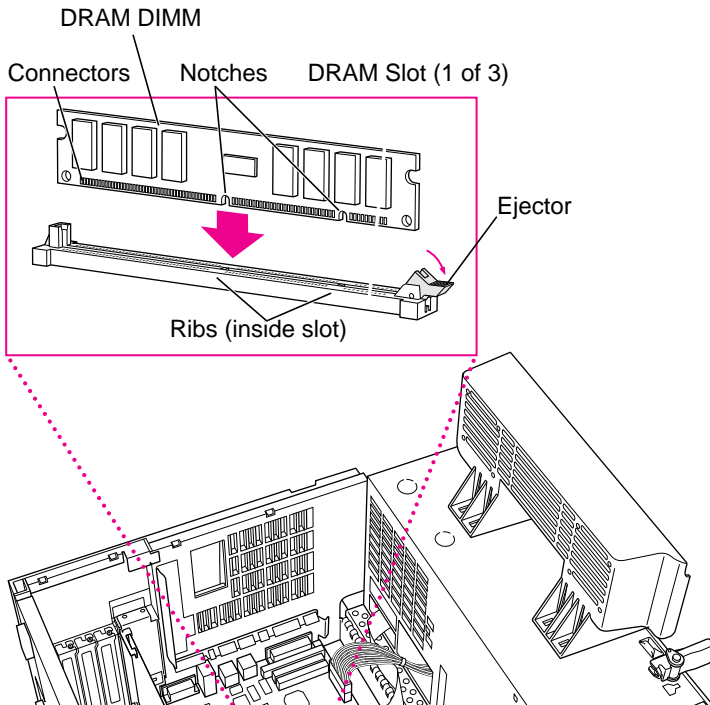
## DRAM

Before you begin, open the chassis.

**Note:** DIMM shape and components may vary.

- 1 To remove existing DRAM DIMMs to make room for new ones, push down on the ejectors.





- 2 Align DIMM notches with DRAM slot ribs.

**Note:** The DIMM is designed to fit in the slot only one way.

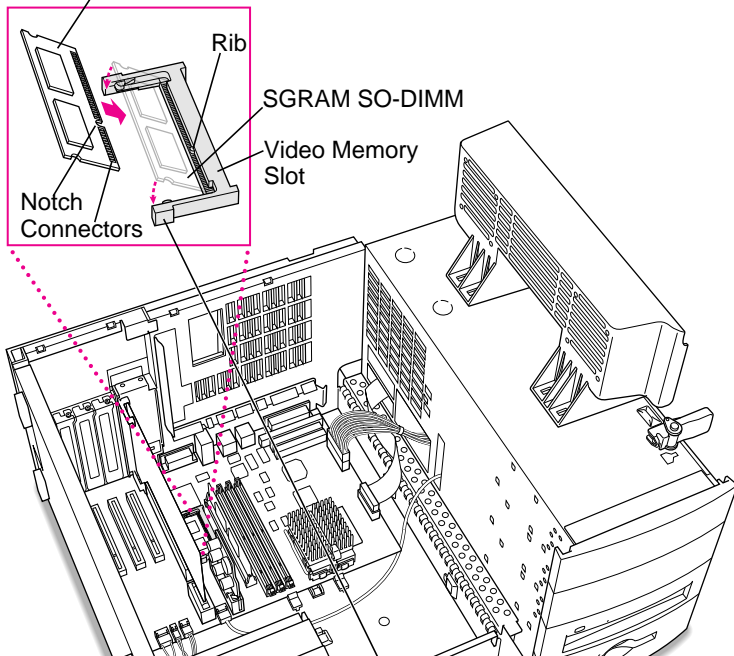
- 3 With ejectors open, press the DIMM into the slot.

**Note:** Slot may have one or two ejectors.





SGRAM SO-DIMM



## VRAM

Before you begin, open the chassis.

**Note:** SGRAM DIMM shape and components may vary.

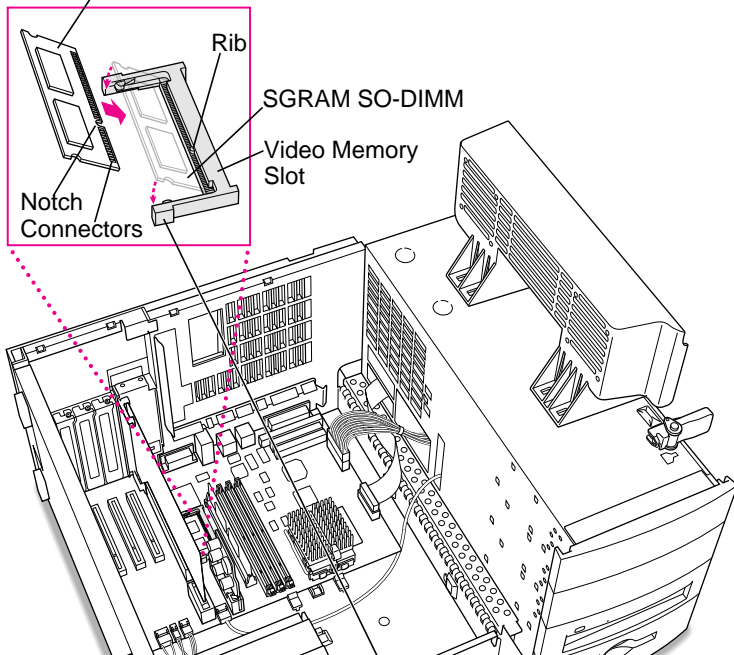
- 1 To remove existing SGRAM DIMM, spread arms of video memory slot apart slightly. The SGRAM DIMM will pop up.







SGRAM SO-DIMM



- 2 Align SGRAM DIMM notches with VRAM slot ribs.

**Note:** SGRAM DIMM fits into slot only one way.

- 3 Press the SGRAM DIMM into the slot.

**Note:** SGRAM DIMM should be flat and parallel to the logic board.

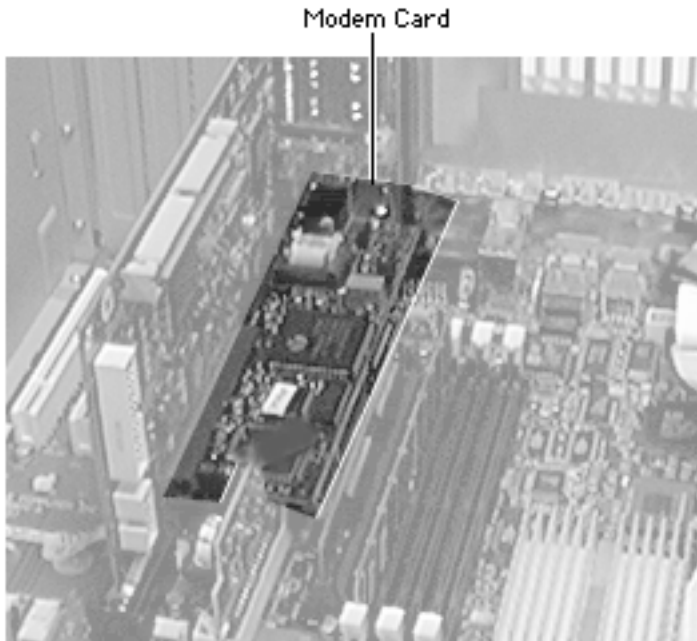


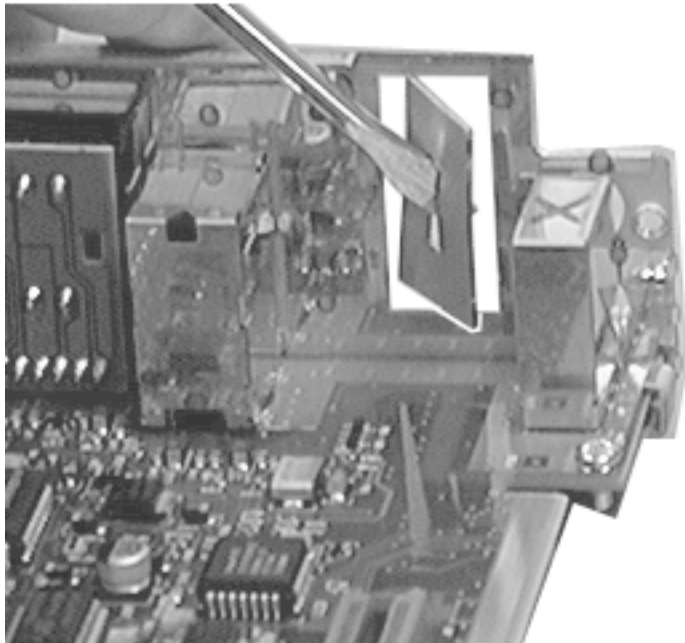


## Modem Card

Before you begin, do the following:

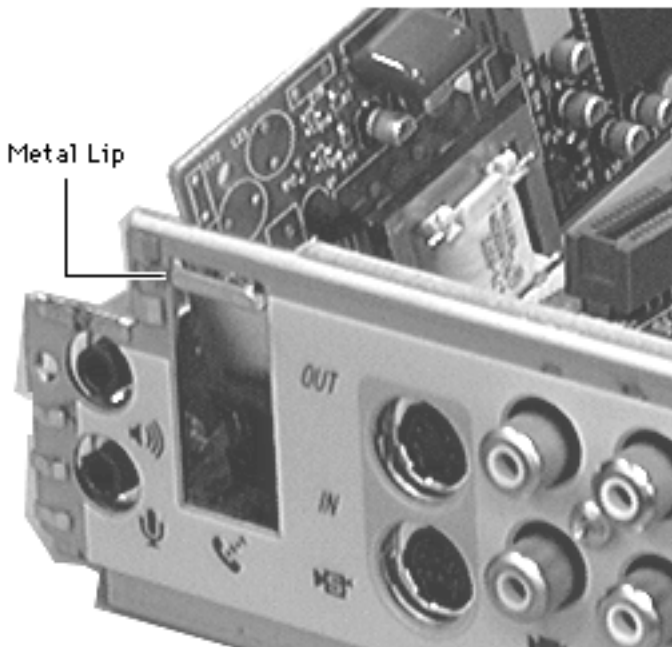
- Remove the side access panel
- Open the chassis
- Remove the I/O Card





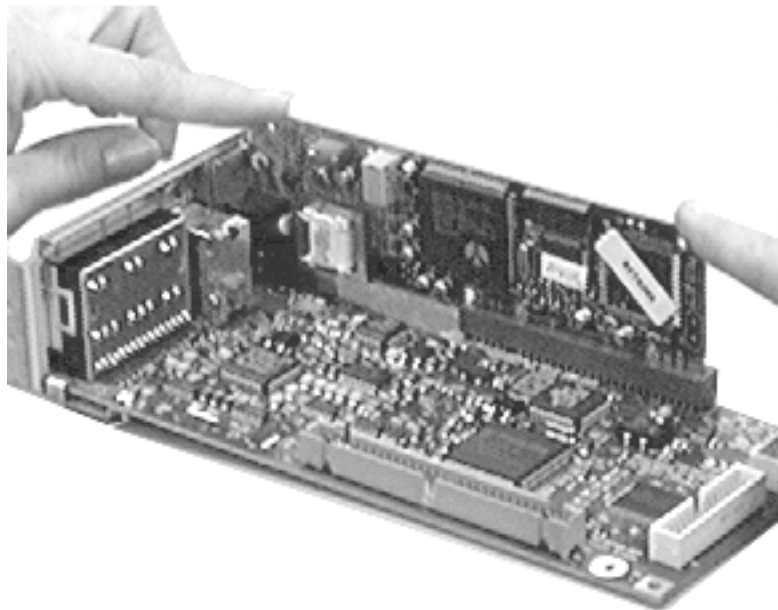
- 1 Insert a small flatblade screwdriver in the modem slot cover on the I/O card.
- 2 Gently twist the screwdriver to pop out the metal modem slot cover.





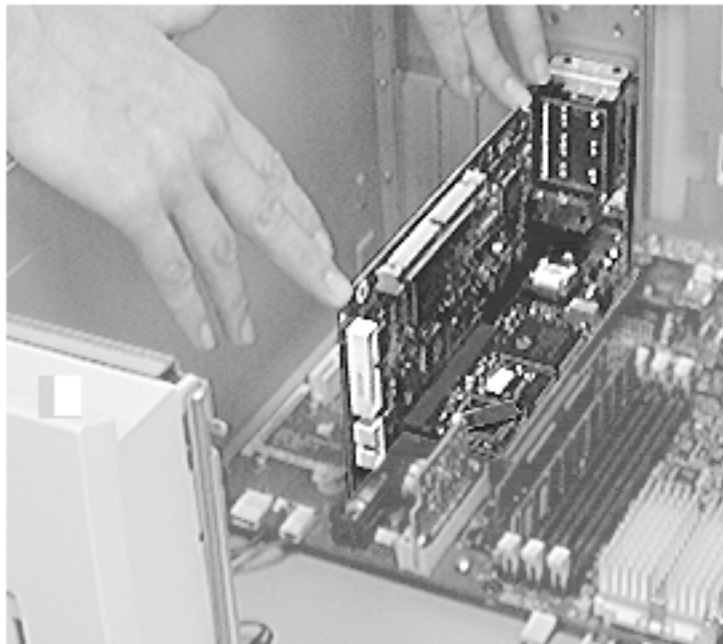
- 1 Holding the modem card at a slight angle to the I/O card, insert the metal lip on the modem card's connector panel through the opening in the I/O card.





- 2 Gently swing down the modem card so that it is aligned on top of the modem card slot on the I/O card.
- 3 Gently press down evenly on the modem card to install it. Be sure the card is properly seated.





- 4 Reinstall the I/O card in the computer. Be sure to insert the three screws that secure the I/O card to the metal chassis.





## Troubleshooting

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Power Macintosh G3 Minitower





## General

The Symptom Charts included in this chapter will help you diagnose specific symptoms related to your product. Because cures are listed on the charts in the order of most likely solution, try the first cure first. Verify whether or not the product continues to exhibit the symptom. If the symptom persists, try the next cure. (Note: If you have replaced a module, reinstall the original module before you proceed to the next cure.)

If you are not sure what the problem is, or if the Symptom Charts do not resolve the problem, refer to the Flowchart for the product family.

For additional assistance, contact Apple Technical Support.







## New Components Theory of Operation

New components on the Power Macintosh G3 logic boards and new strategies for parts replacement make troubleshooting these systems significantly different from previous models. Take a moment to read and understand how each of these new components interacts with the system.

### **Voltage Regulator**

The voltage regulator module regulates the voltage for the particular processor used in different Power Macintosh G3 systems. This system provides an easy way to regulate voltage without changing specific resistor values on the logic board. When you order the Power Macintosh G3 logic board from Service, the voltage regulator comes with the board. You can also order the voltage regulator as a separate part.





## Processor Module

The Power Macintosh G3 logic board comes with a removable processor module. You can replace this module when the logic board or processor module fails. The processor module sits in a ZIF socket for easy removal. Processor modules can be ordered from Service, and each is shipped with the appropriate jumper configuration block to place in location J16. The processor should rarely fail. Replace it only as a last resort.

When replacing the processor module, you must change the processor jumper block and warranty sticker to be compatible with the processor module you are installing. Failure to install the jumper block properly will result in a unit that does not boot up. Refer to “Processor Module” in Take-Apart for installation instructions.





## Jumper Location J16

The jumper block you place at location J16 configures the board to work with different processor modules. Use the appropriate jumper block, identified by color, for each processor module. Refer to “Processor Module” in Take-Apart for installation instructions.

Processor Speed	Jumper Color
233	Red
266	White

The jumper block is protected by a void-warranty sticker. End users are not allowed to remove this jumper block. If the sticker has been tampered with on a unit you receive for repair, do not honor the service warranty on the system.





## Jumper Location J28

Jumper location J28 controls which power supply the Power Macintosh G3 logic board can accommodate. When you receive a Power Macintosh G3 logic board from Service, you need to place the jumper in the proper location. The power supply used in the Power Macintosh G3 Desktop computer is different from the power supply used in the G3 Minitower computer.

If the logic board is installed in the PM G3 Minitower, the power supply jumper must cover the pins marked “PS”. If the logic board is installed in the PM G3 Desktop model, this jumper must cover the pins marked “Mac”. (Replacement logic boards should come preset for the Desktop model.) When replacing the logic board, be sure to check the power supply jumper setting. If this jumper is missing or set incorrectly for the computer model, the computer will not boot up





## I/O Cards

Power Macintosh G3 computers require an I/O card that moves audio and/or video from the main logic board. These cards are placed in the PERCH connector on the main logic board. If the card is not seated correctly, different symptoms appear. Look in the Symptom Charts for details on troubleshooting these cards.

**Note:** the Power Macintosh G3 computers will boot up without the I/O card installed, but they will not operate properly.





## Cleaning Procedure for Card Connectors

It is possible for residue to build up on the gold edge connector pins on some PCI cards, which could cause a variety of symptoms.

If you are having problems with a PCI card, inspect the connector pins with a magnifying glass. If you find residue, use a pencil eraser to gently clean the pins.





# Symptom Charts

## System

Fan on power supply is running, but no startup chime, screen is black, drive not accessed at startup, and no LED on front of system

- 1 Verify power supply voltage switch is set correctly for your region (see “Voltage Switch” in Basics chapter for more information).
- 2 Check jumper block J28. Be sure setting is correct for type of power supply installed (see “Logic Board” in Take-Apart chapter for more information).
- 3 Check jumper block configuration at J16. Make sure jumper block is correct color for processor type installed (see “Processor Module” in Take-Apart chapter for more information).
- 4 Reseat processor module. Make sure locking arm is in down position.
- 5 Reseat ROM DIMM.





- 6 Replace voltage regulator.
- 7 Replace logic board.
- 8 Replace processor module.

Fan is running, LED is on, drive is accessed at startup, but no startup chime and screen is black

- 1 Check jumper block J28. Make sure setting is correct for type of power supply installed (see “Logic Board” in Take-Apart chapter for more information).
- 2 Reseat ROM DIMM.

No apparent power, fan isn't running, no LED

- 1 Verify power cord is attached securely at both ends.
- 2 Check internal power cables and verify they are attached securely at both ends.
- 3 Plug monitor directly into wall socket, and verify monitor has power.
- 4 Reseat ROM DIMM and processor module. The logic board must have both a ROM DIMM and processor module installed to operate.







- 5 Reset Cuda chip. (Refer to “The Cuda Chip” in Basics chapter for instructions.)
- 6 Reset logic board. (Refer to “Resetting the Logic Board” in Basics chapter for instructions.)
- 7 Check jumper block J28. Make sure setting is correct for type of power supply installed (see “Logic Board” in Take-Apart chapter for more information).
- 8 Check jumper block configuration at J16. Make sure jumper block is correct color for processor type installed (see “Processor Module” in Take-Apart chapter for more information).
- 9 Replace power cord.
- 10 Replace voltage regulator.
- 11 Replace power supply.
- 12 Replace logic board.
- 13 Replace processor module.





Clicking, chirping,  
thumping, or rubbing

- 1 Remove all PCI cards and test unit. If problem does not occur with cards removed, begin replacing cards one at a time to determine which card is causing problem. Replace problem card with known-good card.
- 2 Remove hard drive. If problem no longer occurs, replace hard drive with a known-good drive.
- 3 Replace power supply.
- 4 Replace processor module.
- 5 Replace logic board.
- 6 Replace floppy drive cable.
- 7 Replace floppy drive.
- 8 Replace I/O card.

System shuts down  
intermittently

- 1 Make sure air vents are clear. Thermal protection circuitry may shut down system. After 30 to 40 minutes, system should be OK.
- 2 Make sure power cord is plugged in firmly.
- 3 Replace power cord.





- 4 Check battery.
- 5 Reset Cuda chip. (Refer to “The Cuda Chip” in Basics chapter for instructions.)
- 6 Reset logic board. (Refer to “Resetting the Logic Board” in Basics chapter for instructions.)
- 7 Replace power supply.
- 8 Replace logic board.
- 9 Replace processor module.

System  
intermittently  
crashes or hangs

- 1 Verify system software is version 8.0 or later with enabler 770.
- 2 Verify software is known-good. Do a clean install of system software.
- 3 Verify software is Power Macintosh compatible (contact developer). Also, try booting with extensions off to determine if there are system init problems.
- 4 Clear parameter RAM. Hold down <Command> <Option> <P> <R> during startup but before "Welcome to Macintosh"





appears.

- 5 Remove all SDRAM DIMMs and try replacing them one at a time to test. Replace any bad DIMMs.
- 6 Replace logic board.
- 7 Replace processor module.

During startup, following message is displayed, "This startup disk will not work on this Macintosh model...."

- 1 Verify startup disk is good.
- 2 Verify system software is version 8.0 or later with enabler 770.
- 3 Do a clean install of system software.





## Error Chords

One-part error chord sounds during startup sequence

- 1 Disconnect IDE data cable from hard drive and reboot system. If startup sequence is normal, initialize hard drive. Test unit again with IDE data cable connected. If error chord still sounds, replace hard drive.
- 2 Disconnect floppy drive cable from floppy drive and reboot system. If startup sequence is normal, replace floppy drive.
- 3 Reseat processor module.
- 4 Replace logic board.
- 5 Replace processor module.

Eight-part error chord (death chimes) sounds during startup sequence

- 1 Replace SDRAM DIMMs one at a time to test SDRAM. Replace any faulty DIMMs.
- 2 Replace logic board.





## Video

Screen is black, but boot tone is present, drive operates, fan is running, and LED is lit

- 1 Adjust brightness on monitor.
- 2 Clear parameter RAM. Hold down <Command> <Option> <P> <R> during startup but before "Welcome to Macintosh" appears.
- 3 Reset Cuda chip. (Refer to "The Cuda Chip" in Basics chapter for instructions.)
- 4 Reset logic board. (Refer to "Resetting the Logic Board" in Basics chapter for instructions.)
- 5 Replace monitor cable.
- 6 Remove all SDRAM DIMMs and try replacing them one at a time to test. Replace any bad DIMMs.
- 7 Test with known-good monitor. Replace monitor if necessary. Refer to appropriate monitor manual to troubleshoot defective monitor.
- 8 Replace logic board.
- 9 Replace processor module.





Screen is black, no boot tone and drive does not operate, but fan is running and LED is lit

- 1 Reset Cuda chip. (Refer to “The Cuda Chip” in Basics chapter for instructions.)
- 2 Reset logic board. (Refer to “Resetting the Logic Board” in Basics chapter for instructions.)
- 3 Remove all SDRAM DIMMs and try replacing them one at a time to test. Replace any bad DIMMs.
- 4 Replace logic board.
- 5 Replace power supply.
- 6 Replace processor module.

Boot tone is present and screen lights up, but nothing is displayed on screen

- 1 Reset Cuda chip. (Refer to “The Cuda Chip” in Basics chapter for instructions.)
- 2 Reset logic board. (Refer to “Resetting the Logic Board” in Basics chapter for instructions.)
- 3 Replace monitor cable.
- 4 Test with known-good monitor. Replace monitor if necessary. Refer to appropriate monitor manual to troubleshoot defective monitor.





- 5 Replace logic board.
- 6 Replace processor module.







## Floppy Drive

Internal floppy drive does not operate

- 1 Replace floppy disk with known-good disk.
- 2 Replace floppy drive cable.
- 3 Replace floppy drive.
- 4 Replace logic board.
- 5 Replace processor module.

During system startup, disk ejects; display shows icon with blinking "X"

- 1 Replace disk with known-good system disk.
- 2 Replace floppy drive cable.
- 3 Replace floppy drive.
- 4 Replace logic board.
- 5 Replace processor module.

Disk does not eject

- 1 Switch off computer. Hold down mouse button while you switch computer on.
- 2 Replace floppy drive cable.
- 3 Replace floppy drive.





	<ol style="list-style-type: none"><li>4 Replace logic board.</li><li>5 Replace processor module.</li></ol>
Drive attempts to eject disk, but doesn't	<ol style="list-style-type: none"><li>1 Reseat floppy drive bezel and drive so bezel slot aligns correctly with drive.</li><li>2 Replace floppy drive.</li></ol>
Internal floppy drive runs continuously	<ol style="list-style-type: none"><li>1 Replace disk with known-good floppy disk.</li><li>2 Replace floppy drive cable.</li><li>3 Replace floppy drive.</li><li>4 Replace logic board.</li><li>5 Replace processor module.</li></ol>
MS-DOS drive does not recognize a disk formatted on a 1.4 MB drive	To read and write files with either MS-DOS or 1.4 MB drive, format all disks with MS-DOS drive first.





## Hard Drive

Single internal hard drive does not operate; drive doesn't spin

- 1 Replace hard drive power cable.
- 2 Replace hard drive. If problem resolved, reinstall IDE device driver and system software.
- 3 Replace power supply.

No internal SCSI drives operate

- 1 Verify there are no duplicate SCSI device addresses on a single SCSI bus.
- 2 Disconnect external SCSI devices and check for proper termination. Only last device in SCSI chain should be terminated.
- 3 Check internal SCSI devices for proper termination.
- 4 Replace internal SCSI data cable to which non-operational devices are attached.
- 5 Replace power supply.
- 6 Replace logic board.
- 7 Replace processor module.





Works with internal or external SCSI devices but not with both

- 1 Verify there are no duplicate SCSI device addresses
- 2 Replace terminator on external SCSI device.
- 3 Verify that SCSI device at end of internal SCSI data cable is only device terminated.
- 4 Refer to appropriate manual to troubleshoot defective external device.





## Peripherals

Cursor does not move

- 1 Check mouse connection.
- 2 Inspect inside of mouse for buildup of dirt or other contaminants. Clean mouse if necessary.
- 3 If mouse was connected to keyboard, connect mouse to computer ADB port instead. If mouse works, replace keyboard.
- 4 Replace ADB cable.
- 5 If mouse does not work in any ADB port on computer, replace mouse.
- 6 Replace logic board.
- 7 Replace processor module.

Cursor moves, but clicking mouse button has no effect

- 1 Boot from floppy or bootable CD.
- 2 Replace mouse.
- 3 Replace logic board.





Double-click doesn't open application, disk, or server

- 1 Remove duplicate system folders.
- 2 Clear parameter RAM. Hold down <Command> <Option> <P> <R> during startup but before "Welcome to Macintosh" appears.
- 3 If mouse was connected to keyboard, connect mouse to computer ADB port instead. If mouse works, replace keyboard.
- 4 If mouse does not work in any ADB port on computer, replace mouse.
- 5 Replace logic board. Retain customer's DIMMs.

No response to any key on keyboard

- 1 Check keyboard connection to ADB port.
- 2 Replace keyboard cable.
- 3 Replace keyboard.
- 4 Replace logic board.





Known-good serial  
printer does not work

- 1 Verify you have correct version of system software.
- 2 Verify that Chooser is set correctly.
- 3 Reinstall correct printer drivers.
- 4 Do clean install of system software.
- 5 Replace printer interface cable.
- 6 Replace logic board. Retain customer's DIMMs.

Known-good network  
printer does not print

- 1 Check network connections.
- 2 Verify you have correct version of system software.
- 3 Verify that Chooser is set correctly.
- 4 Does printer show up in Chooser? If so, do clean install of system software and/or network and printer software.
- 5 Replace logic board. Retain customer's DIMMs.





## CD-ROM Drive

CD-ROM drive does not work

- 1 Try using known-good compact disc.
- 2 Replace CD-ROM drive mechanism.

Macintosh does not display CD-ROM icon once CD is inserted in drive

- 1 Verify that CD-ROM software is installed.
- 2 Replace CD-ROM drive mechanism.
- 3 Replace CD-ROM data cable.







## Miscellaneous

No sound from speaker

- 1 Verify that volume setting in Control Panel is 1 or above.
- 2 Clear parameter RAM. Hold down <Command> <Option> <P> <R> during startup but before "Welcome to Macintosh" appears. Verify speaker is plugged into logic board.
- 3 Replace speaker.
- 4 Replace logic board.
- 5 Replace I/O card.



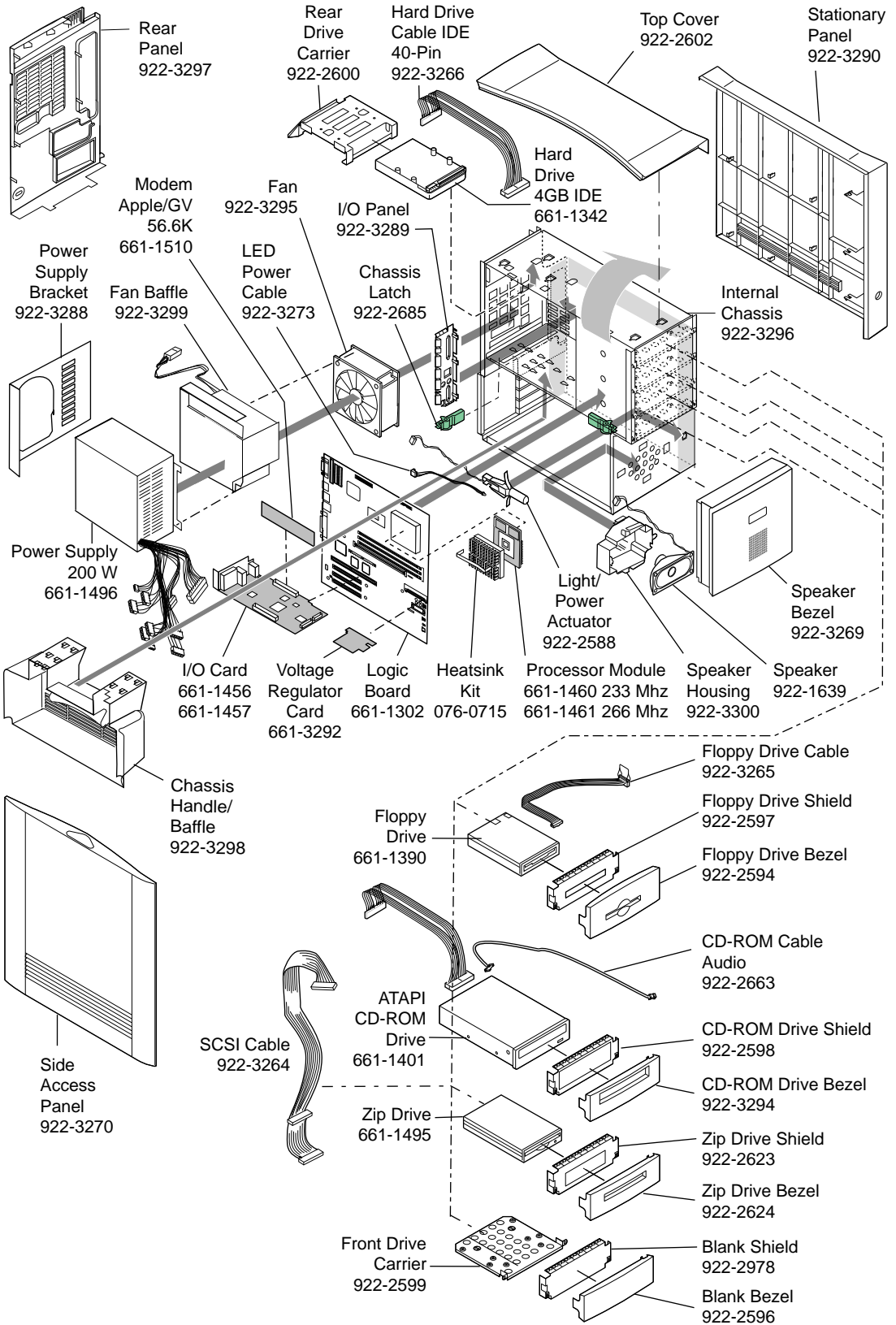


Exploded View

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Power Macintosh G3 Minitower





Power Macintosh G3 Mini Tower

