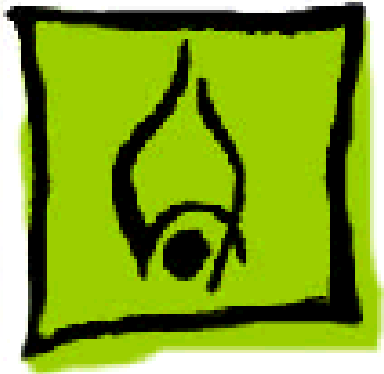




# Power Macintosh G3 Desktop

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## Hot Issues

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Power Macintosh G3 Desktop





## 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 Desktop 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 Desktop logic board has a power supply jumper, which is installed at J28. The setting of this jumper differs between the Power Mac G3 Desktop and Minitower. 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 Desktop logic board has a processor module jumper, which is 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 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 Macintosh G3 Desktop 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 Desktop 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 Desktop 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 Desktop





## Overview



The Power Macintosh G3 desktop chassis design allows you to access the logic board and its components, including the removable processor, 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 desktop has a unique PERCH slot that accepts an I/O card that provides audio capabilities of the computer.





### Features of the Power Mac G3 Desktop include

- PowerPC G3 microprocessor running at 233 MHz or 266 MHz
- RAM expandable to 192\* MB in 3 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 I/O card
- One modem slot on the I/O card 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 7-inch or 12-inch PCI cards, or
  - three 15 W cards, or
  - two 25 W 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 logic board supports a maximum of 384 MB of DRAM, but 128 MB JEDEC industry-standard DIMMs are too tall to fit in the chassis, which limits the DRAM to 192 MB.





## 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. (See “Logic Board Diagram” later in this chapter to locate the Cuda reset button.) 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 card. Each supports 16-bit stereo sound output and input, available simultaneously.

The sound circuitry on the I/O card 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
- A compact disc in the CD-ROM player
- Analog sound from the cross-platform card in a PCI slot
- Analog sound from optional communication cards

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 the I/O card. The I/O card provides one mini jack for sound output on the back of the enclosure.

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 card provides 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.

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.





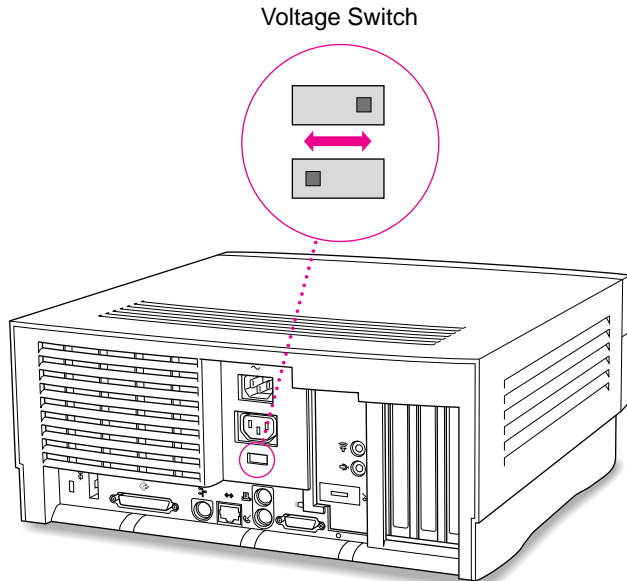
- Sound record with playthrough—input sound is recorded and also sent to the speakers and sound output jacks.





## 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.





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







## PowerPC G3 and Backside Cache

Backside cache is a significant architectural design change from earlier PowerPC processors. The main advantage of the backside cache architecture is the speed of the dedicated CPU-to-L2 cache interface. Using the dedicated bus allows the CPU to access the fast L2 cache storage through a high speed bus without addressing the slower system bus or competing with other devices attached to the system bus. In comparison, a “far-side” cache running on the system bus would limit that SRAM interface to 50MHz.

The PowerPC G3 microprocessor interfaces with SRAM storage via a dedicated bus running at various multiples of the core PLL CPU speed. With high speed L2 SRAM and a dedicated L2 bus, the CPU can access stored information up to the speed of the processor clock. L2 access is determined by the clock ratio setting. For example, with a 250MHz





PowerPC G3, and a 2.5 L2 bus ratio, the backside cache bus speed will be 100MHz, twice the speed of the system bus.

## 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 on the Power Mac G3 Desktop model is 2 MB, and the largest is 32 MB. The largest DIMM supported is a two-bank DIMM of 64 MB using 32 Mbit SDRAM devices.

While the Power Mac G3 Desktop logic board supports a maximum RAM expansion of 384 MB, the 128 MB JEDEC industry-standard DIMMs are too tall to fit in the Desktop chassis. (The Power Macintosh G3 accommodates a RAM DIMM height of 1.15 inches maximum.) Therefore, the





maximum DRAM expansion for the Power Mac G3 Desktop is 192 MB.

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

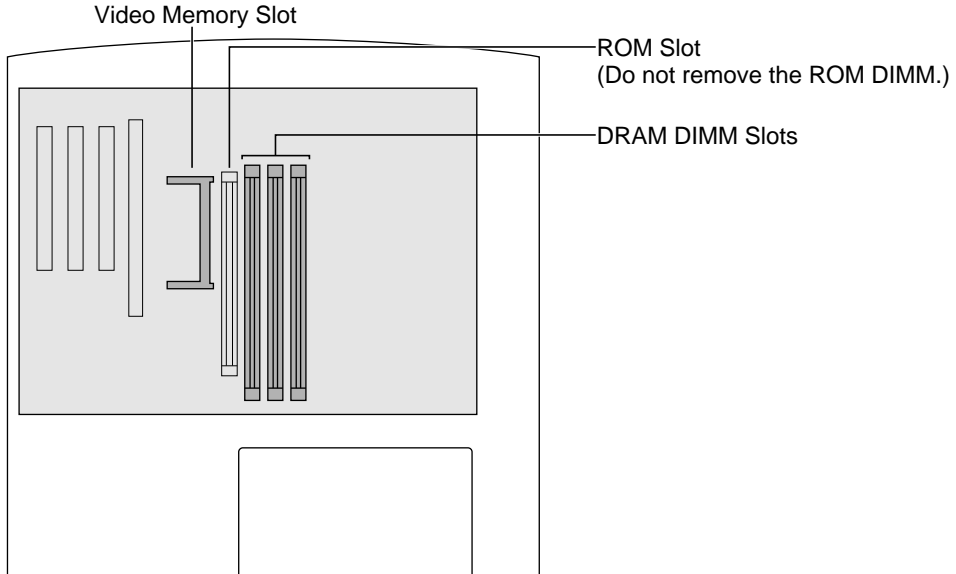
The Power Macintosh G3 logic board comes with 2 MB of Synchronous Graphic RAM (SGRAM) video memory soldered on. The logic board also contains a video memory expansion slot that accepts a Small Outline DIMM (SO-DIMM) to increase video memory up to a maximum of 6 MB. Apple supports a 4 MB SGRAM SO-DIMM 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 Macintosh computers.





# DIMM Slots





## Peripheral Component Interconnect (PCI)

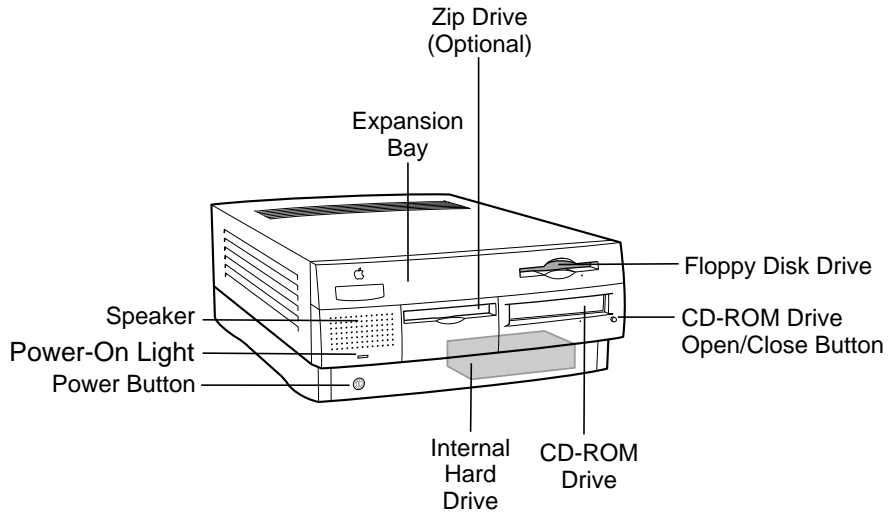
The Peripheral Component Interconnect (PCI) expansion slots accept 6.88-inch and 12.283-inch PCI cards. Because the PCI bus is an industry standard, most existing PCI 2.0-compliant cards (with the addition of a Mac OS-specific software driver) will work in these computers.

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.



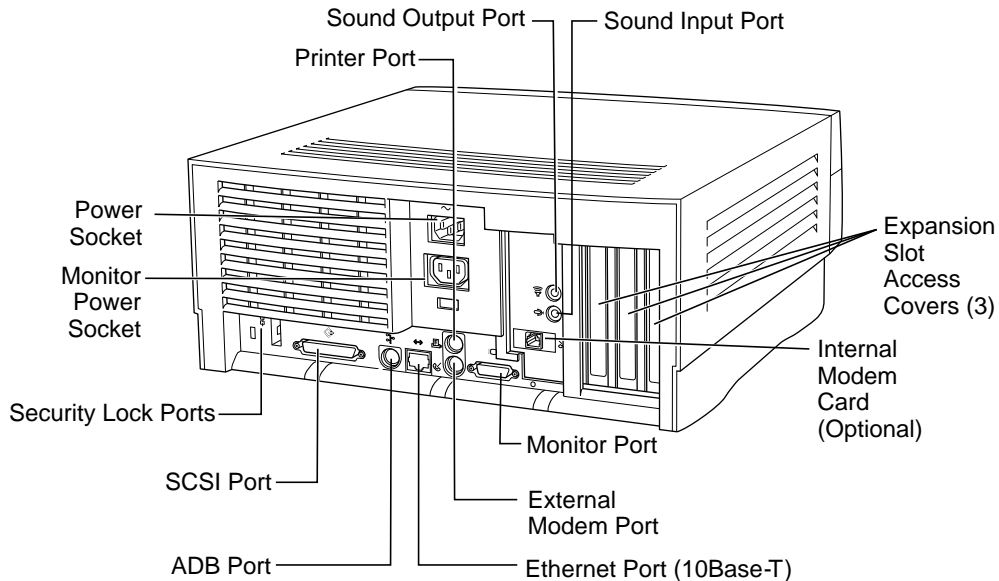


# Front View





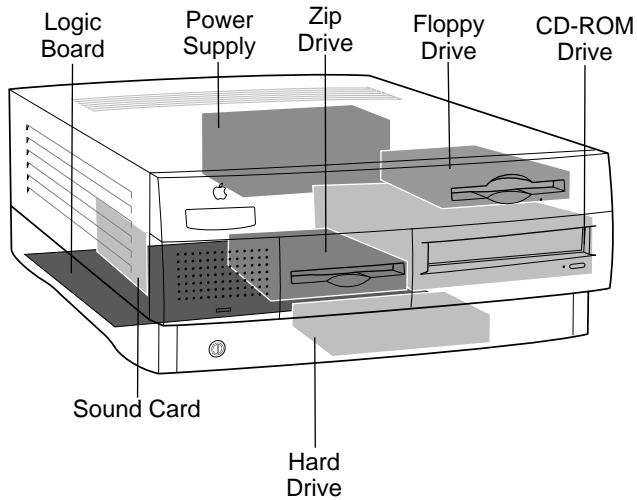
# Rear View





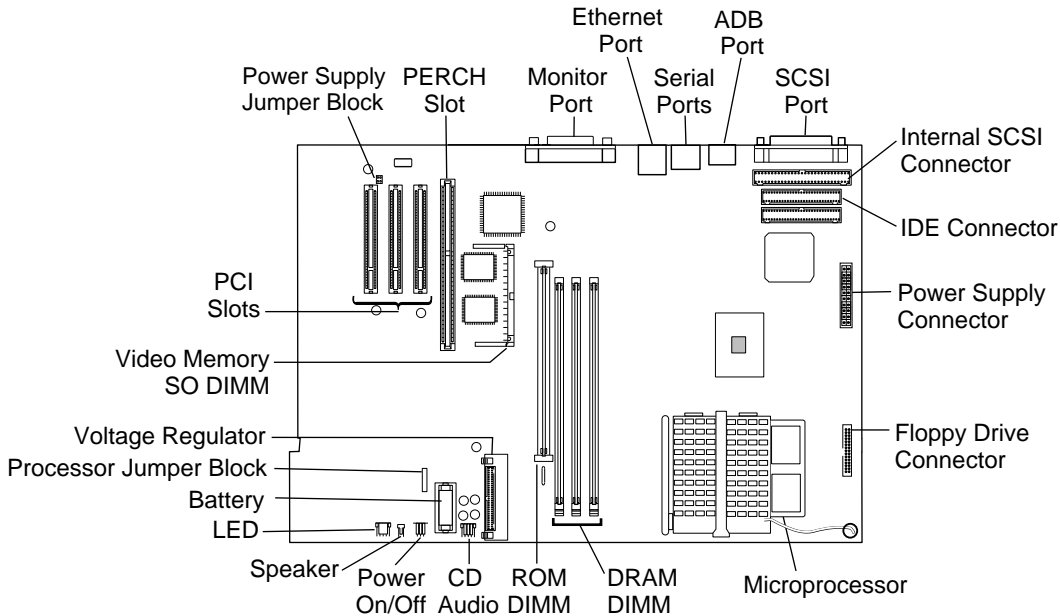


# Internal Locator





# Logic Board





## 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.

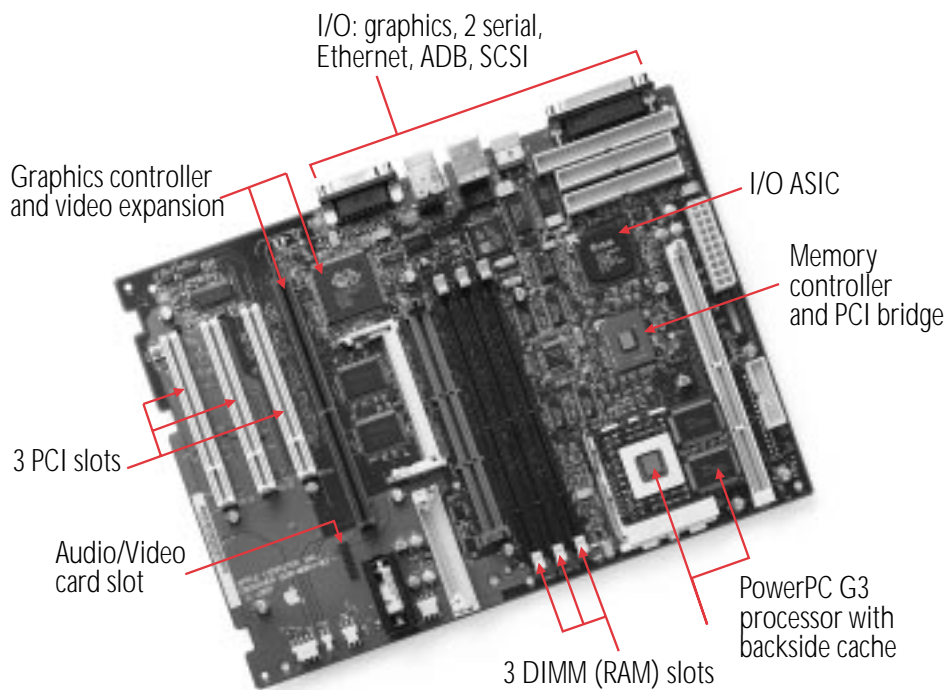
**Enclosure.** The board's efficient use of space is also the key to our ability to use the same logic board in two very different physical enclosures. The Power Macintosh G3 series is currently available in a sleek, low-lying desktop model and a convenient, space-saving minitower. Both enclosures reflect 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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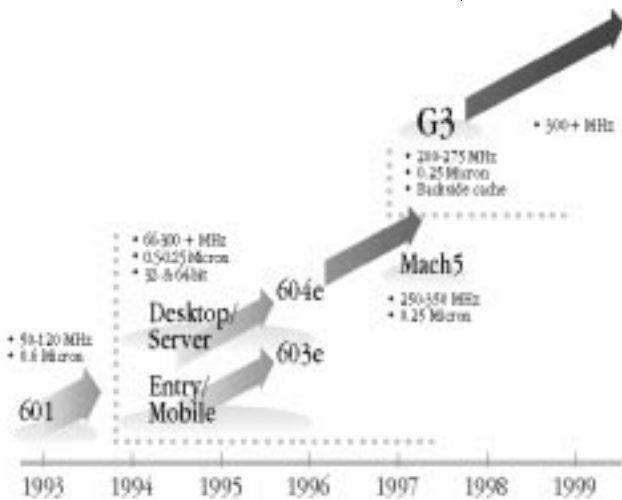


# The PowerPC G3 Processor: Taking the Macintosh to the Next Level

## 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

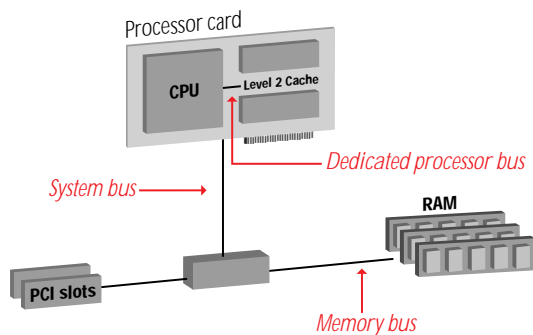
The performance enhancements of the PowerPC G3 processor significantly reduce the usefulness of clock speed in attempting to compare computer performance. Apple systems based on this processor consistently outperform systems with higher clock speeds—in fact, they also outperform Pentium II–based systems.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

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## Specifications

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Power Macintosh G3 Desktop





## Processor

### **CPU**

PowerPC G3 RISC microprocessor running at 233 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 192 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 Level 2 cache module, 3.3 V with SRAM on 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

Two SCSI expansion bays for 3.5" devices. 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 QuickDraw graphics





## I/O Cards

### PERCH Slot

The PERCH slot connector is a 182-pin microchannel connector that supports the Apple I/O cards.

**Note:** The PERCH slot does **not** accept PCI cards.

### Sound

Rear jack for stereophonic speakers

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

### 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 AC, rms, single phase, depending on voltage switch setting
<b>Frequency</b>	50–60 Hz
<b>Maximum Power</b>	230 W maximum continuous 290 W peak input





# Physical

## Dimensions

<b>Height:</b>	6.15 in. (15.6 cm)
<b>Width:</b>	14.37 in. (36.5 cm)
<b>Depth:</b>	16.93 in. (43.0 cm)
<b>Weight:</b>	22 lb. (9.97 kg); weight varies depending on devices installed





## 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

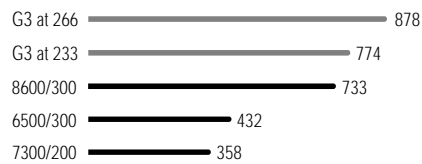
### Mac OS 8 system software

- 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.  
L02515A



Take Apart

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Power Macintosh G3 Desktop







Top Housing



## Top Housing

No preliminary steps are required before you begin this procedure.

**Note:** The top housing covers the top, front, and left and right sides of the computer.





Left  
Tab

Right  
Tab

- 1 Press the two tabs at the front corners of the top housing to release the top housing from the bottom chassis.





- 2 Pull the top housing forward about 1 to 2 inches and lift straight up to remove the top housing from the computer.



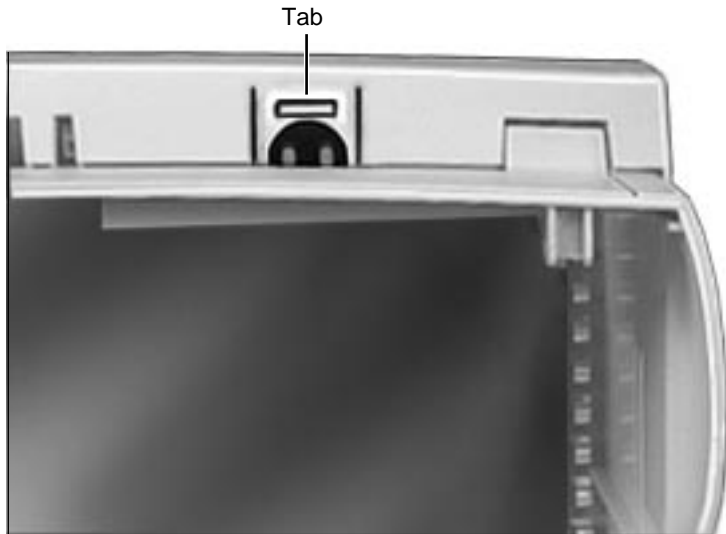


## Bezels

Before you begin, remove the top housing.

**Note:** As you face the computer, the bezels are in the middle of the top housing's front panel. Depending on the unit, you may either see a blank bezel or a Zip drive bezel in the middle of the front panel.





- 1 From the underside of the top housing, pull out on the moon-shaped opening at the bottom of the bezel to release the tab. Lift up the bezel to remove it from the top housing.

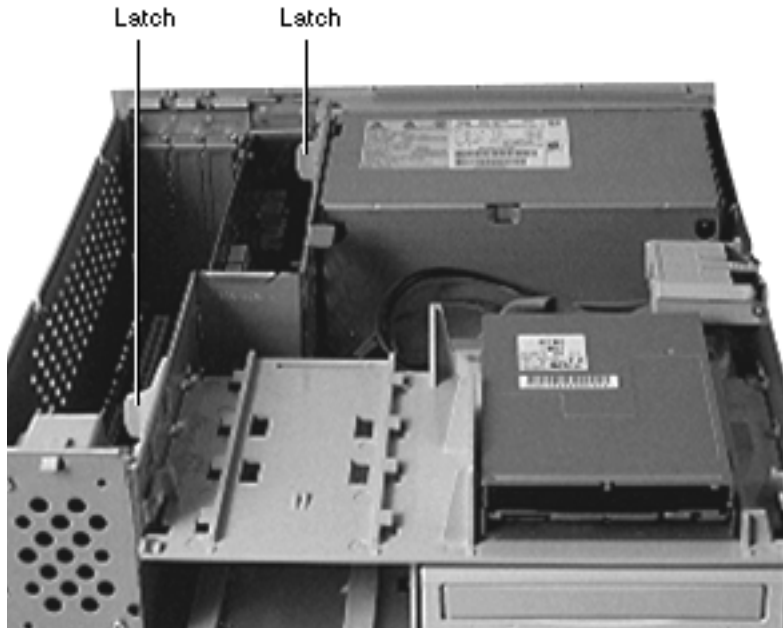


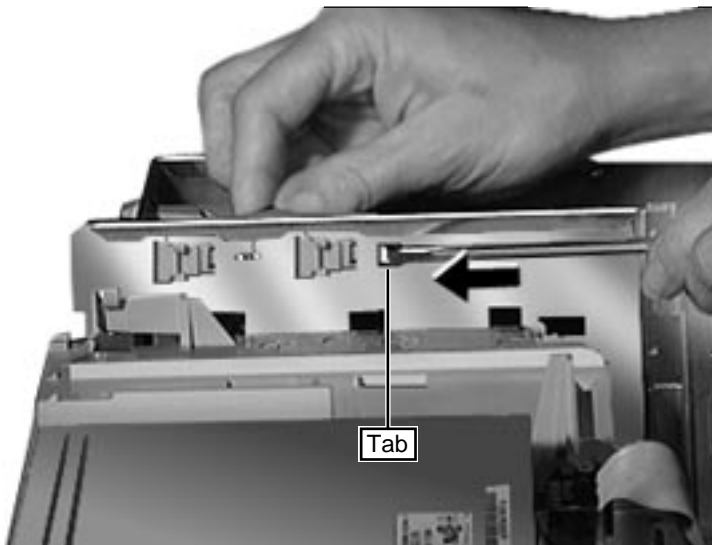


## Chassis Latch

Before you begin, remove the top housing.

**Note:** The chassis latches mount in the internal chassis and secure the internal chassis to the external chassis frame.





- 1 Use a screwdriver to push out the tab indicated in the illustration. Slide the latch forward and lift it from the chassis.

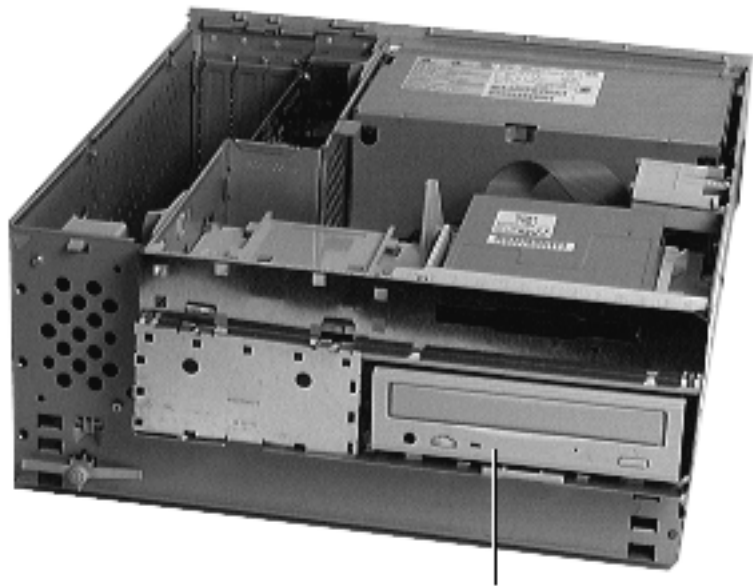




## CD-ROM Drive

Before you begin, remove the top housing.

**Note:** As you face the computer, the CD-ROM drive is in the bottom right drive bay.



CD-ROM Drive







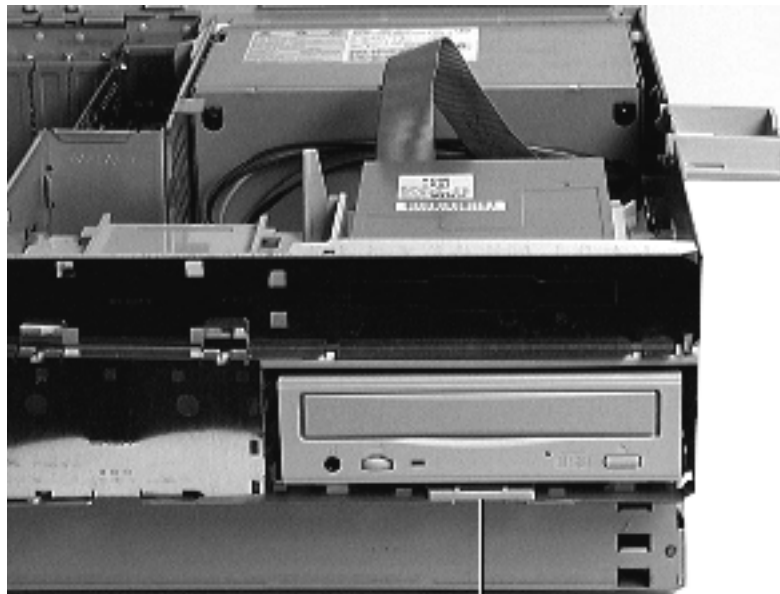
Power  
Connector

SCSI  
Connector

CD-ROM  
Audio  
Connector

- 1 Disconnect the SCSI data cable, power cable, and CD audio cable from the back of the CD-ROM drive.





Release Tab

- 2 Pull up the release tab and slide the CD-ROM forward to remove it from the internal chassis.

**Note:** Be sure to remove the CD-ROM drive from its carrier before returning the drive to Apple.

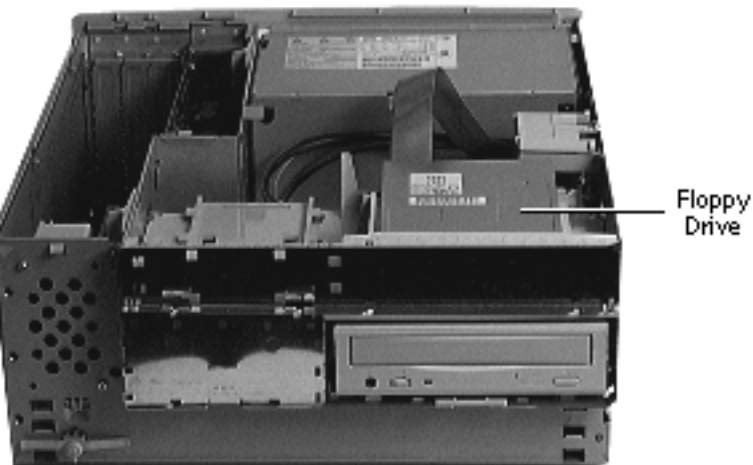




## Floppy Drive

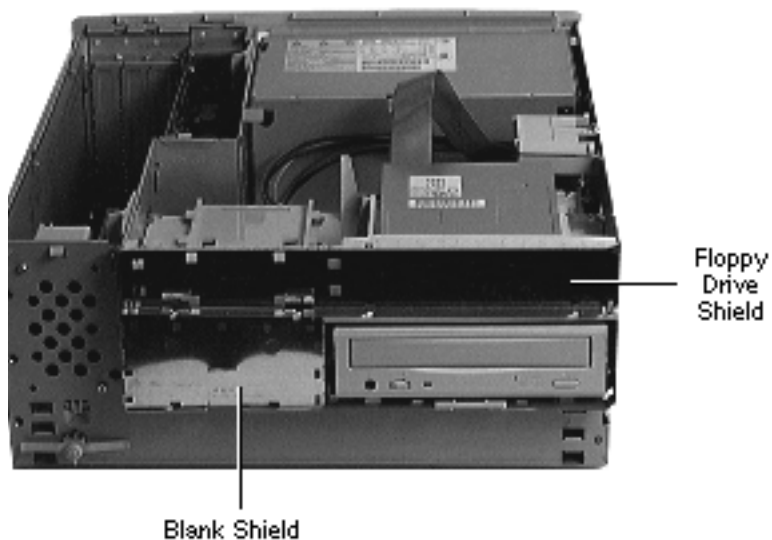
Before you begin, remove the top housing.

**Note:** As you face the computer, the floppy drive is in the top right drive bay.



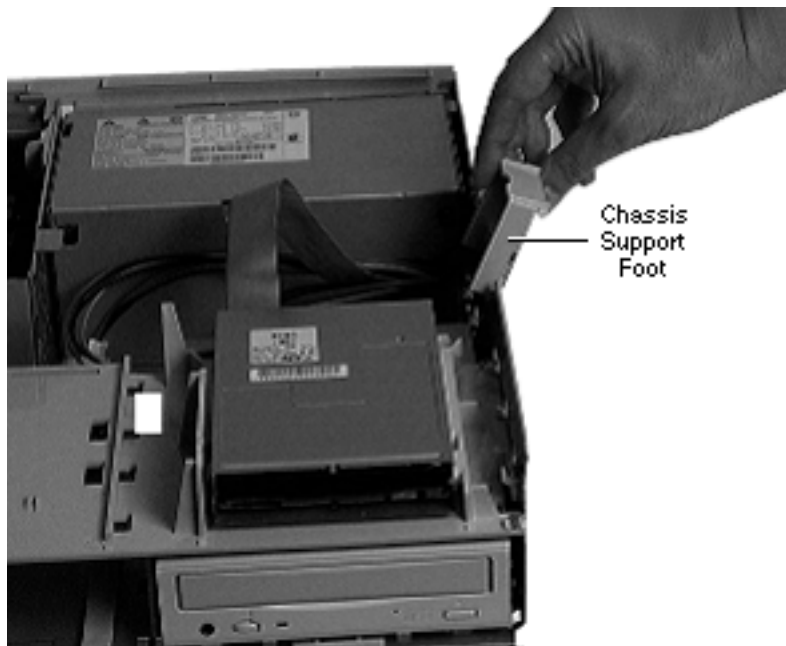


- 1 Remove the blank shield and the floppy drive shield from the front of the unit.





- 2 Flip open the chassis support foot.





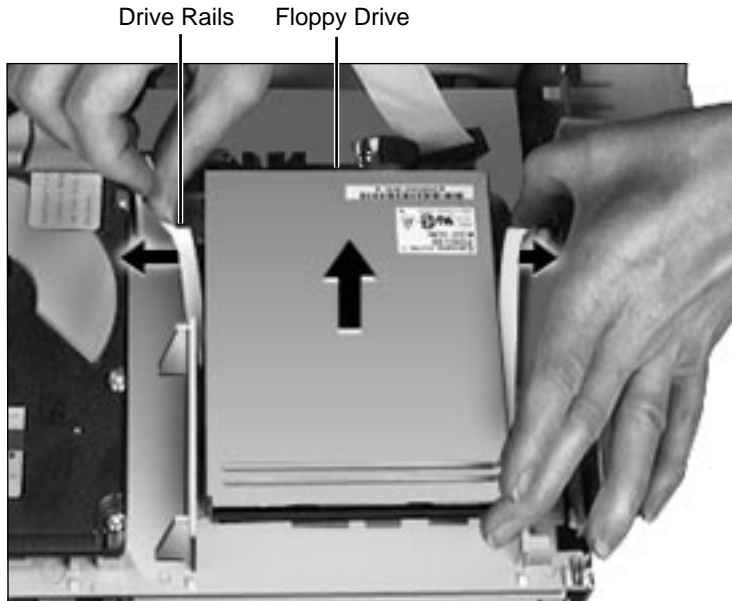
Floppy Drive Cable

Floppy Drive



- 3 Disconnect the floppy drive cable from the back of the floppy drive.





- 4 Pull out on the plastic drive rails that secure the floppy drive to the drive chassis and push back the drive to release it.

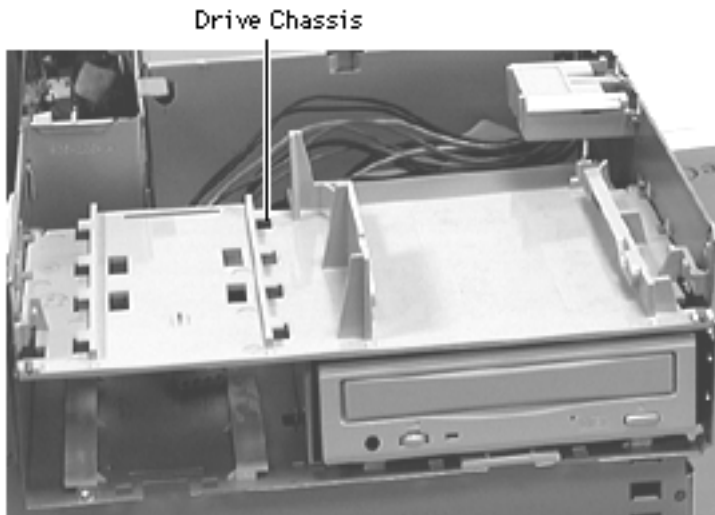
**Replacement Note:** When replacing the floppy drive, you must install an EMI gasket (p/n 922-1895). Peel off the adhesive and attach the gasket in the center of the drive's top surface, with the "V" of the gasket pointing at the front edge of the drive.



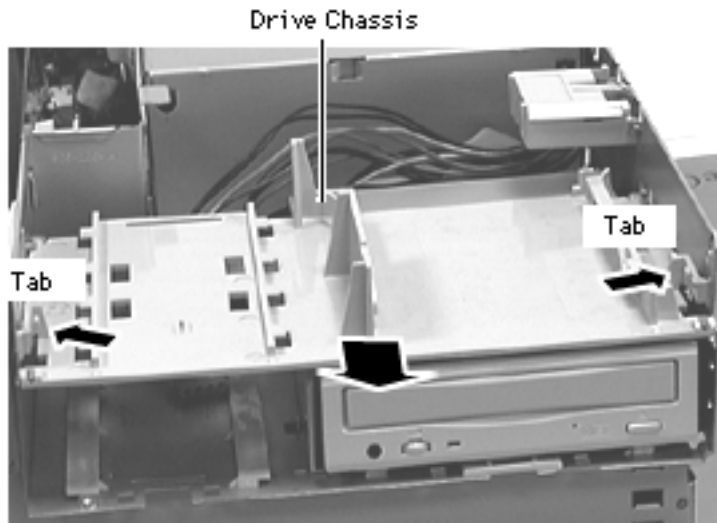


## Drive Chassis

Before you begin, remove the top housing.

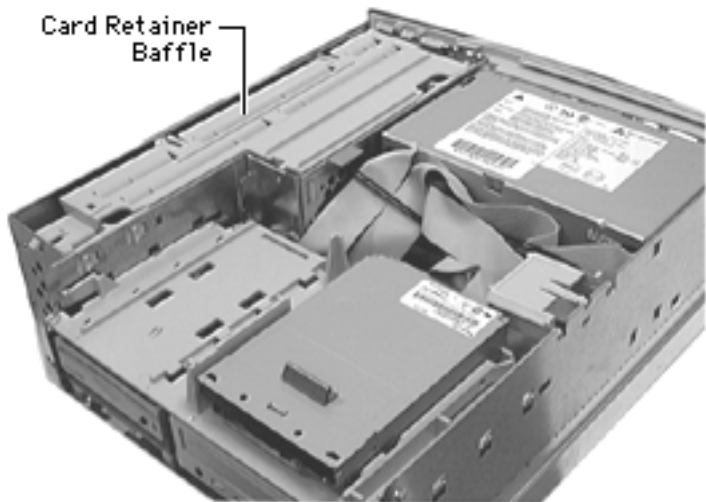






- 1 Push in on the two tabs securing the drive bracket to the internal chassis and slide the drive bracket out to remove it.



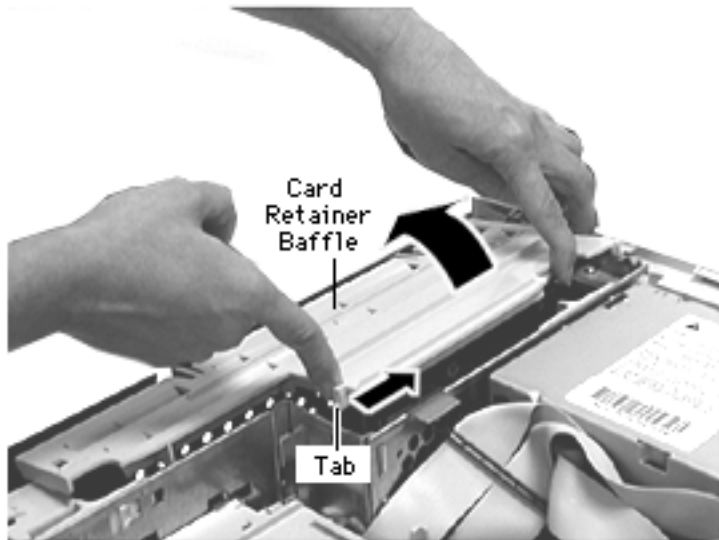


Card Retainer  
Baffle

## Open/Remove Card Retainer Baffle

Before you begin, remove  
the top housing.

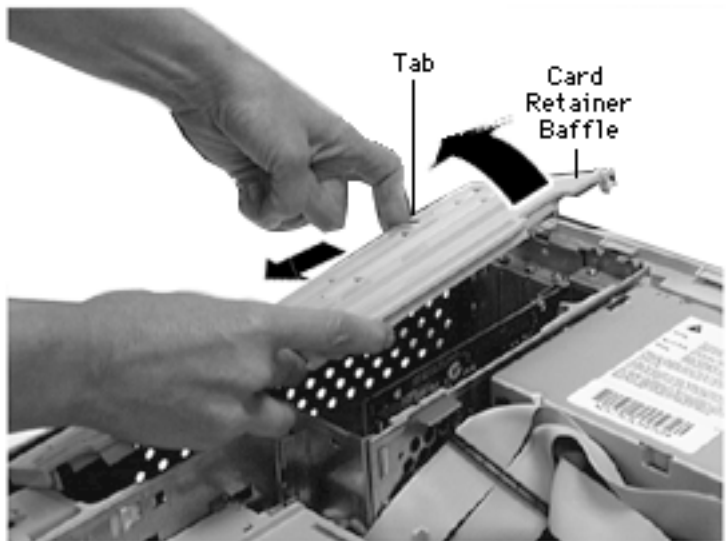




**To Open the Card Retainer Baffle:**

- 1 With one hand lift up on the baffle while, with the other hand, pushing in on the tab that secures the baffle to the internal chassis. This procedure opens the card retainer baffle.





### To Remove the Card Retainer Baffle:

- 2 With the baffle slightly raised, push in on the top tab to release it from the chassis frame and then pull the baffle out and away from the chassis to free the bottom tab.

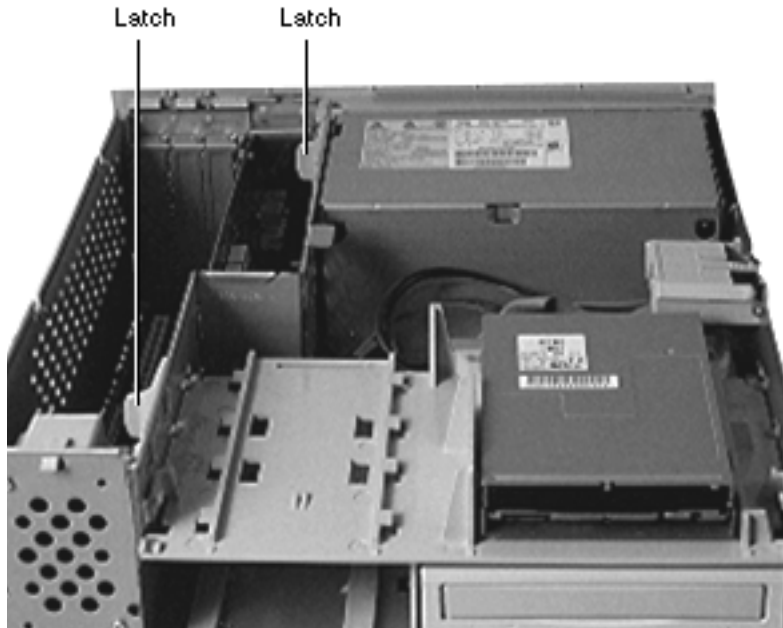




## Open Internal Chassis

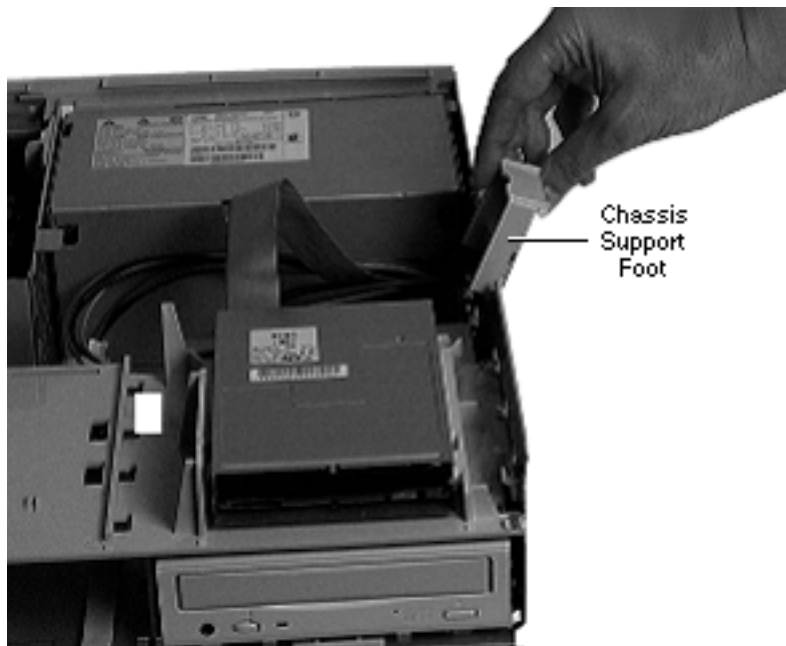
Before you begin, open the card retainer baffle.

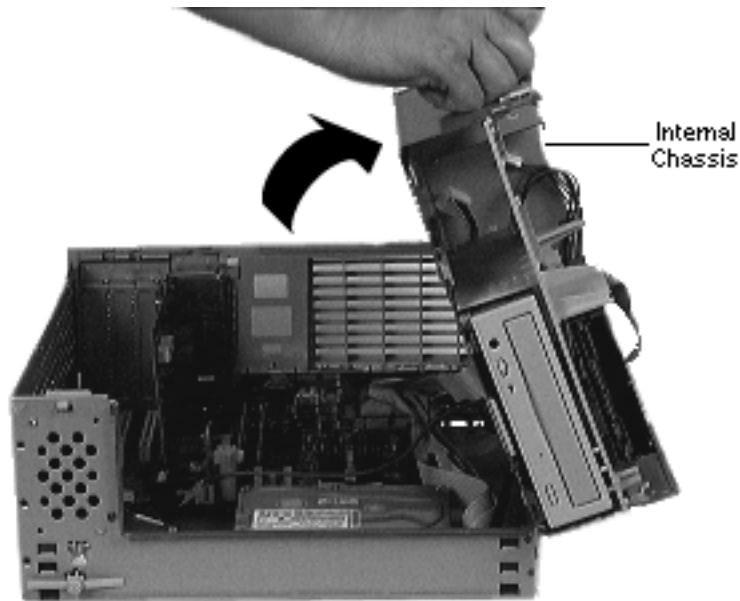
- 1 Release the chassis latches.





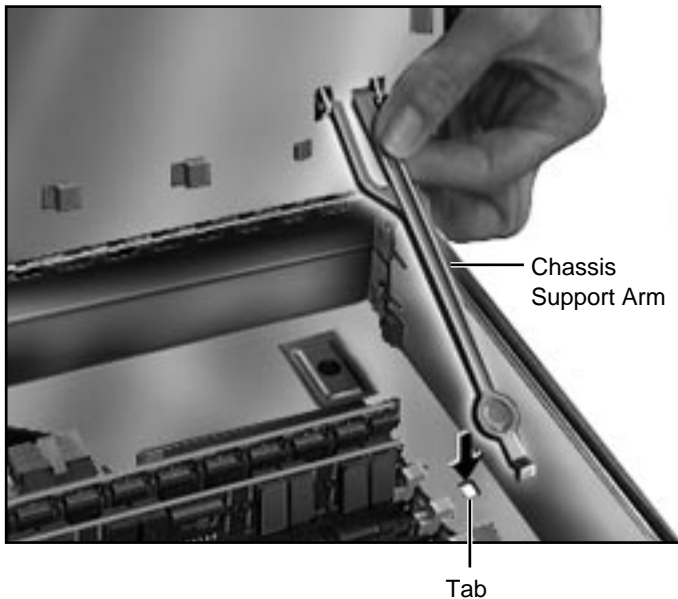
- 2 Flip out the chassis support foot.





- 3 Swing open the internal chassis that contains the power supply. Be sure the internal chassis is perpendicular to the bottom chassis and fully supported by the chassis support foot.





- 4 To secure the internal chassis in the up position, flip down the chassis support arm. Make sure the tab on the bottom of the support arm is securely fastened in the hole provided in the bottom chassis.

**Warning:** To be safe, never work on the computer with the internal chassis in the up position unless the chassis support arm is down and securely fastened.





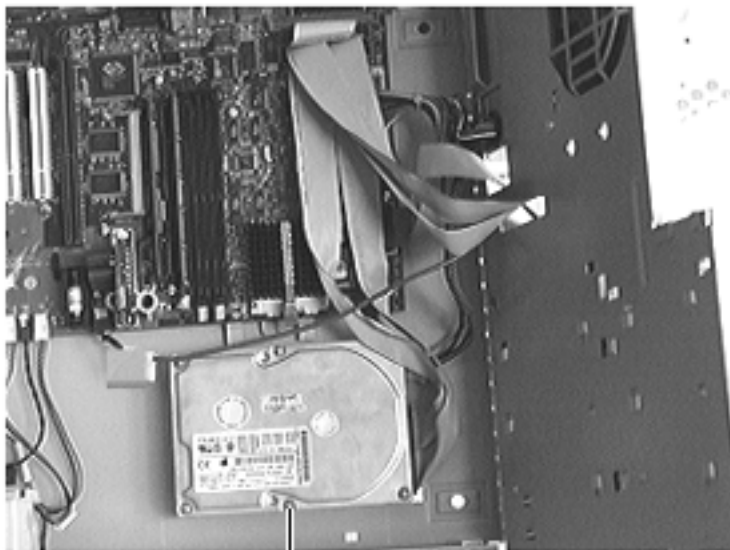


## Hard Drive

Before you begin, do the following:

- Remove top housing
- Open Card Retainer Baffle
- Open internal chassis

**Note:** The hard drive is in the bottom of the chassis, in front of the logic board.

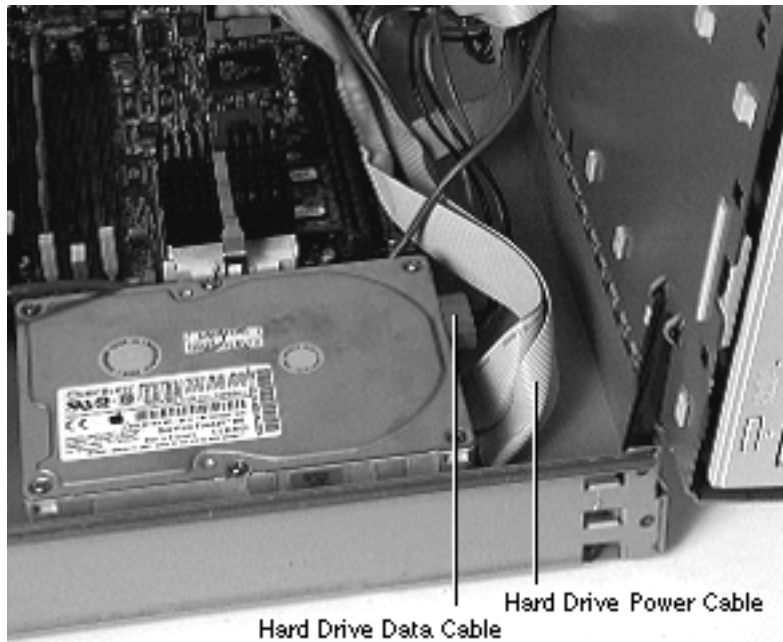


Hard Drive





- 1 Disconnect the cables from the hard drive.



Hard Drive Data Cable

Hard Drive Power Cable





Release Tab

- 2 Pull up the release tab at the front of the hard drive and push the back of the hard drive to remove it from the drive chassis.

**Note:** For information on removing the hard drive from its carrier and returning drives, cables, and carriers to Apple, refer to Additional Procedures in the Hard Drives manual.



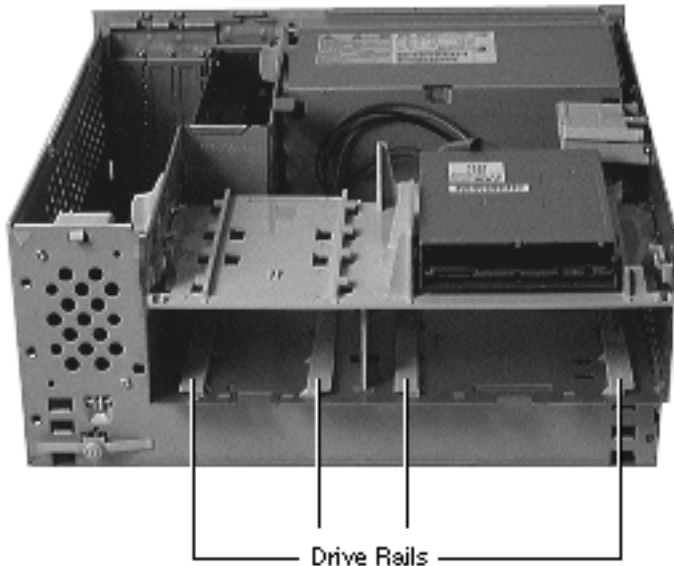


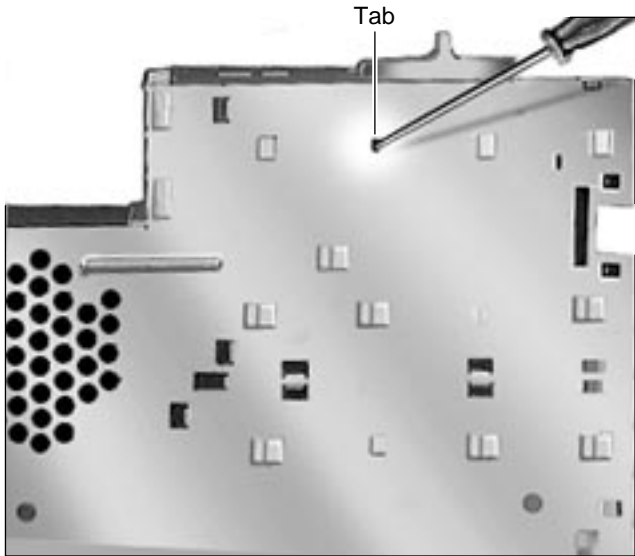
## Drive Rails

Before you begin, do the following:

- Remove top housing
- Remove CD-ROM drive
- Remove Zip drive
- Open Card Retainer Baffle
- Open internal chassis
- Remove hard drive

**Note:** The drive rails attach to the chassis underneath the CD-ROM drive, Zip drive, and hard drive.





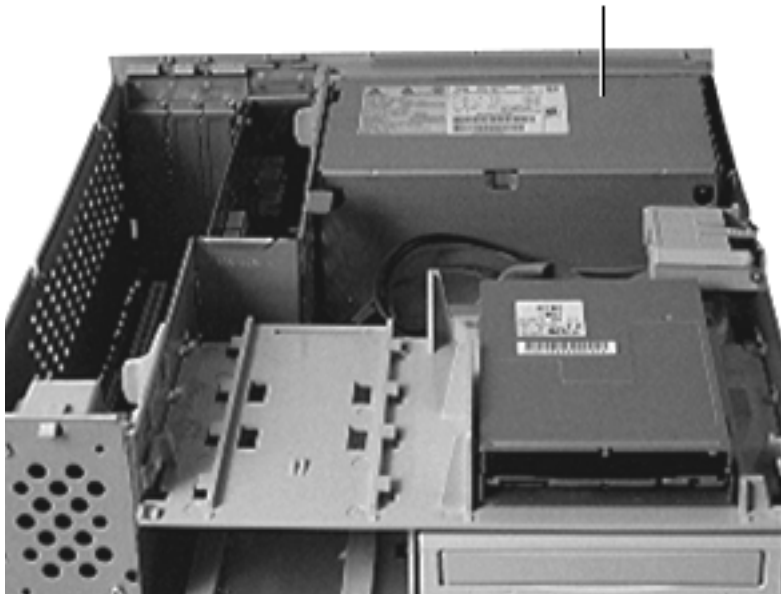
- 1 Use a screwdriver to push out the tab indicated in the illustration.
- 2 Slide the drive rail either forward or backward (depending on which way the tabs are facing) and lift it from the chassis.





## Power Supply

Power Supply



Before you begin

- Remove top housing
- Open Card Retainer Baffle
- Open internal chassis

**Note:** As you face the computer, the power supply is in the back right corner.

**IMPORTANT:** To avoid damaging the computer, be sure the voltage switch on the back of the power supply is set correctly (115V in the U.S.) when you replace the power supply.



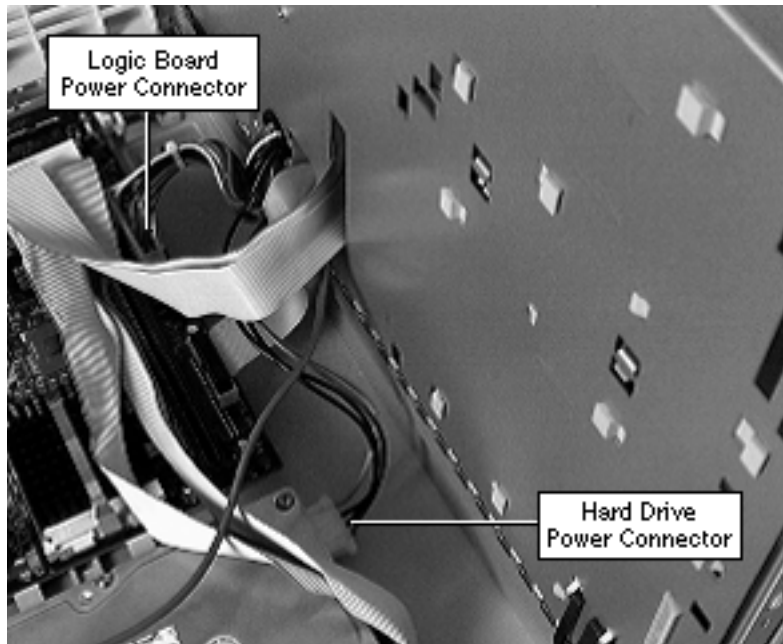


- 1 Disconnect the power supply cable from the CD-ROM drive.
- 2 Open the internal chassis.

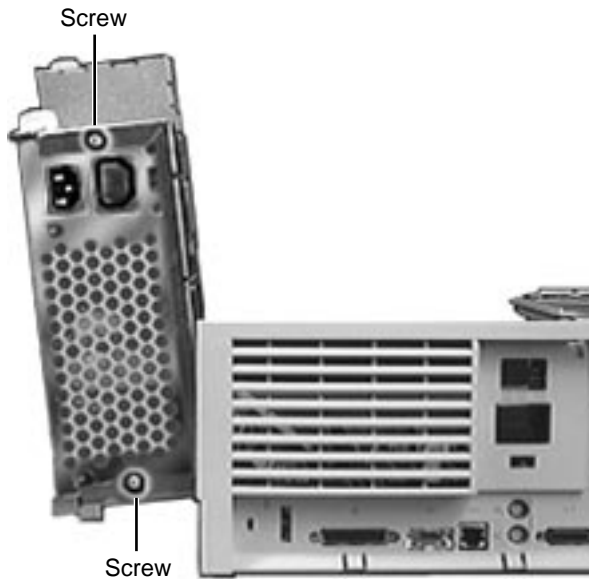




- 3 Disconnect the power supply cable from the hard drive and the logic board.

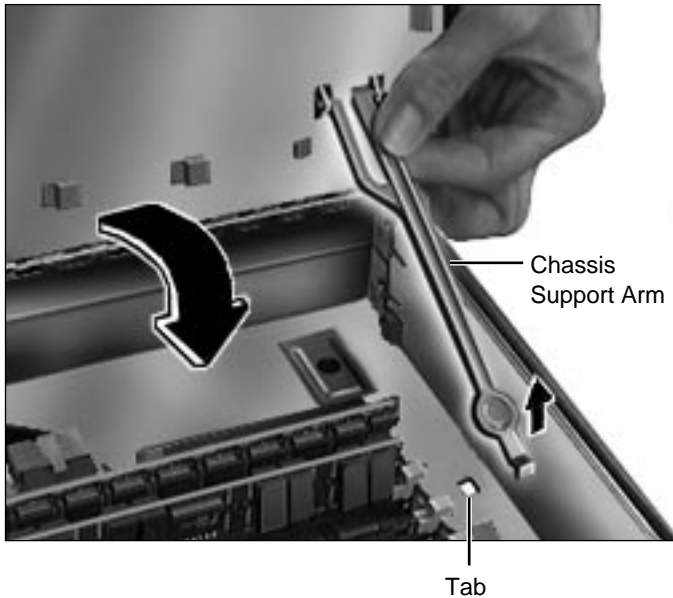






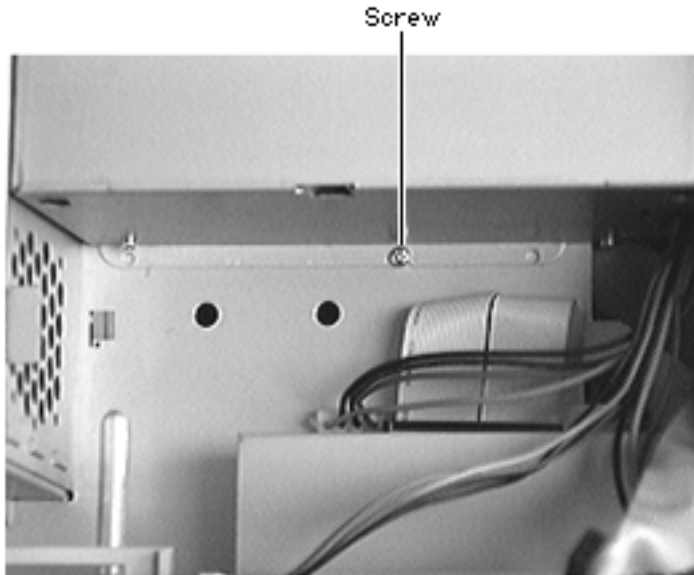
- 4 From the back of the computer, remove the two screws that secure the power supply to the chassis.





- 5 Release the chassis support arm and swing down the internal chassis.





- 6 Remove the screw that secures the power supply to the bottom of the internal chassis





- 7 Slide the power supply forward and pull it out of the computer. You will need to feed the power supply cables that connect to the logic board up through the hole in the chassis.

**IMPORTANT:** Make sure the switch on the back of the power supply is set to the correct voltage (115V in the U.S.). (Refer to the international voltage chart in the Basics chapter under the topic “Voltage Switch” for more information.) The





switch is accessible through the computer's rear panel when the power supply is installed.

**Replacement Note:** There are two metal tabs on the back of the metal chassis and one metal tab on the bottom of the chassis that lock into the power supply. When replacing the power supply, slide it back until it locks into place.



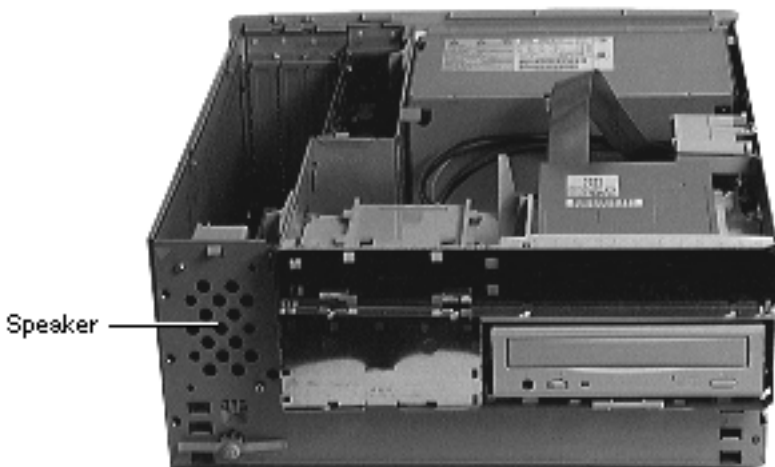


## Speaker

Before you begin, remove the top housing.

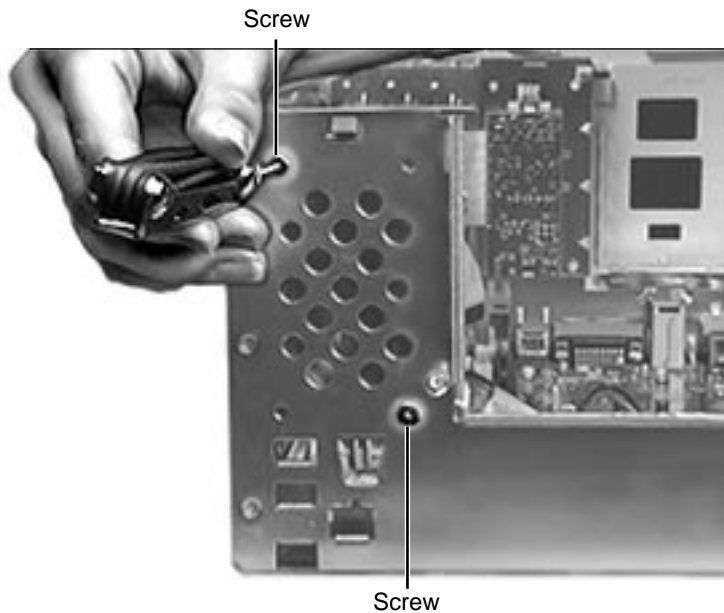
**Note:** As you face the computer, the speaker is in the front left corner of the bottom chassis.

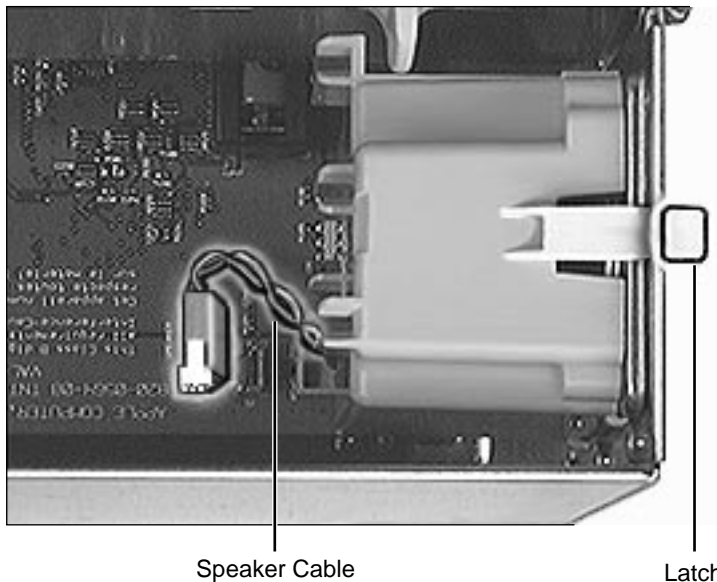
- 1 Swing open the internal chassis.





- 2 Remove the two Torx screws that secure the speaker to the metal chassis.





- 3 Disconnect the speaker cable from the logic board.
- 4 Press the latch holding the speaker to the chassis and lift the speaker out of the computer.



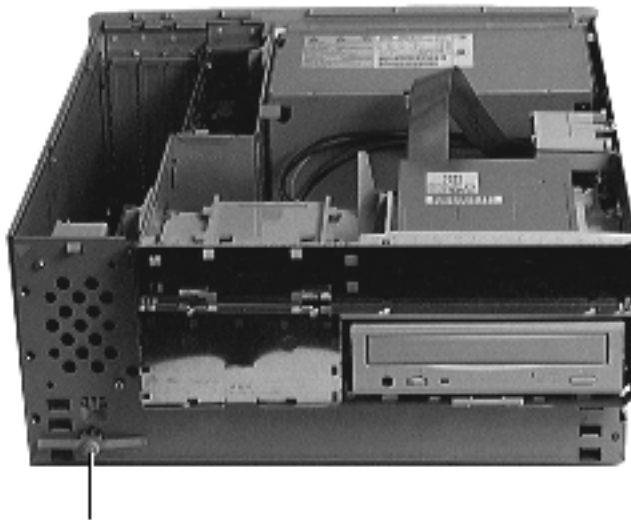




## Power Actuator

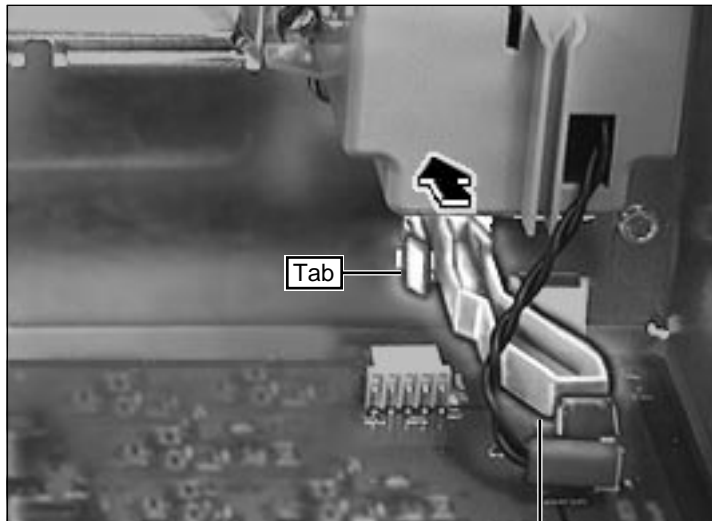
Before you begin, remove the top housing.

**Note:** As you face the computer, the power actuator is in the front left corner of the bottom chassis (directly beneath the speaker).



Power Actuator





Tab

Power Actuator

- 1 Push in the tab that secures the power actuator to the chassis and push the power actuator out of the computer.

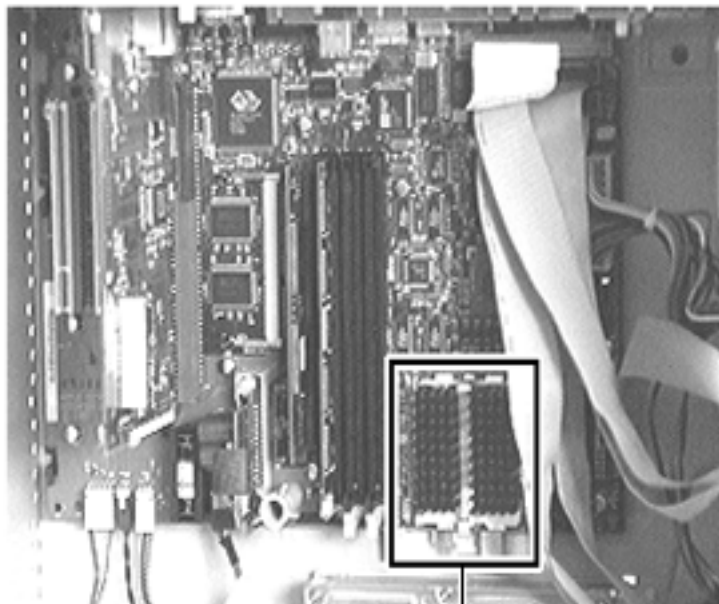




## Processor Module

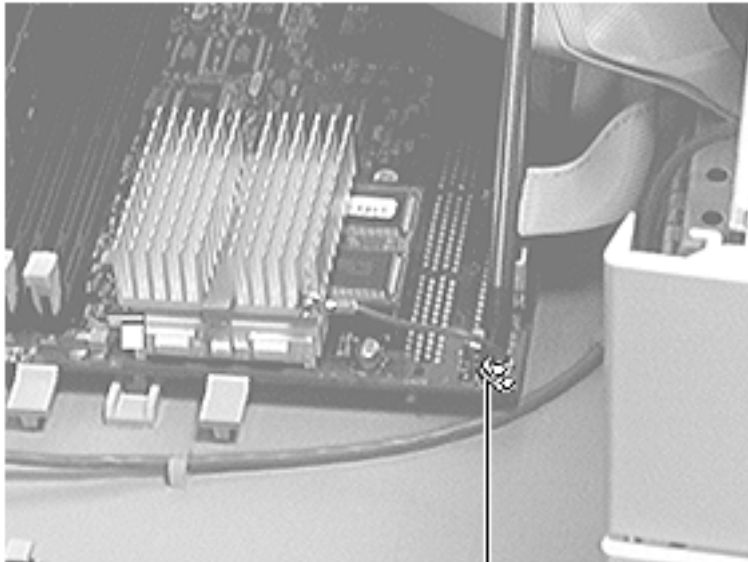
Before you begin, do the following:

- Remove top housing
- Open Card Retainer Baffle
- Open internal chassis



Processor w/Heatsink



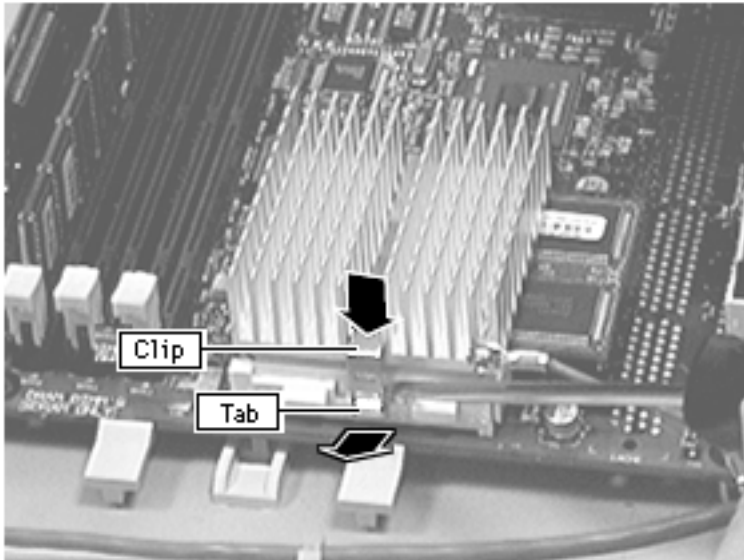


Screw

- 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.

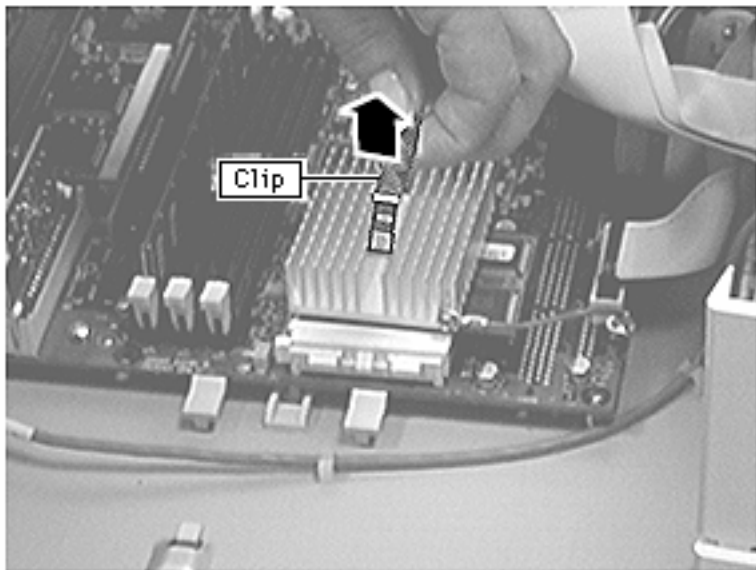




**Warning:** The heat sink may be hot to the touch.

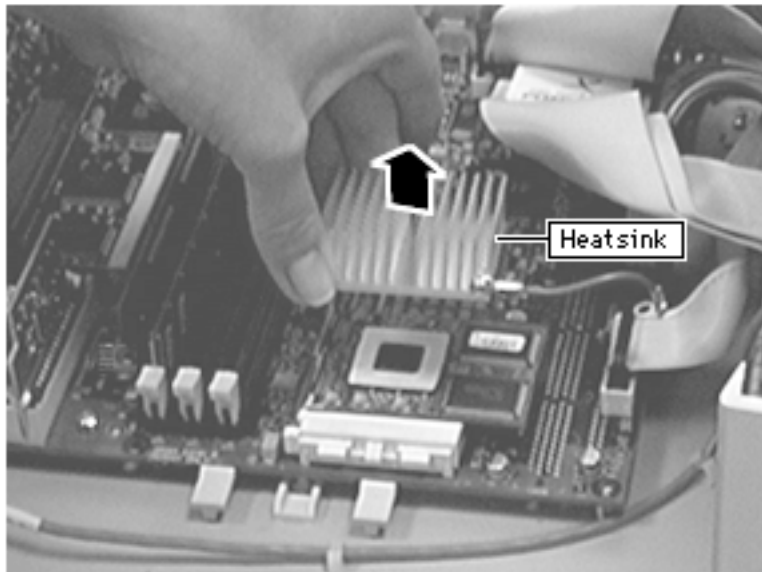
- 2 While pressing down on the top of the clip that secures the heatsink, use a small flatblade screwdriver to lift up on the front tab of the clip to release it.





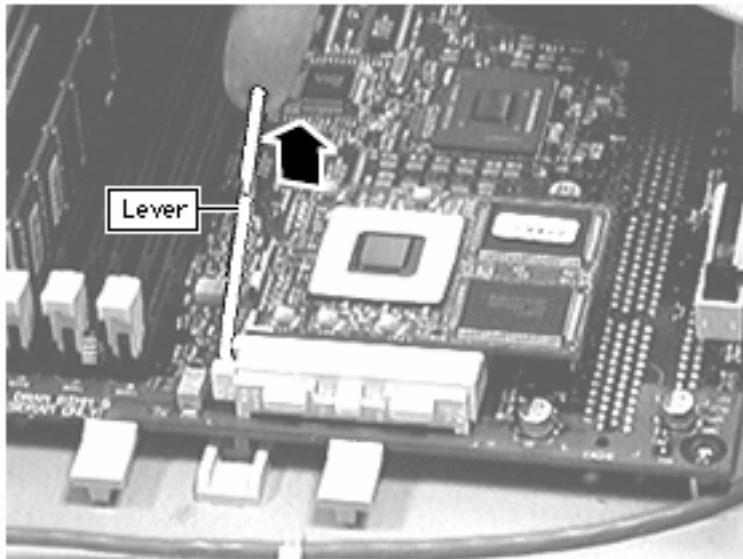
- 3 Lift up the clip and remove it from heatsink.





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





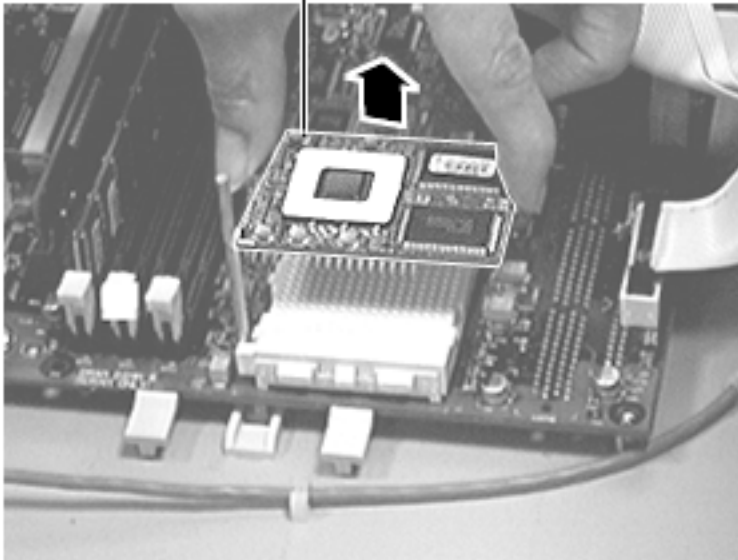
- 5 Lift the metal lever at the left of the processor module.







Processor Module

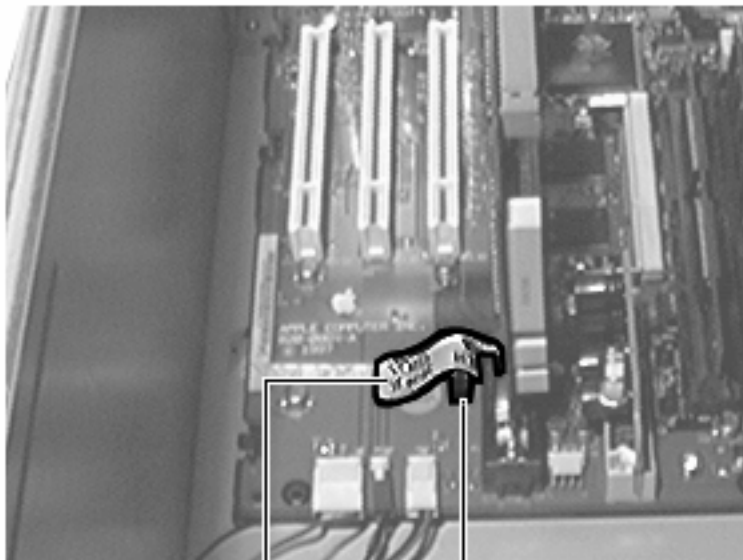


- 6 Pick up the processor module by the edges and gently lift straight up to remove it. Be careful not to bend the pins underneath the module.

**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.

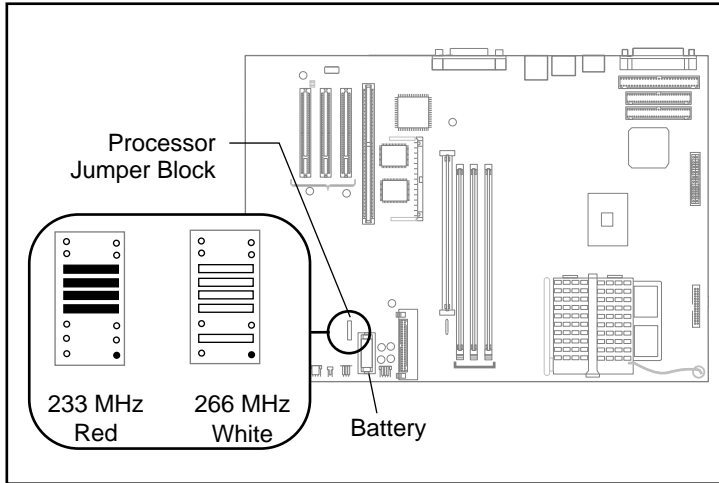


Warranty  
StickerJumper  
Block

- 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.



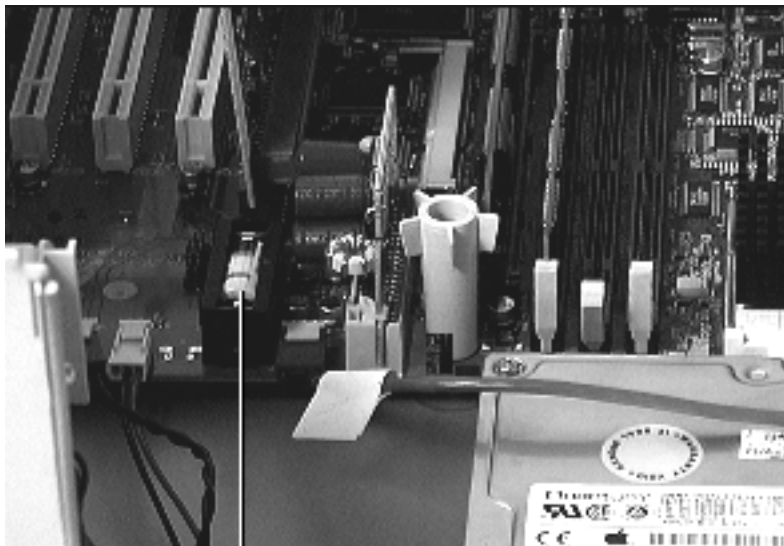


## Battery

Before you begin, do the following:

- Remove top housing
- Open Card Retainer Baffle
- Open internal chassis

**Note:** As you face the computer, the battery is near the front left corner of the logic board.

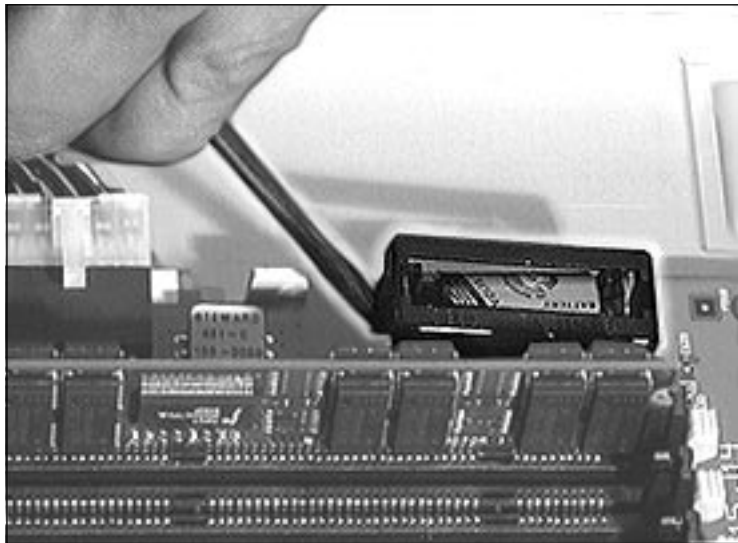


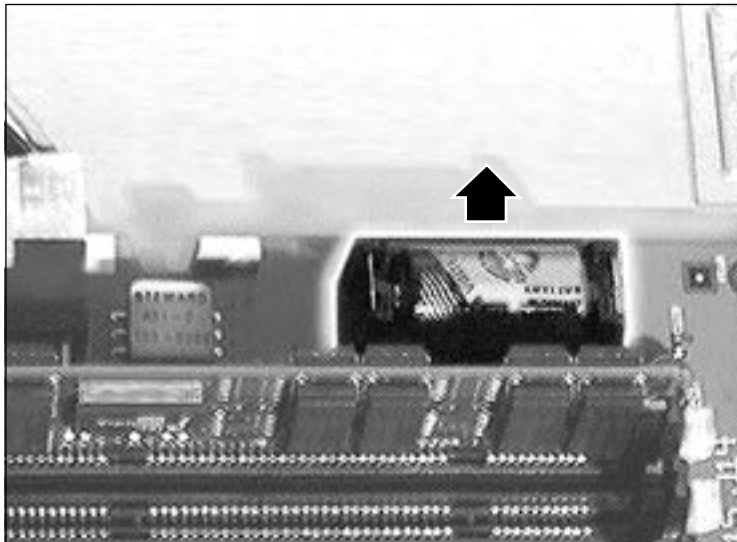
Battery





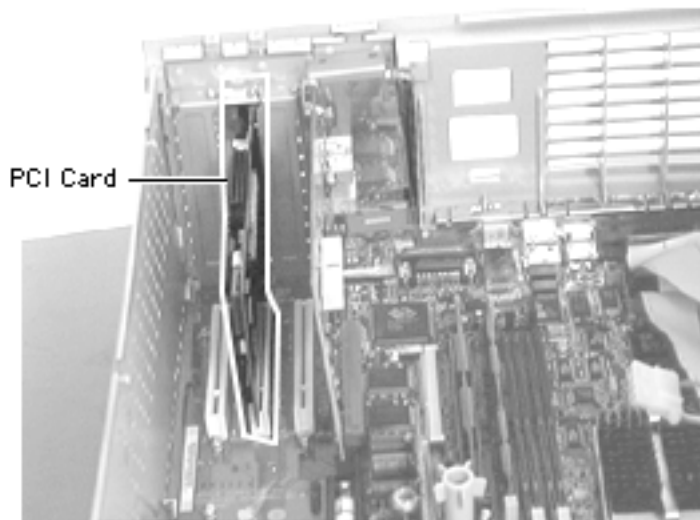
- 1 Use a screwdriver to gently pry up one side of the battery cover.





- 2 Lift up the battery to remove it from the logic board.





## PCI Cards

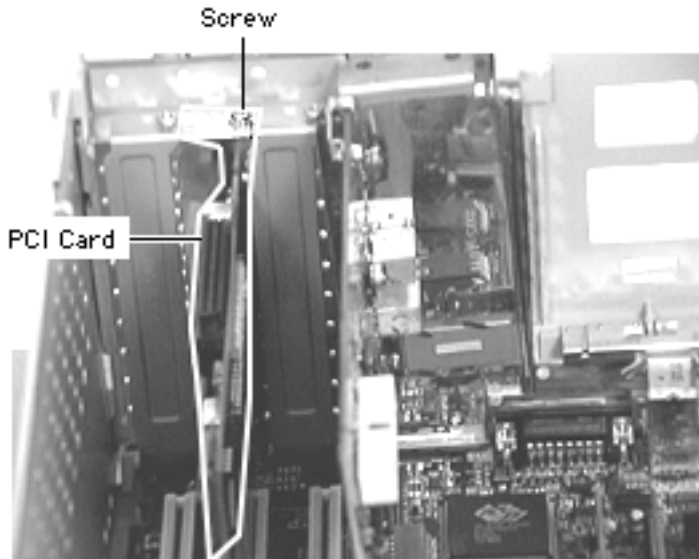
Before you begin, do the following:

- Remove top housing
- Open Card Retainer Baffle
- Open internal chassis

**Note:** PCI expansion cards, if present, install perpendicularly to the logic board (and directly behind the I/O audio card) in one of three PCI slots.

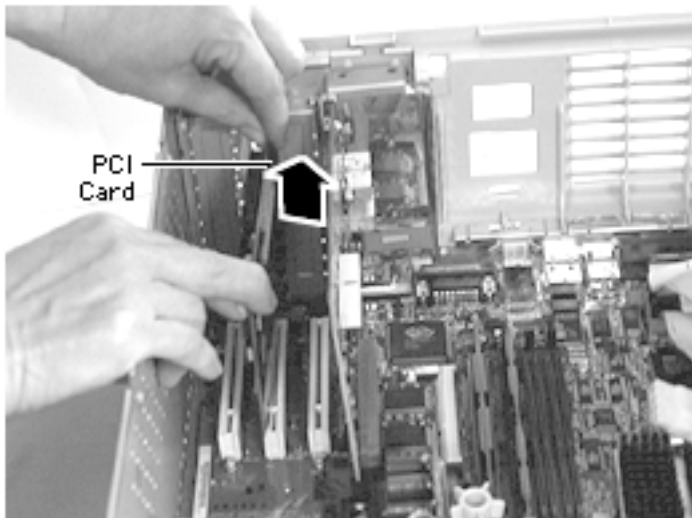






- 1 Remove the screw that secures the PCI card to the back of the chassis.



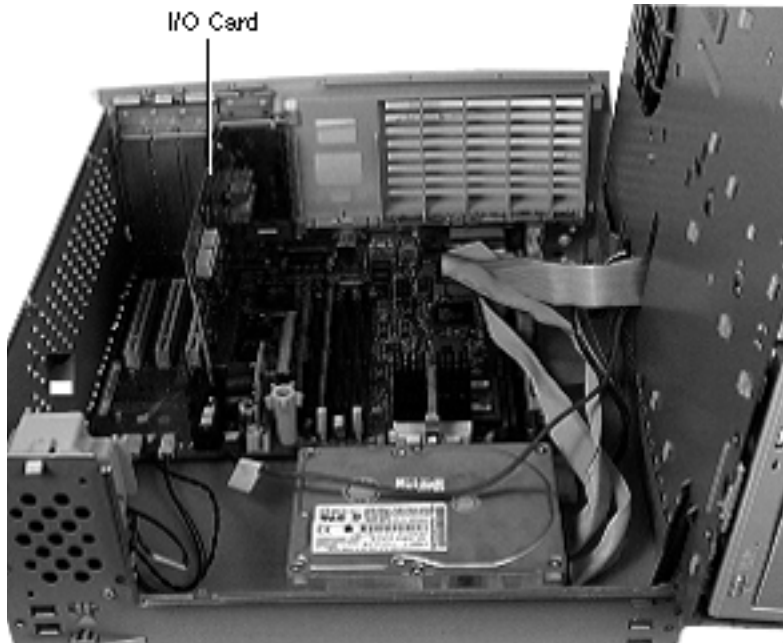


- 2 Grab the corners of the PCI card and pull up the card to remove it.





I/O Card



## I/O Card

Before you begin, do the following:

- Remove top housing
- Open internal chassis

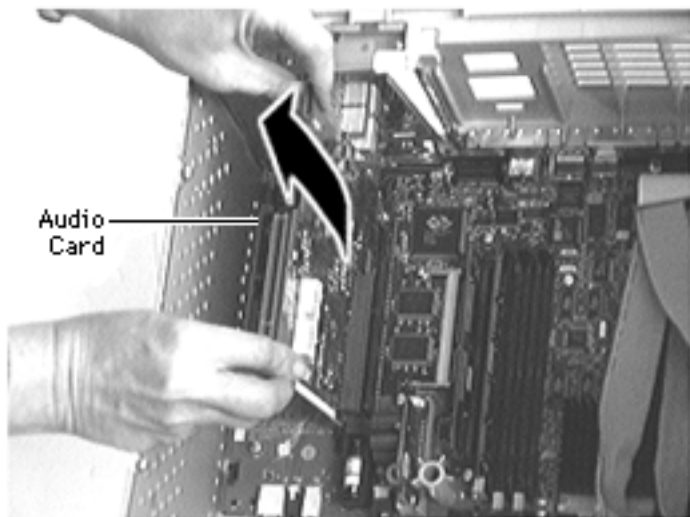
**Note:** The I/O card installs perpendicularly to the logic board. It's located under the expansion card cover next to the PCI expansion slots.

- 1 Remove the two screws that secure the I/O card to the back of the chassis.





- 2 Grab the corners of the I/O card and pull up the card to remove it.



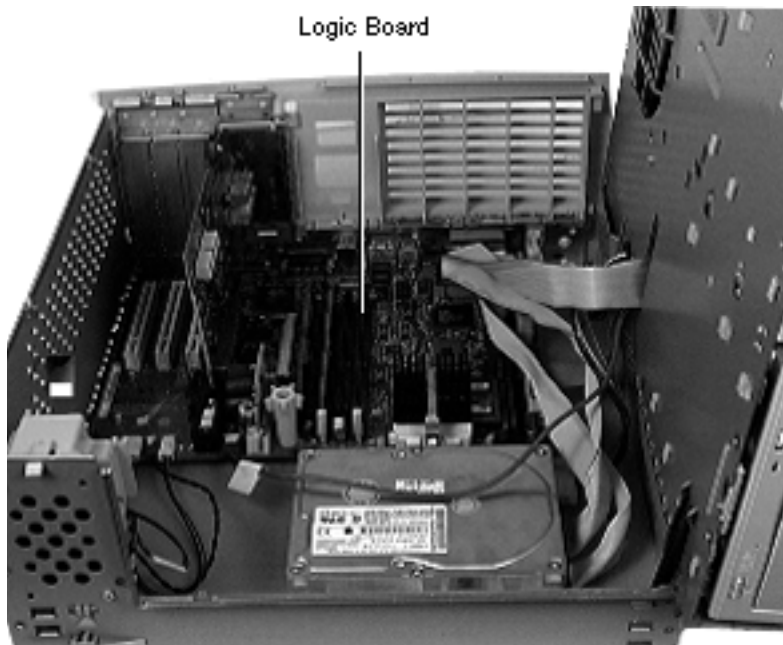


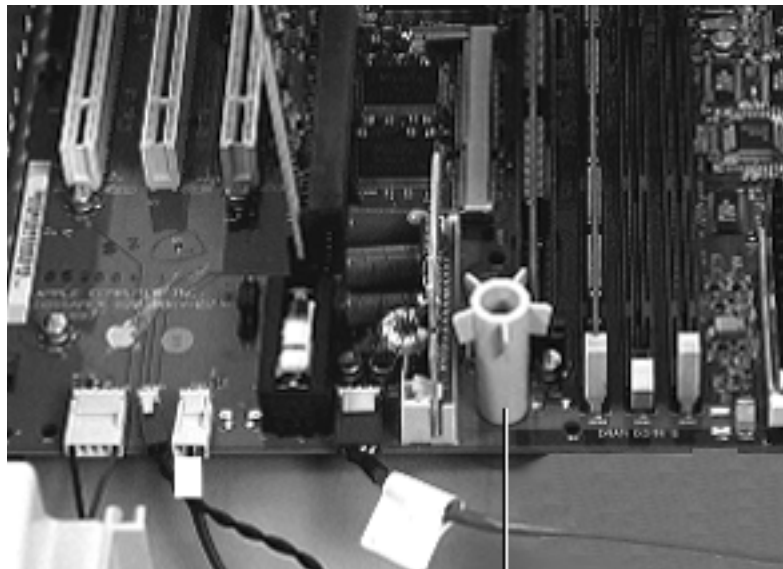
## Logic Board

Before you begin, do the following:

- Remove top housing
- Open Card Retainer Baffle
- Open internal chassis
- Remove PCI cards (if present)
- Remove I/O card
- Remove processor module (only if you are replacing the logic board)

**Note:** The logic board is located in the very bottom of the bottom chassis.

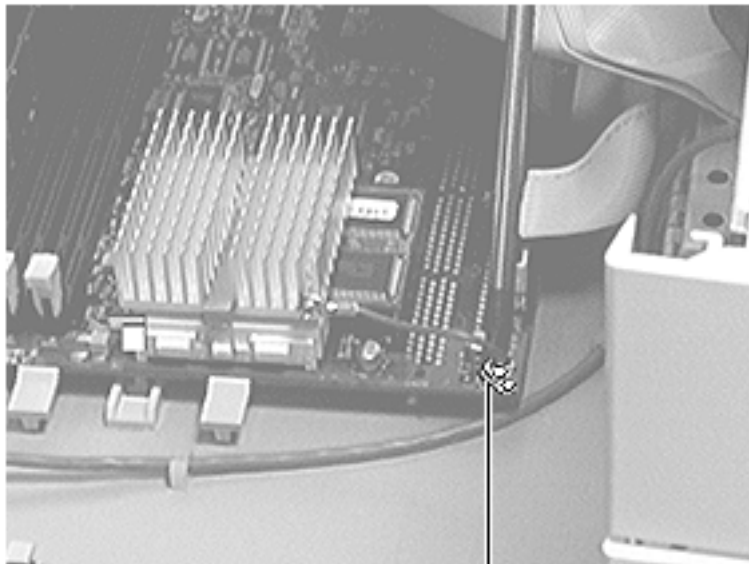




Top Column Support

- 1 Swing open the expansion card cover to provide access to the logic board.
- 2 Disconnect all cables from the logic board.
- 3 Remove the screw inside the top column support that secures the logic board to the chassis.



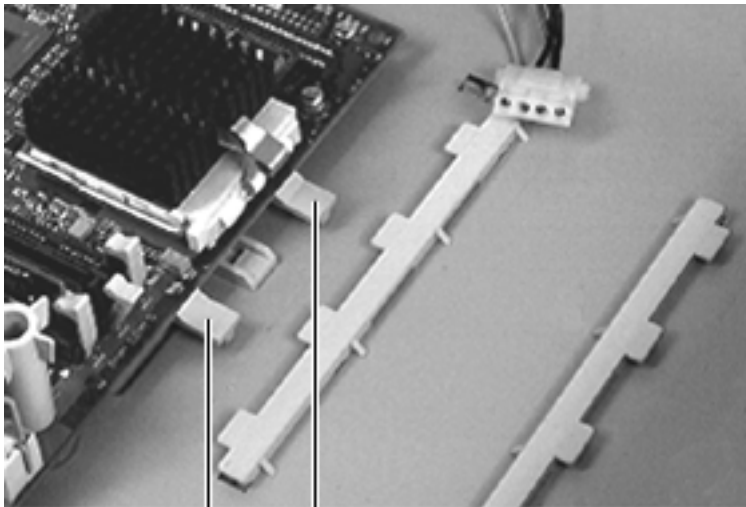


Screw

- 4 Remove the screw that 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.





Logic Board Tabs

- 5 Press down on the two tabs at the front of the logic board and slide the board forward (away from the rear panel) to release it from the tabs. Lift the logic board from the chassis to remove it.

**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”. (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.

**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.

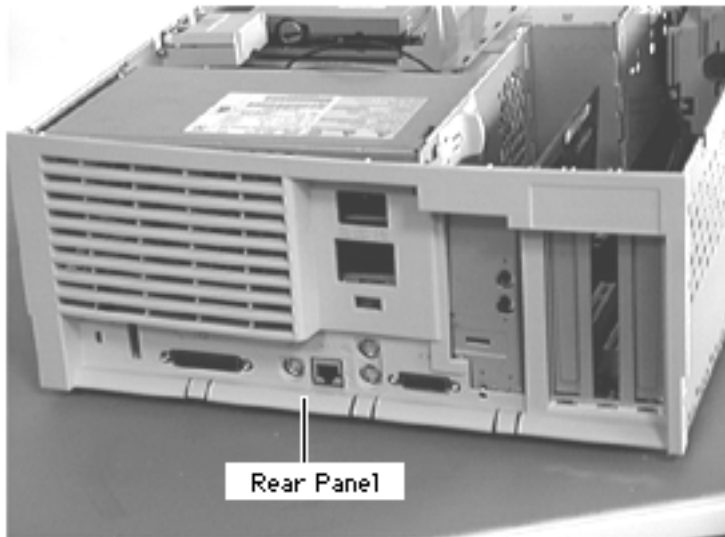
**Note:** Before returning the logic board to Apple, remove the processor module, processor jumper and warranty sticker,





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





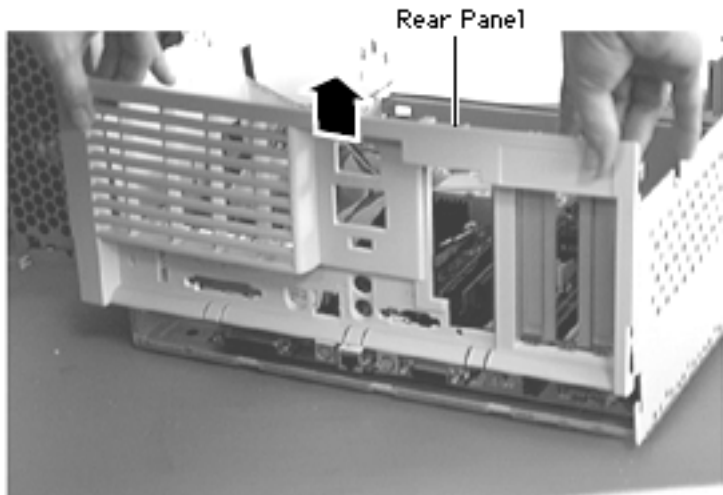
## Rear Panel

Before you begin, do the following:

- Remove top housing
- Open Card Retainer Baffle
- Open internal chassis
- Remove I/O card
- Remove PCI cards (if present)
- Remove logic board (only to replace rear panel)

**Note:** The rear panel covers the back side of the computer and provides access to all the external connectors.





- 1 Lift the rear panel straight up to unhook it from the metal chassis. Once the rear panel is unhooked, you can remove it from the computer.

**Note:** There are tabs on the rear panel that hook into the metal chassis.

**Replacement Note:** To replace the rear panel, you must first follow the procedures for removing the logic board. Instead of fully removing the logic board





from the chassis, however, just slide it forward about an inch. Once you have the rear panel in place, slide the logic board back toward the rear panel until the board locks into place. Be sure the logic board connectors are lined up properly with the openings in the rear panel.

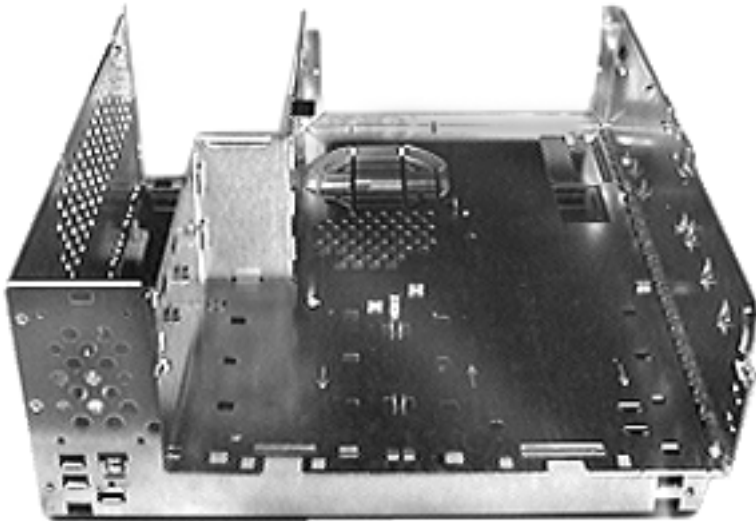




## Bottom Chassis

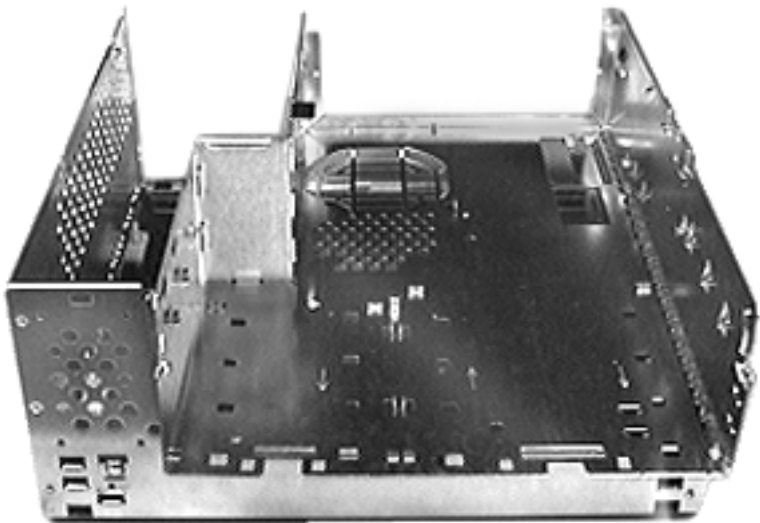
Before you begin, do the following:

- Remove the top housing
- Open Card Retainer Baffle
- Remove PCI cards if present
- Remove I/O card
- Remove speaker
- Remove power supply
- Remove power actuator
- Remove all drives
- Remove chassis latches
- Remove drive rails
- Remove logic board
- Remove rear panel





**Note:** The bottom chassis is what is left once all other modules have been removed.





Upgrades

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Power Macintosh G3 Desktop



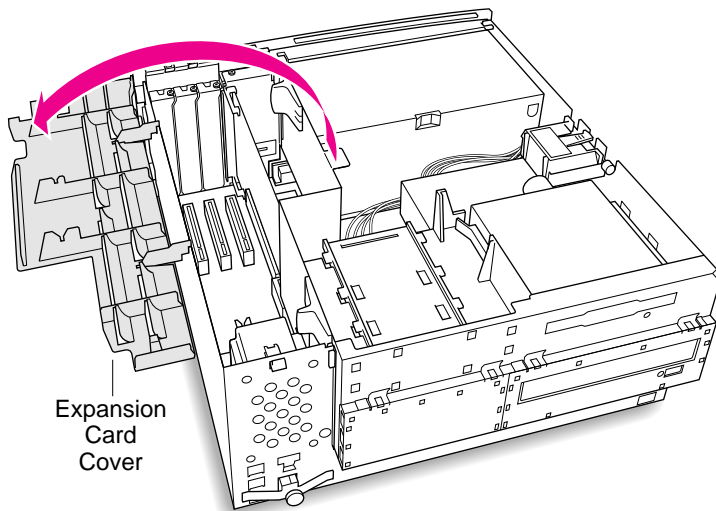


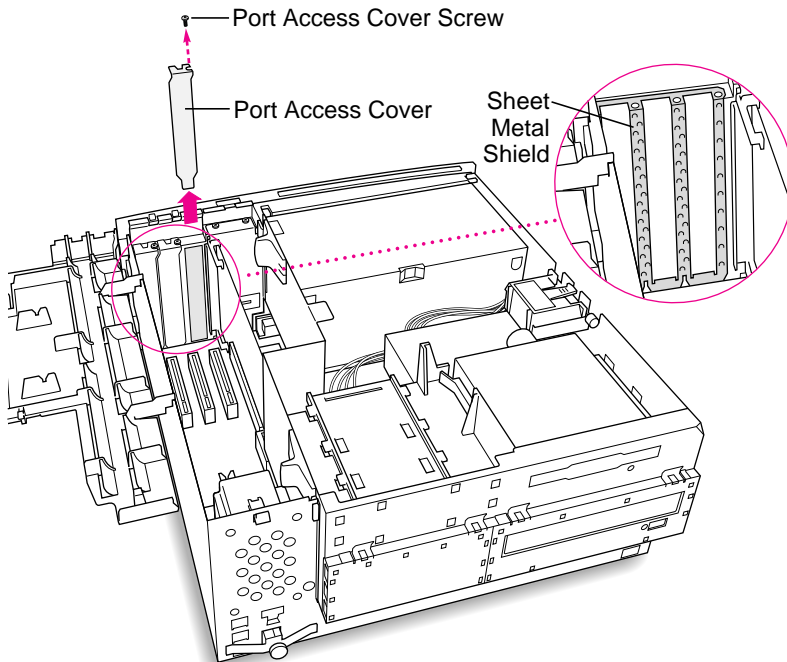


## PCI or I/O Cards

Before you begin, remove the top housing.

- 1 Open the expansion card cover.

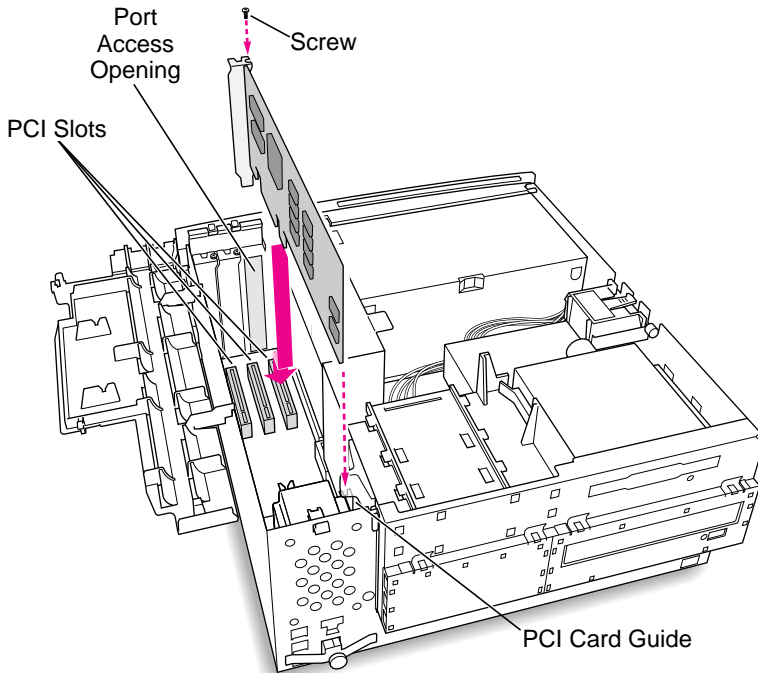




- 2 Remove the screw that holds the port access cover in place.
- 3 Pull out the access cover.

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



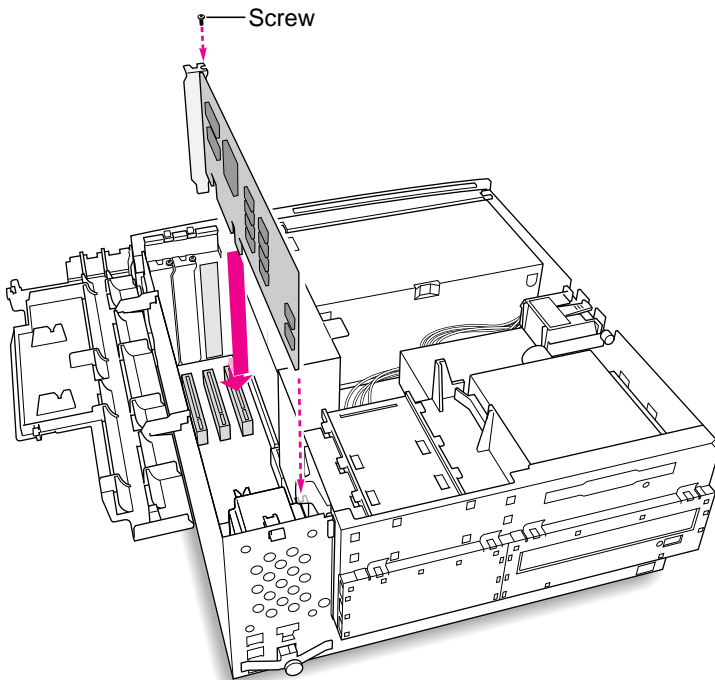


- 4 Align the card connector with the expansion slot and press straight down until the connector inserts all the way into the slot.

**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.



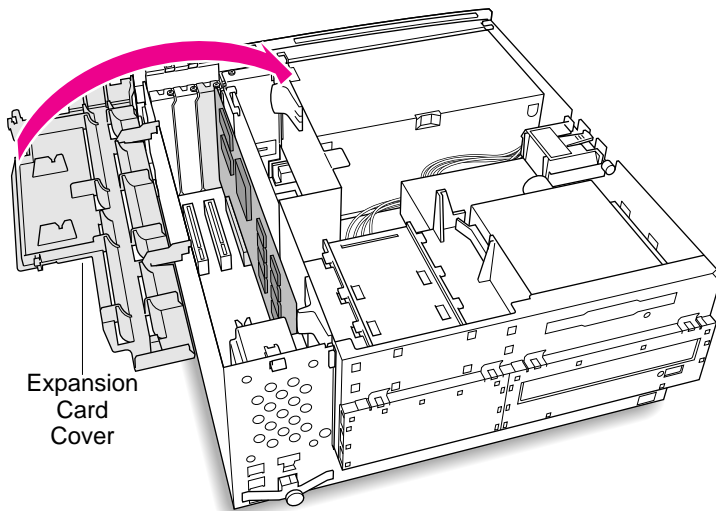


- 5 If you meet resistance, pull the card out and try again.
- 6 To test the connection, pull the card up gently. The card should remain firmly in place.
- 7 Reinstall the screw to secure the card in place.





- 8 Close the expansion card cover.



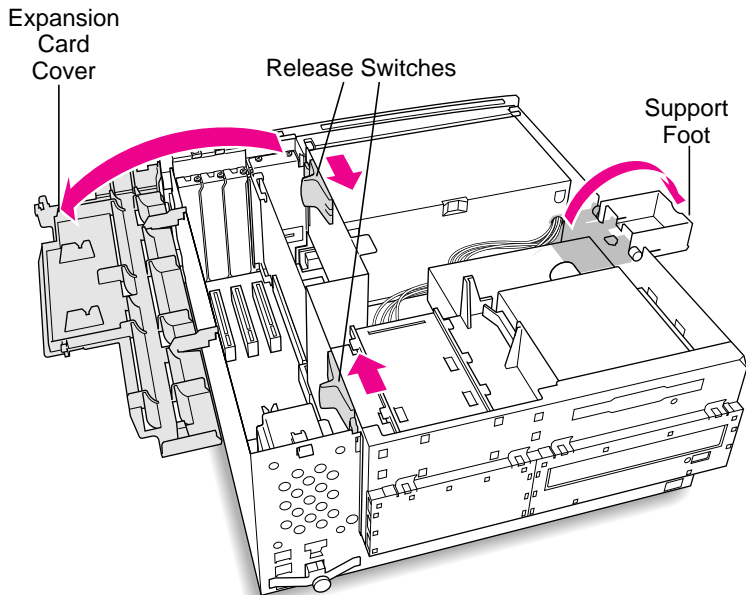


# Memory—DRAM or VRAM

## Open Chassis

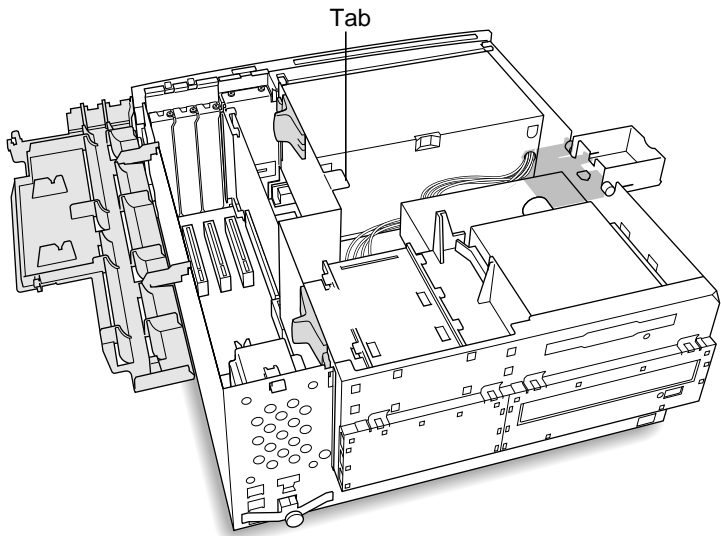
Before you begin, remove the top housing.

- 1 To unlock the chassis, move the release switches toward the inside of the computer.
- 2 Tip the support foot out until it snaps into the locked position.



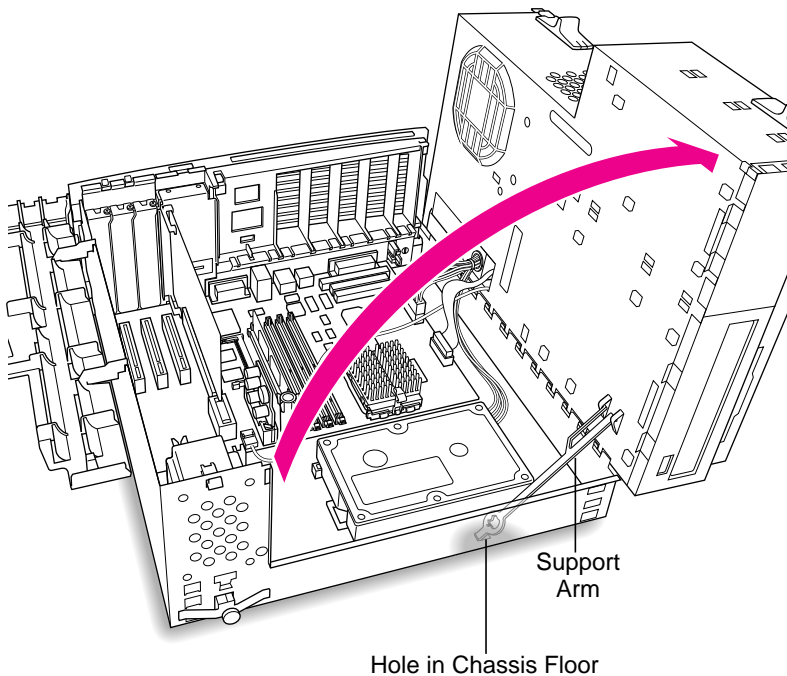


- 3 Lift up on the tab to open the chassis.

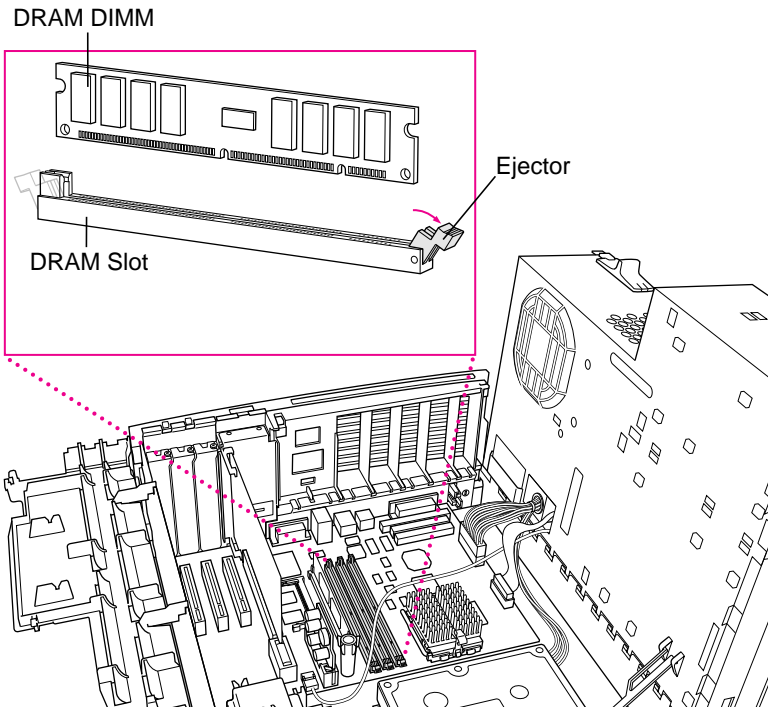




- 4 Swing the chassis up and insert the support arm in the hole.





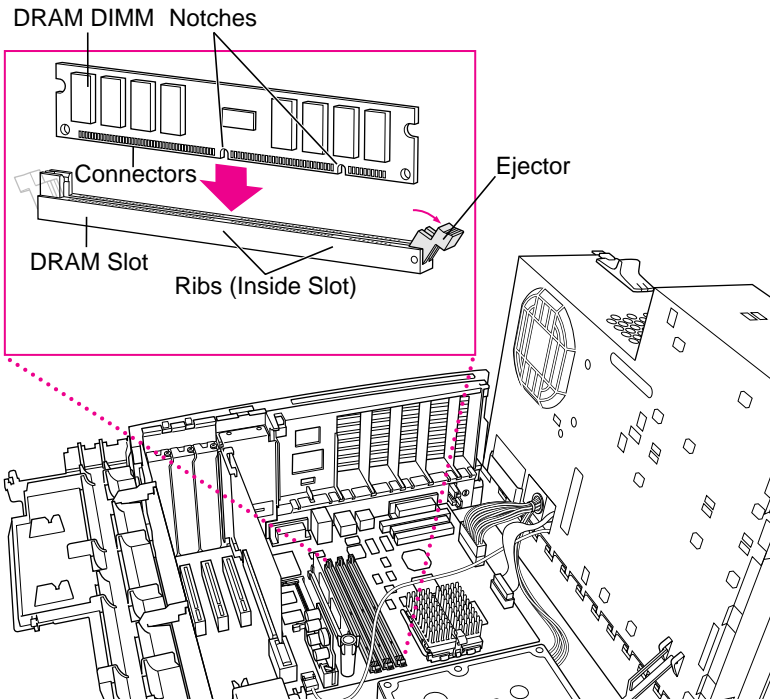


## DRAM

**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.

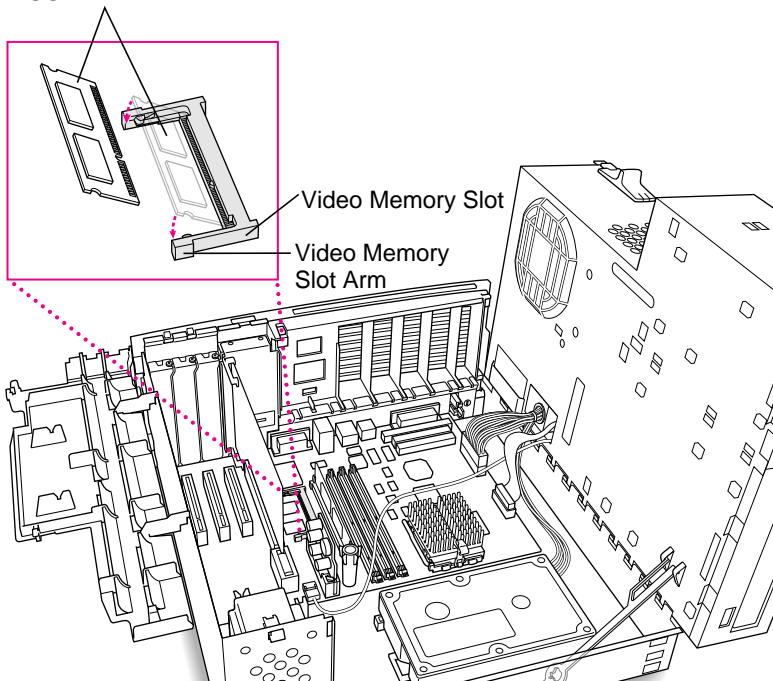
- 3 With ejectors open, press the DIMM into the slot.

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





SGRAM DIMM

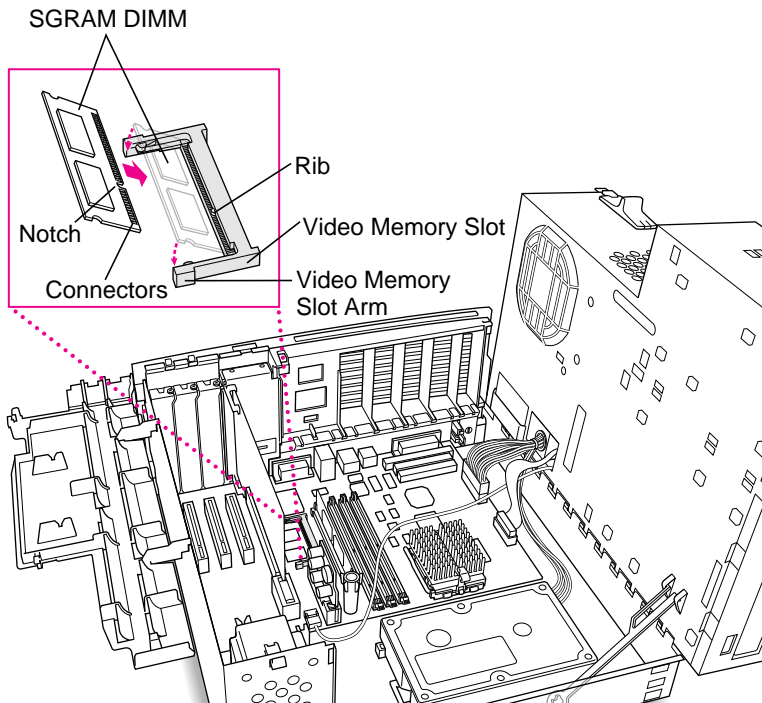


## VRAM

**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.





- 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.

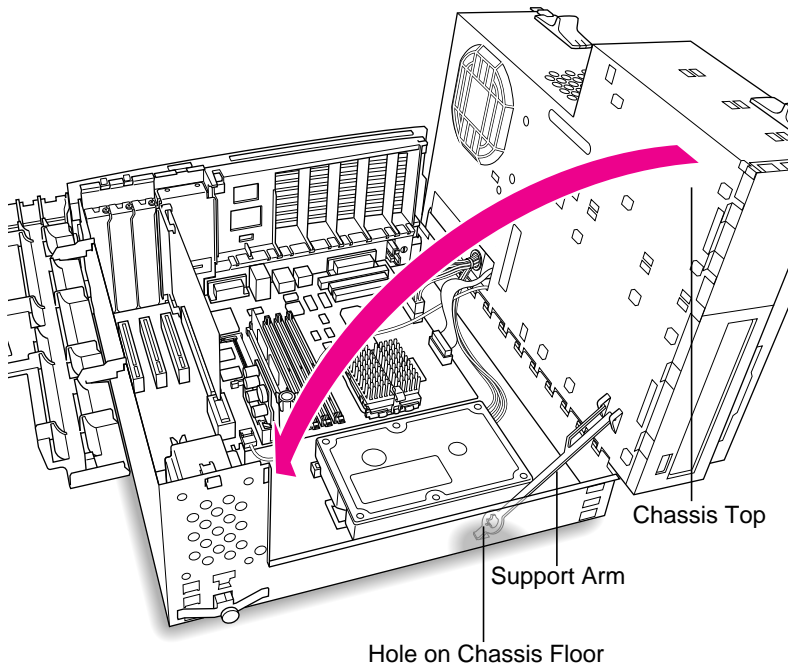
**Note:** SGRAM DIMM should be flat and parallel to the logic board.

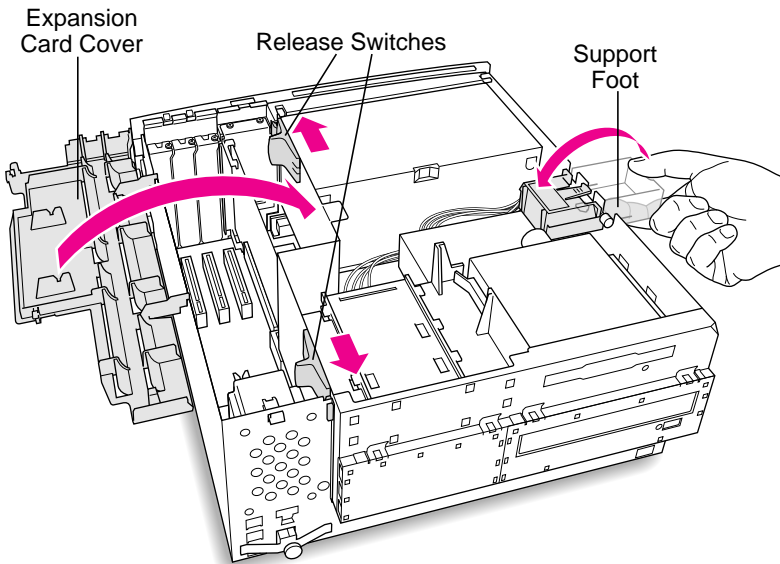




## Close Chassis

- 1 Lift up the chassis support arm from the hole on the chassis floor and gently swing the chassis back into place.





- 2 Close expansion card cover.
- 3 Press the release switches toward the outside of the computer.
- 4 Swing the support foot back inside the computer housing.





## Troubleshooting

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Power Macintosh G3 Desktop





## 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.



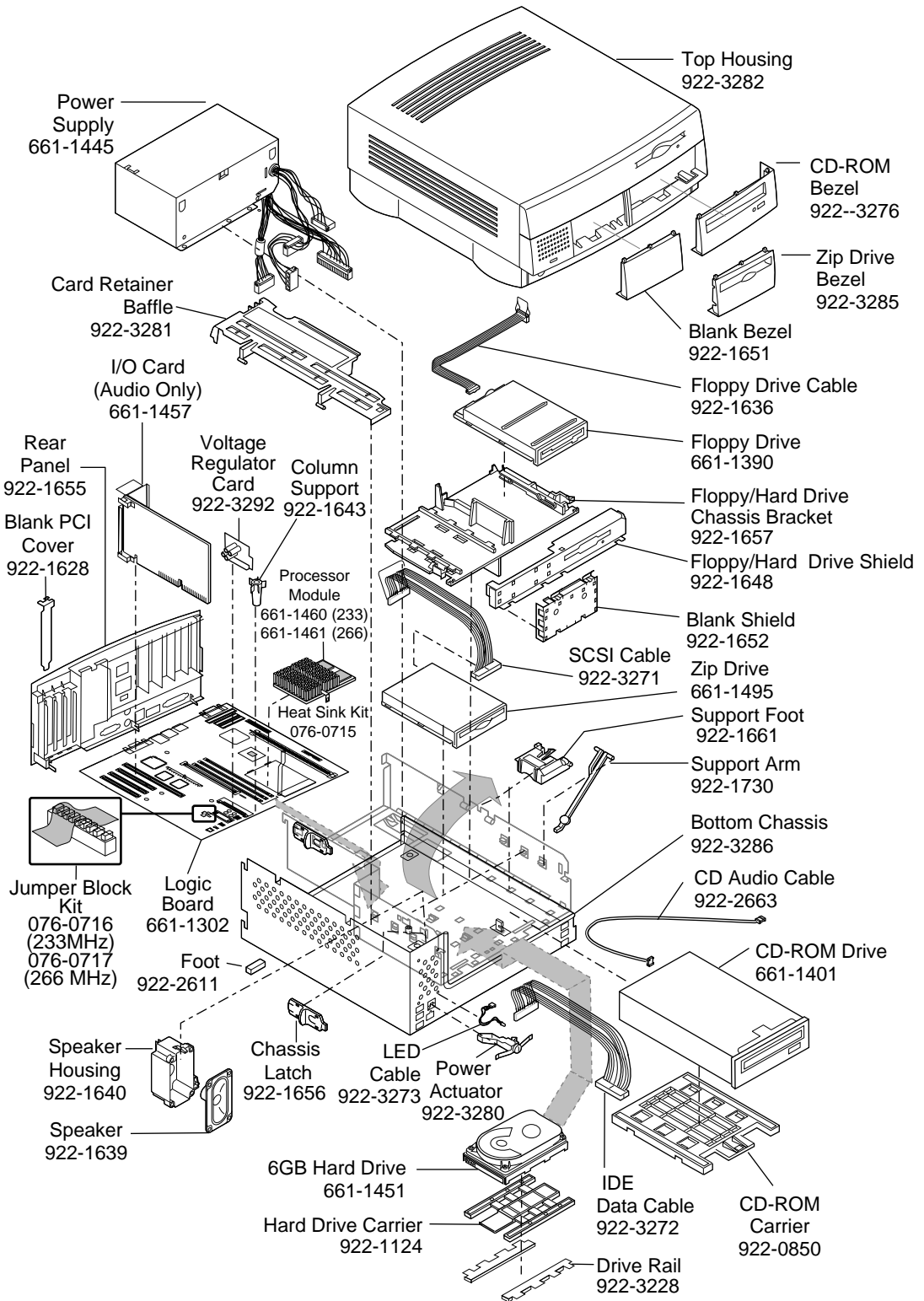


Exploded View

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Power Macintosh G3 Desktop





Product family configurations may vary.

