

PowerTower Pro User's Guide



Part number 72810
Revision number 970116

A word from the Power Computing team

Dear New Power Computing Owner,

Thank you for choosing an award winning Mac OS system from Power Computing. As the first and only vendor of *personalized* Mac OS computers we appreciate your support. Our goal is to provide you with the best product available.

Power Computing was chosen by Apple as the first licensed manufacturer of Mac OS systems. We created our company with the focus on providing customers with more choice, better service, and more affordable systems.

Our top priority is you. We offer toll-free lifetime technical support and an inexpensive optional on-site warranty plan, which provides service at your location. We would love to hear from you. Call us with any questions, or just to let us know how you like the system. Our customer service number is 1-800-671-6227; our e-mail address is, **info@powercc.com**.

We hope this is the beginning of a long relationship between us. We look forward to your continued support. Enjoy your new Power Computer.

Sincerely,



Steve Kahng

Chairman and CEO

Power Computing Corporation

© 1996, 1997 Power Computing Corporation. All rights reserved.

Under copyright laws, this manual may not be copied, in whole or in part, without the written consent of Power Computing. Your rights to the software are governed by the accompanying software license agreement.

Power Computing Corporation
2555 North Interstate 35
Round Rock, Texas 78664-2015
(512) 388-6868

Power Computing, the Power Computing logo, PowerTower, and PowerTower Pro are trademarks of Power Computing Corporation. Mac and the Mac OS logo are trademarks of Apple Computer, Inc. All other trademarks mentioned are the property of their respective holders. Every effort has been made in this book to distinguish proprietary trademarks from descriptive terms by following the capitalization style used by the manufacturer.

Every effort has been made to ensure that the information in this manual is accurate. Power Computing is not responsible for printing or clerical errors.

Warranty information about your system may be found beginning on page xvii. Other legal notices are found in “Regulatory Information” on page 161.

Support Information

For basic customer and technical support information, as well as product information and other news, visit our Web Site at:

<http://www.powercc.com>

Direct or Dealer Support?

Customers who purchased systems directly from Power Computing should contact Power Computing for assistance. Customers who did not purchase systems directly from Power Computing must contact the dealer they purchased their system from for assistance.

Contacting Power Computing Customer Service

To contact Power Customer Service call (800) 671-6227, fax (512) 388-6798, or e-mail **custserv@powercc.com** and describe in detail any problems or issues you need resolved with respect to Power Computing. Be sure to include your order or quote number, serial number, and phone number with all correspondence. For details, see “Contacting Customer Service” on page xix.

Contacting Power Computing Technical Support

To contact Power Technical Support call (800) 708-6227, fax (512) 388-6738, or e-mail **support@powercc.com** and describe in detail the problem that you are having with your Hardware.

Before calling technical support, please complete the troubleshooting steps described in Chapter 4, “Troubleshooting.”

For details on contacting Technical Support, see “Contacting Technical Support” on page 34.

Support Numbers

Customers who purchased systems directly from Power Computing should use the numbers listed below to contact Power Computing for telephone assistance.

Sales	To place an order or check on an order you haven't received yet	M – F 8AM to 10 PM Sat 9 AM to 6 PM Sun 10 AM to 6 PM	1-800-999-7279
Customer Support	If you have a question or a problem with an order you have received	M – F 8 AM to 6 PM Sat 10 AM to 4 PM Sun 10 AM to 6 PM	1-800-671-6227
Technical Support	For help with a technical problem	M – F 8 AM to 8 PM Sat 10 AM to 4 PM Sun 10 AM to 4 PM	1-800-708-6227

Table of Contents

PowerTower Pro User's Guide

A word from the Power Computing team	v
---	----------

System Overview	xv
------------------------------	-----------

System front view	xv
-------------------------	----

System rear view	xvi
------------------------	-----

Return, Support, Warranty, Satisfaction Guarantee, and License Information	xvii
---	-------------

RETURN POLICIES	xvii
-----------------------	------

Support information	xix
---------------------------	-----

LIMITED WARRANTY	xxi
------------------------	-----

CUSTOMER SATISFACTION GUARANTEE	xxiii
---------------------------------------	-------

Apple Computer, Inc. System Software License Agreement	xxv
--	-----

Chapter 1 Getting Started

Finding a place for the computer and monitor	1
--	---

Plugging in the computer	2
--------------------------------	---

Connecting the monitor	4
------------------------------	---

Connecting the mouse and keyboard	7
---	---

Turning the computer on	9
-------------------------------	---

Problems starting up	10
----------------------------	----

Shutting down the computer	12
----------------------------------	----

Warranty Registration	13
-----------------------------	----

Chapter 2 Connecting Peripheral Devices

Using SCSI devices	16
--------------------------	----

Setting the SCSI ID	16
---------------------------	----

Ensuring proper termination	17
-----------------------------------	----

Connecting the device	18
Installing software device drivers	19
Connecting a printer	19
Connecting input devices	19
Connecting a modem or telecom adapter	20
Connecting to a network	20
Connecting to a LocalTalk network	20
Connecting to an Ethernet network	20
Connecting to a Token Ring network	21
Using audio equipment	21
Understanding the sound ports	21
Connecting an audio device	21
Connecting external speakers	22
Connecting a microphone	23
Playing audio CDs on a CD-ROM drive	24

Chapter 3 Getting Started With Mac OS

Running the Basics tutorial	27
Using on-line help	28
Shutting down the computer	29
Sleep	31

Chapter 4 Troubleshooting

Common problems and solutions	33
Restarting the computer	34
The monitor is dark after you turn on the computer.	34
Flashing question mark on start-up	34
A floppy disk icon with an X in it appears.	36
An icon with a sad face appears when you start up.	36
A hard disk icon does not appear on the Mac OS desktop.	37
You cannot read a floppy disk.	37
No characters appear on the screen when you type.	38
You see a dialog box with a bomb.	38
You cannot launch a program or it quits unexpectedly.	39
Isolating system software issues	40
Procedures involved in troubleshooting	42

Starting up from the Power CD	42
Using Disk First Aid	44
Using HDT Primer PE to test and repair SCSI disks	45
Using Drive Setup for test and repair IDE hard disks	47
Using the System Software installer	48
Rebuilding the desktop file	50
Resetting (Zapping) the PRAM	51
Technical Support Contact Information	52

Chapter 5 Installing PCI Expansion Cards

Required tools	55
Removing the cover	55
How to remove the cover	56
Installing expansion cards	59
What you need to know about adding expansion cards	59
Install an expansion card	61

Chapter 6 Adding Memory

Required tools	67
Removing the cover	67
How to remove the cover	68
Adding memory	72
What you need to know about adding RAM	72
Installing and removing RAM	73
Prepare the computer	74
Adding video memory	93

Chapter 7 Installing Internal Drives

What you need to know about installing internal drives	95
Required tools	95
Drive bay locations	96
Prepare the drive	100
Removing the cover	103
Installing the drive	106
Drive replacement and installation considerations	110
Replacing a drive in the bottom 5.25 inch rack position	111

Replacing and installing drives in the upper 5.25 inch rack positions	119
Replacing and installing drives in the front 3.5 inch rack positions	130
Replacing and installing drives in the RAID rack	135
Putting the computer back together	137
Installing software drivers	147
If the drive does not work	147

Appendix A Safety and Health Information

Safety instructions	149
Health-related information about computer use	150

Appendix B Technical Information

Specifications	153
RAM configurations	157
VRAM information	157
Monitor resolution/color table	158
Power requirements	159

Appendix C Regulatory Information

FCC statement	161
Radio and television interference	161
DOC statement	162
CD-ROM drive	163
Lithium battery warning	163
For use in European countries	164

Hard Disk ToolKit•Personal Edition User Guide

Hard Disk ToolKit•Personal Edition End-User Software License Agreement ...	167
HDT Primer PE	169
Copyright Notice	169
Trademarks	169
Disclaimer of Liability and Warranty	169
Introduction	171
Welcome to Hard Disk ToolKit• <i>Personal Edition</i>	171
System Requirements	171
What Is Hard Disk ToolKit• <i>Personal Edition</i> ?	171
Installing Hard Disk ToolKit•Personal Edition	175
Installing Hard Disk ToolKit•Personal Edition	175
HDT Primer PE	177
What is HDT Primer PE?	177
The HDT Driver	178
Using HDT Primer PE	179
Launching HDT Primer PE	180
Formatting	182
Initializing	185
Partitioning	187
Testing a Drive	194
Information Capabilities	195
HDT Primer PE Menu Commands	198
Apple Menu	198
File Menu	198
Edit Menu	199
SCSI Bus menu	200
Troubleshooting	201
Common problems by category	201

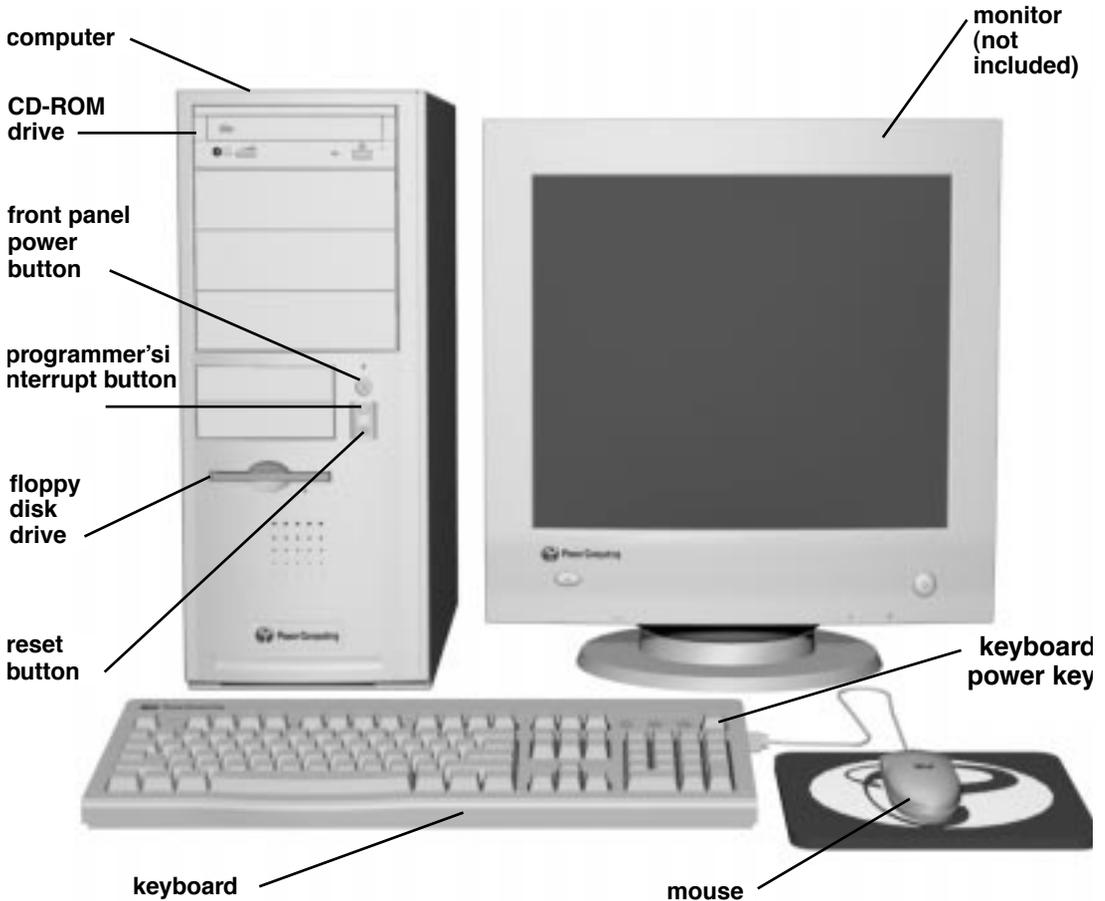
ToolKit Operation Problems	201
Happy Mac Problems	202
Sad Mac	202
Drive Problems	203
Removable Media	205
File-Oriented Problems	205
System Bomb	206
Turning off Blind transfers	207
Frequently asked questions	208
 CD-ROM ToolKit™ User Guide	
Introduction.....	223
What's New	223
About CD-ROM ToolKit	223
About CDT Remote	224
System Requirements	225
Supported Devices	225
Quick Start	227
Installing CD-ROM ToolKit.....	229
Removing Old Driver Software	229
Installing CD-ROM ToolKit and CDT Remote	230
How To Use CD-ROM ToolKit.....	239
Overview	239
Opening CD-ROM ToolKit	240
Setting Up a CD-ROM Drive	240
Loading a Device Driver	253
How To Use CDT Remote	255
Overview	255
Playing Audio Discs with CDT Remote	258
Transfer Digital Audio	260
Troubleshooting	263

Overview	263
Troubleshooting Installation	263
Frequently Asked Questions	264
Notes on Supported Devices	271
Technical Information	277
Overview	277
A Few Facts About CD-ROM	277
Compatibility with Audio Players and CD-ROM Drives	278
CD Recorders	280
Some Facts About Digital Audio Extraction	284
Care when Manually Ejecting CDs	286
CD+G	287
Drive Setup: Suggested Settings.....	291
Overview	291
Some notes about settings	292
Glossary	307
Bitstream Typeface Library	313
Index	317
Registration Cards	327

System Overview

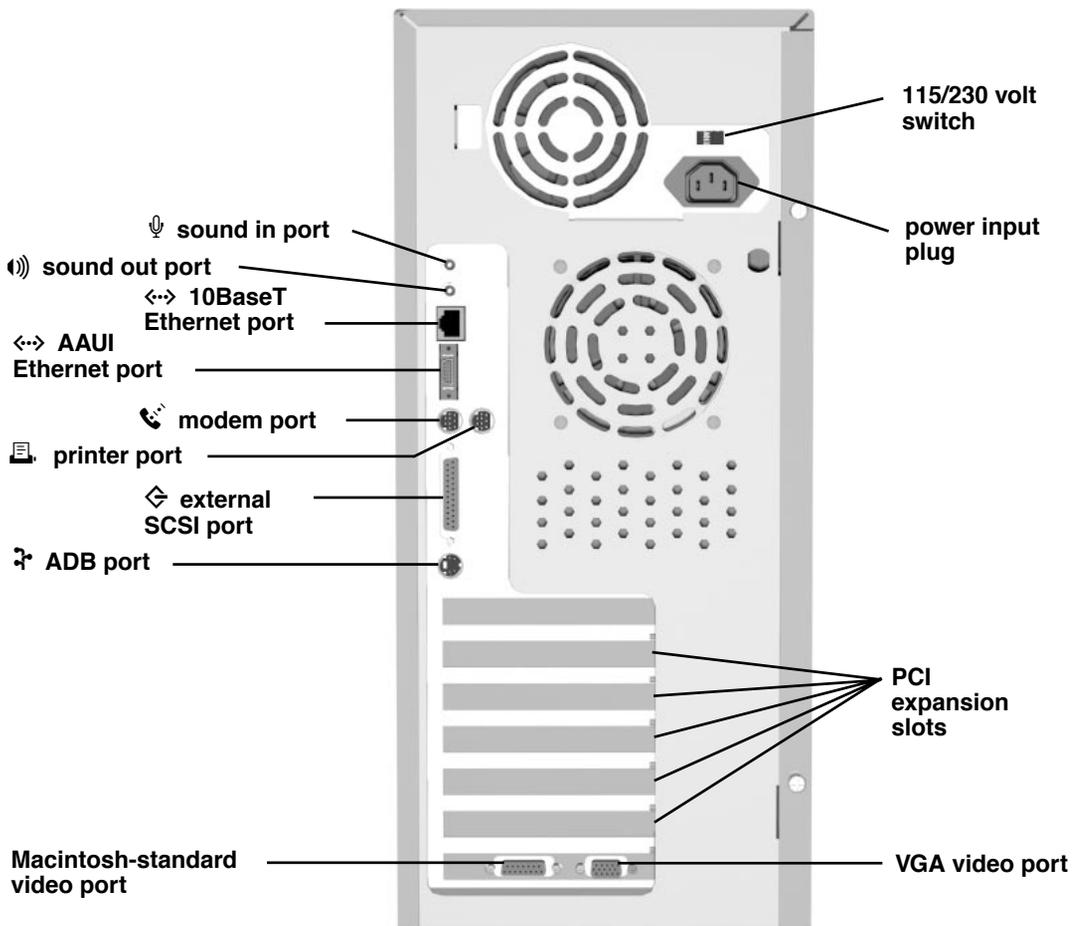
System front view

Here are the key features of the system from the front.



System rear view

Here are the key features of the system from the rear.



Return, Support, Warranty, Satisfaction Guarantee, and License Information

RETURN POLICIES

If you received equipment (“Hardware”) from Power Computing Corporation (“Power”) in a damaged shipping container or if your Hardware was otherwise damaged in shipment to you, please contact the shipper immediately. All Hardware and packaging were fully inspected prior to shipment from Power, and you must file a claim with the shipper for any damages that may occur in shipment. Retain all shipping materials. Contact Power’s Customer Service Department if you need assistance with any such claims.

Customers who did not purchase systems directly from Power Computing must contact the dealer they purchased their system from for assistance.

Returns for refund

To return Hardware manufactured by Power Computing Corporation and purchased under Power’s thirty-day money back guarantee, see the terms of the Customer Satisfaction Guarantee. You must contact Customer Service for a Return Merchandise Authorization (“RMA”) before returning the merchandise. If you have already registered your Product for warranty purposes (see “Warranty registration” on page xxi for details), processing will be simplified.

After your return request is received, Power's Customer Service will issue you an RMA number, along with shipping instructions for return of the Hardware. This number is valid for ten (10) days from the date of issuance. The Hardware must be received by Power on or before the tenth day after issuance of the RMA number. Returns will not be accepted without a valid RMA number written on the box.

Note: A sample shipping label is included in the back of the manual.

Returns for repair

In order to return Hardware for warranty or non-warranty service, you must request an RMA by contacting Power's Technical Support or Customer Service Department.

You must back up all data stored on the Hardware before returning your Hardware to Power for repair, as Power will format your drive with a new disk image. Power is not responsible for any loss of data.

If Power finds defective components, materials or workmanship in your Hardware, Power will use reasonable efforts to repair or replace the Hardware. If the Hardware is under warranty, there shall be no charge to you for such repairs or replacement, and the Hardware will be returned to you using the same class of service for shipping. Otherwise, Power's standard charges for parts, labor, shipping and handling will apply.

Shipment of hardware to Power

For both types of returns, all Hardware should be returned in the original packaging material, accompanied by all original components as configured by Power Computing, and the Hardware must have the RMA number clearly written at least three (3) times on the outside of each box. You bear all costs and risks of loss in connection with shipping the Hardware back to Power Computing. We recommend that the package(s) be insured for the full purchase amount.

These policies are subject to change at the discretion of Power Computing, except that any changes in these policies will not apply to Hardware sold to customers prior to the effective date of any policy change. If you have any questions regarding these policies, please contact Power Computing Customer Service.

Dealers, Distributors, Leasing Companies, VARs, and other resellers of Power Hardware are not eligible for the Satisfaction Guarantee return and refund policies. Sales to those entities will be final unless otherwise agreed to in writing by Power. Customers who did not purchase systems directly from Power Computing must contact the dealer they purchased their system from for assistance.

Support information

For basic customer and technical support information, as well as product information and other news, visit our Web Site at:

<http://www.powercc.com>

Direct or dealer support?

Customers who purchased systems directly from Power Computing should contact Power Computing for assistance. Customers who did not purchase systems directly from Power Computing must contact the dealer they purchased their system from for assistance.

Contacting Customer Service

To contact Power Customer Service call (800) 671-6227, fax (512) 388-6798, or e-mail custserv@powercc.com and describe in detail any problems or issues you need resolved with respect to Power Computing. Be sure to include your order or quote number, serial number, and phone number with all correspondence.

Customer Service telephone hours are as follows: (All times are United States Central Time.)

Customer Service	If you have a question or a problem with an order you have received	M – F 8 AM to 6 PM Sat 10 AM to 4PM Sun 10 AM to 6 PM	1-800-671-6227
-------------------------	---	---	----------------

Contacting Technical Support

To contact Power Technical Support call (800) 708-6227, fax (512) 388-6738, or e-mail **support@powercc.com** and describe in detail the problem that you are having with your Hardware.

For details on contacting Technical Support, see “Contacting Technical Support” on page 34.

Be sure to include your model number, serial number, date of purchase and phone number with all correspondence. We advise you to confirm receipt of all fax or e-mail requests.

Technical Support telephone hours are as follows: (All times are United States Central Time.)

Technical Support	For help with a technical problem	M – F 8 AM to 9 PM Sat 10 AM to 4 PM Sun 10 AM to 4 PM	1-800-708-6227
--------------------------	-----------------------------------	--	----------------

LIMITED WARRANTY

One-year limited hardware warranty

Warranty registration

You should register your Product with Power by completing the Power **Owner Registration Card**, enclosed in the accessory box along with the keyboard and mouse, and mail the completed card to Power. If you prefer, you can register your purchase on Power's web site at www.powercc.com. You should register within 3 months from the date of purchase. Once you register your purchase, you will receive an on-site registration validation sticker and card for you to use to validate your limited warranty.

Power Computing Corporation ("Power") warrants the computer hardware delivered to you by Power ("Hardware") against defects in components, materials and workmanship for a period of one year from the date of original purchase of the Hardware by the end user (proof of purchase required). If Power finds defective components, materials or workmanship in your Hardware, Power shall, at its option, either repair or replace the Hardware at no charge to you. If Power is unable to repair or replace your Hardware within a reasonable time, your exclusive remedy shall be a refund of the purchase price of your Hardware upon its return to Power.

Exclusions

The above warranty shall not apply to defects to Power Hardware resulting from improper or inadequate maintenance by you; software or interfacing supplied by you; unauthorized modification, neglect, abuse or misuse of the Hardware, including without limitation operation of the Hardware in an environment other than an ordinary office or home; or acts of God. Power makes no warranties with respect to the software and other accessories provided with the Hardware beyond those provided by the respective vendors of such items. Power shall not be liable for shipping damages.

Obtaining warranty service

To obtain warranty service, you must return your Hardware, freight pre-paid, to a service facility authorized by Power in accordance with Power's then-current Return Policy. All Power Hardware must be returned in original packaging material.

Warranty limitations and disclaimer of damages

POWER MAKES NO OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

THE REMEDIES PROVIDED FOR ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHERS, WHETHER ORAL OR WRITTEN, EXPRESS OR IMPLIED.

POWER SHALL NOT BE LIABLE TO YOU OR ANY THIRD PARTY, PURSUANT TO THIS WARRANTY OR IN ANY OTHER WAY WITH RESPECT TO THE USE OF THE HARDWARE, FOR ANY AMOUNTS REPRESENTING LOSS OF PROFITS, LOSS OF DATA, DOWNTIME, LOSS OF GOOD WILL OR BUSINESS DAMAGE OR REPLACEMENT OF EQUIPMENT AND/OR PROPERTY, OR ANY COSTS OF RECOVERING, REPROGRAMMING OR REPRODUCING ANY PROGRAM OR DATA STORED ON OR USED WITH THE HARDWARE, OR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES OF YOU OR ANY THIRD PARTY, WHETHER RESULTING FROM BREACH OF WARRANTY OR ANY OTHER LEGAL THEORY.

This warranty gives you specific legal rights, and you may also have other rights that may vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages or exclusions of implied warranties, so the above limitations or exclusions may not apply to you.

CUSTOMER SATISFACTION GUARANTEE

Note: The Customer Satisfaction Guarantee applies only to Hardware purchased **directly** from Power Computing. Hardware purchased from a reseller, dealer, or retailer is handled by that reseller, dealer, or retailer. If you did not purchase your Hardware directly from Power Computing, contact whoever you purchased your Hardware from for their terms and follow their procedures.

If you purchased your Hardware directly from Power Computing, within thirty (30) days of receipt of merchandise, you may contact Power Computing to arrange for the return of any computer system purchased from Power Computing (“Hardware”) for a full refund of the cost of the system if you are not entirely satisfied, as long as the following conditions are met:

1. Contact Power Computing Customer Service within 30 days of receipt of merchandise to obtain a Return Merchandise Authorization (RMA) number, at 800 671-6227. The merchandise must then be received by Power Computing on or before the tenth day after the RMA number is issued.
2. Repack and seal the Hardware and all documentation, software, accessories, registration cards and other materials originally supplied with the Hardware in the original packing material.
3. Make sure that the RMA number is visibly legible on the box in at least three places.
4. Ship the Hardware to Power Computing at the address shown on the sample Merchandise Return Form shown at the back of this manual. Make sure the shipper does not cover the form. The Hardware must be received by Power Computing on or before the tenth day after the RMA number is issued.
5. You should pre-pay shipment, and assume all risks of loss or damage in connection with shipping the system back to Power Computing. We recommend that package(s) be insured for the full purchase amount.
6. Refunds or credits for Hardware returned under this guarantee will be made pursuant to Power Computing's Refund Policy in effect as of the date of sale of the Hardware. Refunds or credits will be issued only after the Hardware is verified by Power to be in “like-new” condition. Reductions in credit will result if Hardware is in “less-than-new” condition, or if any documentation, software, accessories and other materials originally supplied with the Hardware are not returned completely intact. Once approval is given for a refund or credit, processing will vary according to payment method. If the Hardware was paid for with a

valid credit card, a credit will be applied to the same credit card account. If payment was made with a check, a refund check will be mailed to the customer. Other payment methods will involve appropriate refunds or credits according to Power's accounting department policies.

7. Hardware received with any shipping charges due or after the tenth day after issuance of the RMA number will be refused by Power Computing and returned to the sender. We will also return any Hardware that is not in "like-new" condition and accompanied by all documentation, software, accessories, registration cards and other materials originally supplied with the Hardware, as determined by Power. If any of these circumstances occur, eligibility for the thirty-day money back guarantee may no longer apply.

Apple Computer, Inc. System Software License Agreement

PLEASE READ THIS LICENSE CAREFULLY BEFORE USING THE SOFTWARE. BY USING THE SOFTWARE, YOU ARE AGREEING TO BE BOUND BY THE TERMS OF THIS LICENSE. IF YOU DO NOT AGREE TO THE TERMS OF THIS LICENSE, PROMPTLY RETURN THE UNUSED SOFTWARE TO THE PLACE WHERE YOU OBTAINED IT AND YOUR MONEY WILL BE REFUNDED.

1. License. The application, demonstration, system and other software accompanying this License, whether on disk, in read only memory, or on any other media (the “Apple Software”), the related documentation and fonts are licensed to you by Apple. You own the disk on which the Apple Software and fonts are recorded but Apple and/or Apple’s Licensor(s) retain title to the Apple Software, related documentation and fonts. This License allows you to use the Apple Software and fonts on a single Apple computer and make one copy of the Apple Software and fonts in machine-readable form for backup purposes only. You must reproduce on such copy the Apple copyright notice and any other proprietary legends that were on the original copy of the Apple Software and fonts. You may use the Apple Software in a networked environment so long as each computer in such environment is the subject of a license for the Apple Software; however, you may not electronically transmit the Apple Software from one computer to another over a network. You may also transfer all your license rights in the Apple Software and fonts, the backup copy of the Apple Software and fonts, the related documentation and a copy of this License to another party, provided the other party reads and agrees to accept the terms and conditions of this License.

2. Restrictions. The Apple Software contains copyrighted material, trade secrets and other proprietary material and in order to protect them you may not decompile, reverse engineer, disassemble or otherwise reduce the Apple Software to a human-perceivable form. You may not modify, network, rent, lease, loan, distribute or create derivative works based upon the Apple Software in whole or in part, except for the limited networking described above in Section 1. THIS APPLE SOFTWARE MAY NOT BE IMPORTED TO, USED IN, OR RE-EXPORTED FROM FRANCE OR ANY OF ITS COLONIES OR TERRITORIES.

3. Termination. This License is effective until terminated. You may terminate this License at any time by destroying the Apple Software, related documentation and fonts and all copies thereof. This License will terminate immediately without notice from Apple if you fail to comply with any provision of this License. Upon termination you must destroy the Apple Software, related documentation and fonts and all copies thereof.

4. Export Law Assurances. You agree and certify that neither the Apple Software nor any other technical data received from Apple, nor the direct product thereof, will be exported outside the United States

except as authorized and as permitted by the laws and regulations of the United States. If the Apple Software has been rightfully obtained by you outside of the United States, you agree that you will not re-export the Apple Software nor any other technical data received from Apple, nor the direct product thereof, except as permitted by the laws and regulations of the United States and the laws and regulations of the jurisdiction in which you obtained the Apple Software.

5. Government End Users. If you are acquiring the Apple Software and fonts on behalf of any unit or agency of the United States Government, the following provisions apply. The Government agrees:

(i) if the Apple Software and fonts are supplied to the Department of Defense (DoD), the Apple Software and fonts are classified as “Commercial Computer Software” and the Government is acquiring only “restricted rights” in the Apple Software, its documentation and fonts as that term is defined in Clause 252.227-7013(c)(1) of the DFARS; and

(ii) if the Apple Software and fonts are supplied to any unit or agency of the United States Government other than DoD, the Government's rights in the Apple Software, its documentation and fonts will be as defined in Clause 52.227-19(c)(2) of the FAR or, in the case of NASA, in Clause 18-52.227-86(d) of the NASA Supplement to the FAR.

6. Limited Warranty on Media. Apple warrants the diskettes and/or compact disc on which the Apple Software and fonts are recorded to be free from defects in materials and workmanship under normal use for a period of ninety (90) days from the date of purchase as evidenced by a copy of the receipt. Apple's entire liability and your exclusive remedy will be replacement of the diskettes and/or compact disc not meeting Apple's limited warranty and which is returned to Apple or an Apple authorized representative with a copy of the receipt. Apple will have no responsibility to replace a disk/disc damaged by accident, abuse or misapplication. ANY IMPLIED WARRANTIES ON THE DISKETTES AND/OR COMPACT DISC, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO NINETY (90) DAYS FROM THE DATE OF DELIVERY. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY BY JURISDICTION.

7. Disclaimer of Warranty on Apple Software. You expressly acknowledge and agree that use of the Apple Software and fonts is at your sole risk. The Apple Software, related documentation and fonts are provided “AS IS” and without warranty of any kind and Apple and Apple's Licensor(s) (for the purposes of provisions 7 and 8, Apple and Apple's Licensor(s) shall be collectively referred to as “Apple”) EXPRESSLY DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. APPLE DOES NOT WARRANT THAT THE FUNCTIONS CON-

TAINED IN THE APPLE SOFTWARE WILL MEET YOUR REQUIREMENTS, OR THAT THE OPERATION OF THE APPLE SOFTWARE WILL BE UNINTERRUPTED OR ERROR-FREE, OR THAT DEFECTS IN THE APPLE SOFTWARE AND THE FONTS WILL BE CORRECTED. FURTHERMORE, APPLE DOES NOT WARRANT OR MAKE ANY REPRESENTATIONS REGARDING THE USE OR THE RESULTS OF THE USE OF THE APPLE SOFTWARE AND FONTS OR RELATED DOCUMENTATION IN TERMS OF THEIR CORRECTNESS, ACCURACY, RELIABILITY, OR OTHERWISE. WITHOUT PREJUDICE TO THE GENERALITY OF THE FOREGOING, APPLE DOES NOT WARRANT OR MAKE ANY REPRESENTATION OR GUARANTEE REGARDING THE AUTHENTICITY OR SECURITY OF ANY DIGITAL SIGNATURE GENERATED USING THE APPLE SOFTWARE, OR ANY WARRANTY OR REPRESENTATION THAT THE PERSON OR ENTITY THAT IS USING SUCH A DIGITAL SIGNATURE HAS THE AUTHORITY TO DO SO. NO ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY APPLE OR AN APPLE AUTHORIZED REPRESENTATIVE SHALL CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THIS WARRANTY. SHOULD THE APPLE SOFTWARE PROVE DEFECTIVE, YOU (AND NOT APPLE OR AN APPLE AUTHORIZED REPRESENTATIVE) ASSUME THE ENTIRE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU.

8. Limitation of Liability. UNDER NO CIRCUMSTANCES INCLUDING NEGLIGENCE, SHALL APPLE BE LIABLE FOR ANY INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES THAT RESULT FROM THE USE, INCLUDING BUT NOT LIMITED TO THE IMPROPER, WRONGFUL, OR FRAUDULENT USE OF THE DIGITAL SIGNATURES GENERATED USING THE APPLE SOFTWARE, OR INABILITY TO USE THE APPLE SOFTWARE OR RELATED DOCUMENTATION, EVEN IF APPLE OR AN APPLE AUTHORIZED REPRESENTATIVE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME JURISDICTIONS DO NOT ALLOW THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

In no event shall Apple's total liability to you for all damages, losses, and causes of action (whether in contract, tort (including negligence) or otherwise) exceed the amount paid by you for the Apple Software and fonts.

9. Controlling Law and Severability. This License shall be governed by and construed in accordance with the laws of the United States and the State of California, as applied to agreements entered into and to be performed entirely within California between California residents. If for any reason a court of competent jurisdiction finds any provision of this License, or portion thereof, to be unenforceable, that

provision of the License shall be enforced to the maximum extent permissible so as to effect the intent of the parties, and the remainder of this License shall continue in full force and effect.

10. Complete Agreement. This License constitutes the entire agreement between the parties with respect to the use of the Apple Software, related documentation and fonts, and supersedes all prior or contemporaneous understandings or agreements, written or oral, regarding such subject matter. No amendment to or modification of this License will be binding unless in writing and signed by a duly authorized representative of Apple.

Note: The Apple Software Registration Card is in the back of the manual.

Chapter 1 Getting Started

Your computer has been designed for easy plug-and-play setup in four simple steps - if you are in need of technical assistance after completing the setup process described in this chapter, please feel free to call Power Computing Technical Support at 1-800-708-6227.

- Find a place for the computer and monitor
- Plug in the computer
- Plug in and connect the monitor
- Connect the mouse and keyboard

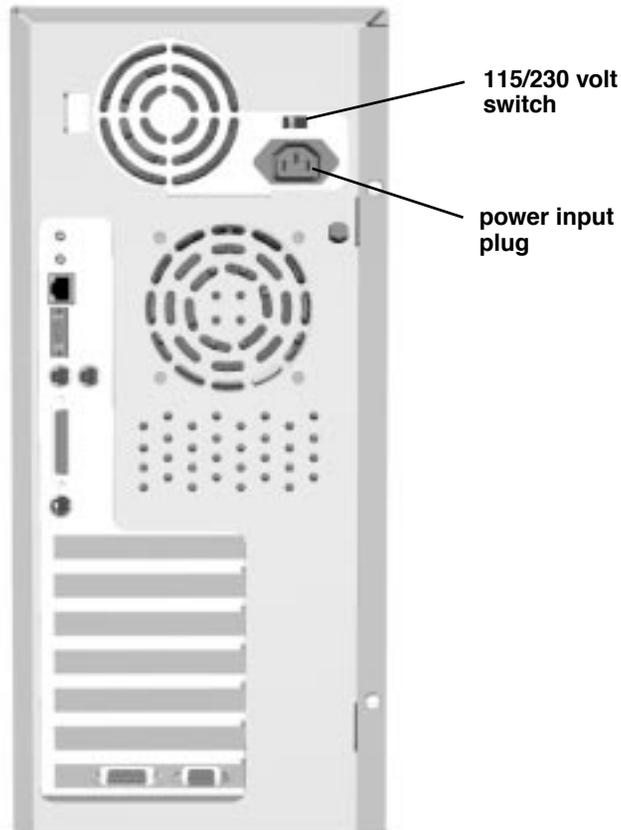
Finding a place for the computer and monitor

Think carefully about where to place your computer and monitor. Here are some suggestions to help you find a good place:

- Make sure there is a grounded, three-hole electrical outlet within a few feet.
- Use a sturdy, level table or desk as a work surface. Make sure that you can position your monitor, keyboard, and mouse so that you can work comfortably. See Appendix A, “Safety and Health Information,” on page 149 for detailed instructions.
- Leave a few inches of space around the computer and monitor for air to circulate.

Plugging in the computer

Set up and plug in the computer before connecting the monitor, keyboard, and other devices. Plugging in the computer ensures that it is grounded and protected from electrical damage. The key components for plugging in the computer are shown below.



WARNING! For your safety, the computer is equipped with a three-prong plug designed to be used with a grounded electrical outlet. If you do not have access to an appropriate outlet, have an electrician install one. Do not use your computer with a three-prong adapter in an ungrounded outlet.

To plug in the computer:

CAUTION: Do not press the power switch on the front panel of the computer or the keyboard power switch until you have completed all of the setup instructions.

- 1. Place the computer in the location you have chosen.**
- 2. Set the 115/230 volt switch to the correct setting for your country.**
Set the switch to 115 volts for the U.S., Canada, and Japan. Use the 230-volt setting in most European countries.
- 3. Connect the socket end of the power cord to the power input plug on the back of the computer.**
- 4. Plug the prong end of the power cord into a grounded, three-hole electrical outlet. If you have any expansion cards to be installed at this time, follow the instructions in Chapter 5, “Installing PCI Expansion Cards,” on page 55 to install them now.**

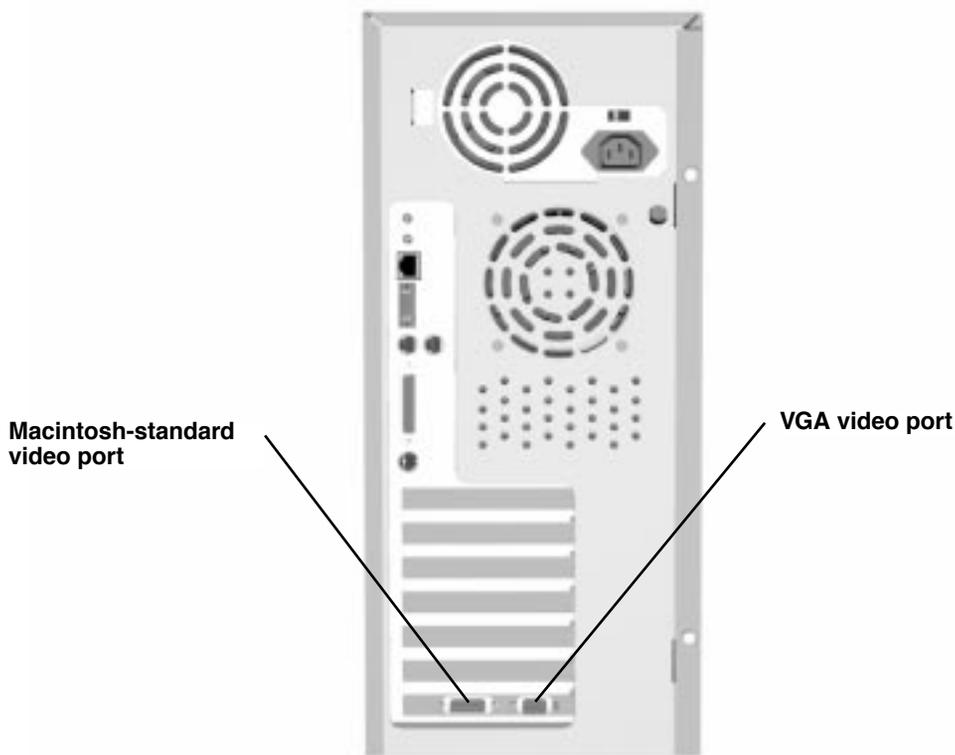
Connecting the monitor

Your computer can be used with a wide variety of monitors. The basic system comes with one of two video cards:

- a 128-bit video accelerator card containing 4 or 8MB of VRAM or
- a 64-bit graphics ;accelerator card which comes with 2 MB of Video RAM.

“VRAM information” on page 157 provides details of various monitor sizes, resolutions, and numbers of colors supported by the standard video cards.

The key components for connecting the monitor are shown below.



- The Macintosh-standard monitor port allows you to connect a monitor with a Macintosh-style connector.
- The VGA monitor port allows you to connect a standard VGA or SVGA monitor and use a PC-style connector.

CAUTION: Do not connect monitors to both video ports simultaneously.

Use the **Monitors and Sound** control panel in Mac OS to control how the monitor is configured. See Macintosh Guide (available through the Guide menu, marked with  in the top right corner of your screen, or the Mac OS manual that came with your system) for additional information about using the **Monitors and Sound** control panel.

Connecting the monitor involves two steps: plugging in the monitor and connecting the monitor cable.

To plug in the monitor:

1. **Place the monitor on the location you have chosen.**
2. **If necessary, connect the power cord to the monitor.**
Some monitors have permanently attached power cords.
3. **Connect the monitor power cable into a grounded, three-hole electrical outlet.**

To connect the video cable:

1. **If necessary, attach the video cable to the monitor.**
Some monitors have video cables permanently attached.

2. Connect the video cable to the monitor port on the back of the computer.

There are two types of video port connectors on the back of your computer: Macintosh-standard and VGA. Connect your monitor to the appropriate port for your monitor. See the figure on page 4 to tell which one you have.

Do not connect monitors to both built-in ports. The on-board video automatically senses which port you are using.

- If you are using a monitor with a Macintosh-standard video connector, connect the monitor cable to the built-in Macintosh-standard port (the larger of the two connectors).
- If you are using a VGA monitor with a PC-style connector, connect the monitor cable to the built-in VGA port (the smaller of the two connectors).

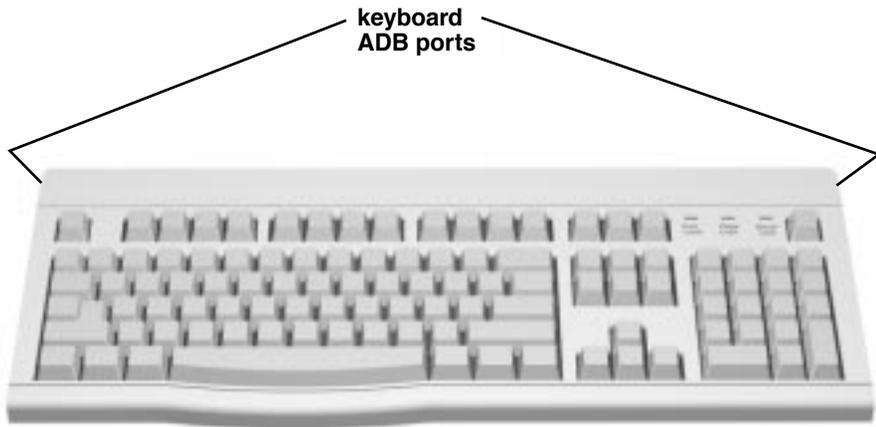
Connecting the mouse and keyboard

Once you have connected the monitor, you can connect the mouse and keyboard.

□ To connect the mouse and keyboard:

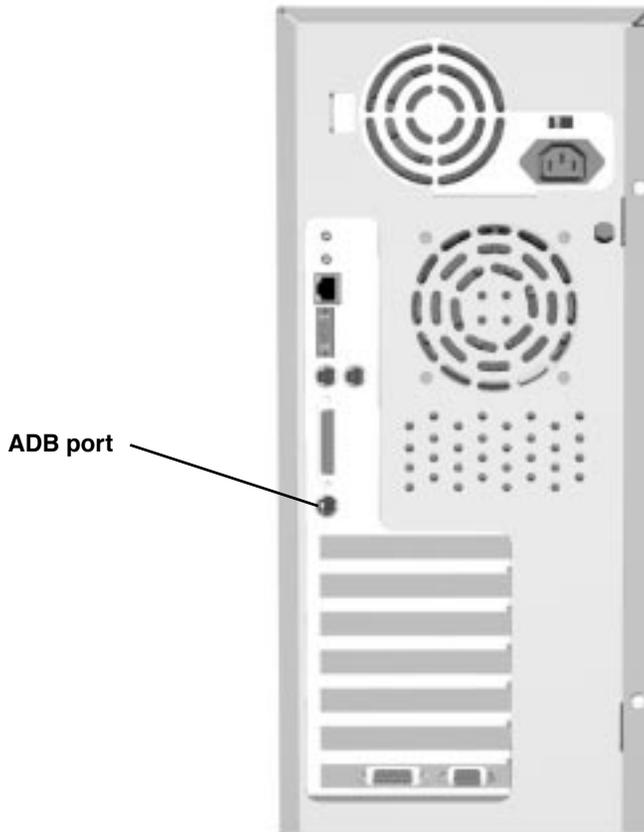
1. Plug the mouse cable into an ADB port on the keyboard.

There is an ADB port at each end of the keyboard; use whichever one you prefer.



2. Plug the keyboard cable into the ADB port (marked with ) on the back of the computer.

The keyboard end of the cable is hardwired into the back of the keyboard.



Turning the computer on

When the computer, monitor, keyboard, and mouse are connected, you can turn the computer on.

□ To turn the computer on:

1. Turn on the monitor.

See the documentation that came with the monitor for the location of the power switch.

2. Turn the computer on by pressing the keyboard power key (marked with a triangle) on the upper right corner of the keyboard.



When the computer finishes its start-up procedure, you should see the Mac OS desktop. If you see a blinking question mark, you need to install the system software on your hard disk. See Chapter 4, “Troubleshooting,” on page 29. If you see a blank screen or anything not already described, see the next section, “Problems starting up”

When you need to shut your computer down, follow the instructions in “Shutting down the computer” on page 12.

Problems starting up

If you see a blank screen when you start up, check the following items to identify the source of the problem:

- Are the computer and monitor plugged in? If they are plugged into a power strip, is the power strip plugged in and turned on?
- Are the computer and monitor turned on? The power button on the front of the computer should be lighted. Most monitors also have power lights, which should also be on if the monitor is on.
- Is the video cable securely connected to the monitor and computer? (If you need to reattach the cable, first turn off the computer and monitor.)
- Are the keyboard and mouse properly connected to the computer? (If you need to reconnect them, first turn off the computer to avoid damage.)
- Is the brightness control on the monitor turned too far down? Check the documentation that came with your monitor for instructions.

- Press the reset button on the front of the computer (the bottom of the three front-panel buttons) firmly and release it. Frequently a simple reset will rectify a minor problem.



If none of the procedures above solve the problem, see Chapter 4, “Troubleshooting,” on page 29. If those procedures don’t resolve the problem, contact Technical Support. Procedures for contacting Technical Support are described in “Contacting Technical Support” on page 34.

Shutting down the computer

When you are finished working with your computer, it is very important to shut it down correctly.

❑ To shut down the computer:

1. Choose Shut Down from the Special menu in Mac OS.

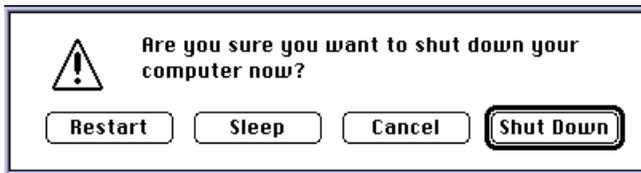
You are prompted to save any unsaved files before shutting down.



OR

2. Press the power key on the keyboard

A Shut Down dialog box is displayed



Choose the **Shut Down** option by pressing the **return** key.

3. In the unlikely event that the system does not respond to mouse movement or the keyboard, see Chapter 4, “Troubleshooting,” on page 33.

Warranty Registration

Once your system is set up, you should register your purchase with Power by completing the Power **Owner Registration Card**, enclosed in the accessory box along with the keyboard and mouse, and mail the completed card to Power. If you prefer, you can register your purchase on Power's web site at www.powercc.com. You should register within 3 months from the date of purchase. Once you register your purchase, you will receive an on-site registration validation sticker and card for you to use to validate your limited warranty. Terms of the Power warranty are described in "LIMITED WARRANTY" on page xxi.

You should also send in your Apple warranty registration card, found in the back of this manual. Terms of the Apple warranty are described in "Apple Computer, Inc. System Software License Agreement" on page xxv.

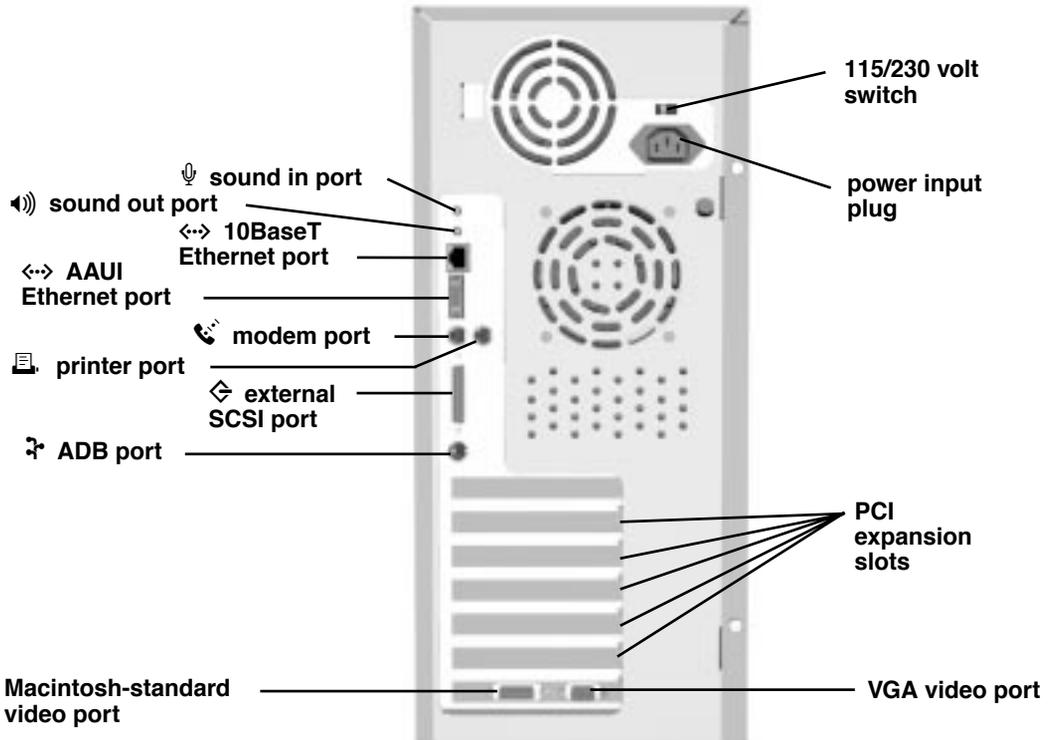
Chapter

2

Connecting Peripheral Devices

Your computer has a number of ports for connecting peripheral devices such as printers, storage devices, audio equipment, network cabling, and modems.

See the figure below for the location of the ports.



Using SCSI devices

Your computer has two separate SCSI buses—a high-speed 10 MB per second internal SCSI bus for the built-in devices like the hard disk and the CD-ROM drive and a 5 MB per second bus primarily for external devices. You can connect up to seven devices in a *SCSI chain* to each bus.

External SCSI devices, such as scanners, hard drives, CD-ROM drives, and removable-cartridge drives can be connected to your computer through the SCSI port on the back of your computer. Note that there is also an internal SCSI cable connected to this SCSI 5 MB per second chain in case the main internal SCSI bus is completely filled.

Connecting a SCSI device involves four steps:

- Setting the device's SCSI ID number
- Ensuring proper termination
- Connecting the device
- Installing a software device driver (if one is required)

Setting the SCSI ID

Each device in a SCSI chain requires a unique number called a SCSI ID, which the computer uses to identify the device. The computer itself is assigned SCSI ID 7 and the internal hard disk is assigned SCSI ID 0. Every other device you install must have a unique number from 1 to 6.

Drives provided by Power normally come with SCSI ID pre-set as follows:

SCSI ID	Device
0	primary internal hard drive (terminated)
1	optional additional hard drive
3	CD-ROM drive
5	optional removable-cartridge drive
7	motherboard (self-terminated)

The way you assign SCSI IDs varies from device to device. On most external devices, the ID is displayed on the back of the device. You usually change it by pressing small buttons above or below the number display. For some external and most internal devices, changing the ID requires setting switches or moving jumpers. Refer to the documentation that came with the device for exact instructions.

The important thing to remember is that each device must have an ID that is unique within its bus. If there is an ID conflict, your computer and the SCSI devices connected to it will malfunction.

Ensuring proper termination

For a SCSI chain to work properly, it must be terminated correctly. The basic rule about SCSI termination is simple: the device at the end of the chain must be *terminated*. Active termination is recommended for external SCSI chains, as it reduces noise and increases reliability. Devices located between the computer and the end of the chain must be unterminated. Devices located between the computer and the end of the chain must be unterminated.

On the internal SCSI bus, any devices you install should be unterminated because the computer's hard disk at the end of the bus is terminated and all of the internal connectors are in the middle of the chain.

On the external bus, you need to consider where the device is placed in the chain and whether it has an internal terminator. (Most SCSI devices use removable external terminators, but some older devices have built-in terminators that are difficult to remove.)

- If you have an internally terminated device, place it at the end of the chain and remove or disable external terminators from other devices in the chain.
- If none of the devices is internally terminated, place an external terminator on the last device in the chain and on no other device.

See the documentation that came with each device for information about how it is terminated.

Connecting the device

Connecting an external SCSI device

The SCSI port, marked with , provides 5 MB per second communication between the computer and devices such as hard disks, CD-ROM drives, scanners, printers, tape backup drives, and so on.

To connect a single SCSI device (or the first device in a chain), you need a SCSI cable with a 25-pin connector on one end and a 50-pin connector on the other. For each additional external device, you need a cable with 50-pin connectors on both ends. The cables you use should be double-shielded and have approximately 110-ohm impedance. Most SCSI problems are the result of low-grade cables. Of the SCSI cables our engineers have tested, Apple and APS cables are recommended for consistent reliability. We also recommend using active termination on external chains to minimize termination problems.

Note: External SCSI devices which are connected to the computer have independent power systems and must be turned on and off at the device; internal SCSI devices are powered by the computer and turn on and off when the computer does. Devices on the SCSI bus which are turned off can cause system errors.

To connect an external SCSI device:

- 1. Shut down the computer and the SCSI device.**
- 2. Make sure that the device has a unique SCSI ID from 0 to 6.**
For details, see “Setting the SCSI ID” on page 16.
- 3. Connect the device to the computer’s SCSI port or to the last device in the chain, using the appropriate cable.**
- 4. Make sure that the last device in the chain is terminated.**

Some devices require an external terminator, while others are internally terminated.

When you are ready to start up, turn on your SCSI devices before you turn on the computer. If you do not, your computer will not recognize the devices.

Connecting an internal SCSI device

You install internal SCSI devices in one of the computer's internal storage bays. See "Installing internal storage devices" in Chapter 3 for instructions on installing internal SCSI devices.

Installing software device drivers

Some SCSI devices require special software called device drivers to operate with your computer. If a device driver is required, it is normally supplied with the device; if you are unsure whether one is required, contact the manufacturer of the device. Follow the installation instructions supplied by the manufacturer. If a device driver is not supplied, you can assume that the device does not need one.

Connecting a printer

Your computer has a port (marked with ) . This port can be used for direct printer connections or for LocalTalk network printer connections.

You can also connect a printer to the modem port (marked with ) or one of the Ethernet ports (marked with ) . Use the Chooser program to tell the Mac OS which port you are using. See Macintosh Guide for information about the Chooser.

To connect the printer, follow the instructions that came with it.

Connecting input devices

Use the computer's ADB port (marked with ) to connect input devices such as a mouse, trackball, graphics tablet, or bar-code reader. Depending on their power consumption, you can connect up to three input devices in a chain from the ADB port.

The total power used by all the ADB devices must not exceed 500 milliamperes (mA). Check the documentation that came with your ADB devices for information about their power consumption.

Connecting a modem or telecom adapter

Your computer is equipped with an enhanced telecommunications port (marked with ) , which can be used with a standard modem or the Apple GeoPort Telecom Adapter. The GeoPort Telecom Adapter offers advanced communications features not available with standard modems. It is available from authorized Apple dealers.

To connect a modem or GeoPort Adapter, follow the instructions that came with it.

Connecting to a network

Your computer has built-in support for two different networking systems—LocalTalk and Ethernet. Other networking systems are possible, but they require expansion cards.

Use the **AppleTalk** control panel in Mac OS to choose a networking system. See Macintosh Guide for information about using your computer on a network.

Connecting to a LocalTalk network

Use the computer's printer port (marked with ) to connect to a LocalTalk network. LocalTalk connectors and cables are available from several vendors. Follow the instructions that came with the connector and cabling.

Connecting to an Ethernet network

The computer has two built-in ports (marked with ) for connecting to high-speed Ethernet networks. Using the appropriate AAUI adapter, you can connect to standard Ethernet wiring such as 10Base-T, thick coax, and thin coax. Adapters are available from several vendors. Follow the manufacturer's instructions for connecting the adapter. If you are connecting to a 10Base-T network, you can plug the network RJ45 connector into the 10Base-T port.

If both the AAUI and the 10Base-T connectors are connected, only the 10Base-T connection will be active.

Connecting to a Token Ring network

You can connect to a Token Ring network by installing an expansion card and appropriate networking software. Token Ring cards and software are available from several vendors.

Using audio equipment

Using the sound in and sound out ports of your computer, you can record and play high-quality stereo audio. You can connect audio devices such as microphones, stereo equipment, and speakers. (You can also use an external or internal CD-ROM drive to play audio CDs. See “Playing audio CDs on a CD-ROM drive” on page 24 later in this section.)

Understanding the sound ports

Your computer has two sound ports—a sound output port (marked with ) and a sound input port (marked with ). Use these ports to connect audio devices.

The sound ports accept a connector called a *stereo mini-plug*, the same kind of connector used to connect headphones to a personal stereo. If an audio device has a different kind of connector, you can buy an adapter at an electronics store.

Connecting an audio device

To play or record sounds, connect an audio device to your computer.

- If you want to use your computer to work with the sound produced by a device like a microphone, CD, or tape player, attach it to the sound input port.
- If you want to use a device such as a tape recorder or external speakers to work with sound produced by the computer, attach it to the sound output port.

A device that can both record and play (such as a tape deck) can be connected to both the sound input and sound output ports.

The following section gives general instructions for connecting an audio device. If you plan to connect a microphone or external speakers, read “Connecting a microphone” on page 23 or “Connecting external speakers” on page 22 later in this section.

To connect an audio device:

1. **Make sure that the device has a stereo mini-plug connector. Attach an adapter if necessary.**
2. **Shut down your computer and turn off the audio device.**

- 3. Connect the audio cable to the device and to the appropriate sound port of the computer.**
- 4. Turn on the computer and the device.**

After starting up the computer, use the Mac OS **Monitors & Sound** control panel to select the device as the **Sound Input** or **Sound Output** source. See the Macintosh Guide for information about using the **Monitors & Sound** control panel.

Connecting external speakers

You can connect external, amplified speakers to your computer to take advantage of its high-quality, stereo sound output.

You need a cable with stereo mini-plugs on each end to connect the speakers. In some cases, you connect the cable to one of the speakers and then use speaker wire to connect the second speaker. In other cases, you use a Y-shaped, two-plug adapter on the end of the cable and attach one plug to each speaker. Refer to the instructions that came with the speakers for more information.

To connect external speakers:

- 1. Turn off the computer and the speakers.**
- 2. Connect one end of the cable to the sound output port of the computer.**
- 3. Connect the other end of the cable to the speakers.**
If necessary, use a Y-shaped adapter.
- 4. If necessary, connect the speakers with speaker wire.**
- 5. Turn on the computer and speakers.**

The sound output of the computer is heard through the speakers.

You can control the speaker volume in the Mac OS **Monitors & Sound** control panel. In some cases, the speakers themselves may also have a volume control. See the Macintosh Guide for information about controlling the volume.

Connecting a microphone

You can connect a microphone to your computer via the sound input port. The microphone can be used for recording sounds or for issuing spoken commands to your computer.

The computer requires the Apple PlainTalk Microphone, pictured below. PlainTalk software is required for voice commands. PlainTalk microphones and software are available from authorized Apple dealers. Other line-level microphones can be used for sound recording.



Playing audio CDs on a CD-ROM drive

You can use a CD-ROM drive to play audio CDs on your computer. The sound will be heard through the computer's built-in speaker (or through headphones or external speakers if you connect them appropriately).

Use audio CD software (such as AppleCD Audio Player, part of Mac OS) to play the CD. The volume control on the AppleCD Audio Player controls the output level of the CD-ROM player, and should normally be set at maximum volume.



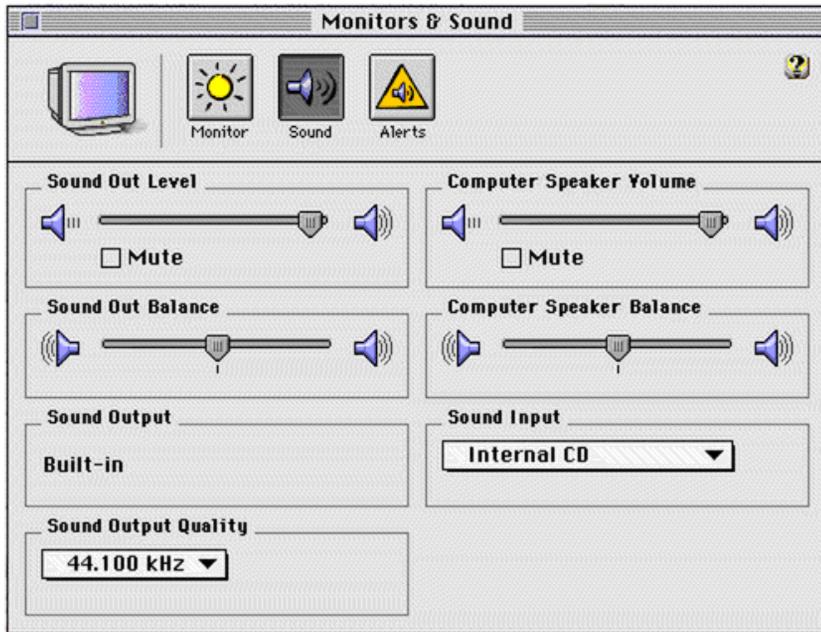
The CD-ROM output then may be routed from the CD-ROM player to any of several outputs. The volume you hear from the audio CD is controlled by one of several controls, depending on which output you are using, as shown in the following table.

Output Device	Volume Control
Internal speaker	Monitors & Sound control panel Computer Speaker Volume control
CD-ROM Player front-panel Headphones connector ()	CD-ROM drive front-panel volume control ()
Computer rear panel Sound Out port ()	Monitors & Sound control panel Sound Out Level control

CD-ROM
player
volume
control



To check or adjust the internal speaker or sound out settings, open the **Monitors and Sound** control panel and select the **Sound** button at the top of the dialog box, then view or adjust the appropriate control.



Note: If you want to turn off the sound to the internal speaker, select the **Mute** check box in the **Computer Speaker Volume** control.

Chapter 3

Getting Started With Mac OS

Your computer uses the Mac OS operating system, which offers a unique combination of power and ease of use. This chapter offers very basic instructions about how to use the built-in learning features of Mac OS. It also explains how to shut down your computer properly. For more detailed information about the Mac OS, refer to Macintosh System 7.5 manual, which came with your computer.

Running the Basics tutorial

Mac OS includes a tutorial program called Mac™ OS Tutorial that shows you how to use the fundamental features of the software. If you are brand new to Mac OS, we suggest you complete the tutorial before you begin working with your computer.

In Mac OS, you use the mouse for tasks such as choosing menu commands or starting programs. When you move the mouse, the *mouse pointer* (☞, the small arrow on the screen, sometimes referred to as the *cursor*) moves in the same direction. By placing the tip of the mouse pointer over an icon and clicking twice quickly (*double-clicking*), you can open a folder or launch a program.

□ To run the Basics program:

- 1. In the Mac OS desktop, if your hard disk window is not already open, double-click the icon that represents your hard disk (located in the upper-right corner of the screen). Be careful to place the mouse pointer over the icon, not on the words below.**

The hard disk icon “opens,” displaying a “window” containing the files and folders stored on the hard disk.

2. Double-click the folder called Mac™ OS Tutorial.

The folder opens, displaying the Mac™ OS Tutorial Part 1 icon.

3. Double-click the Mac™ OS Tutorial Part 1 icon.

The program starts up, displaying an introductory screen.

4. Follow the on-screen instructions to complete the tutorial.

Using on-line help

Mac OS (and many applications that run under it) include an on-line help system with information about using the software. The help system for Mac OS is called Macintosh Guide and is available through the Guide menu (marked with ).

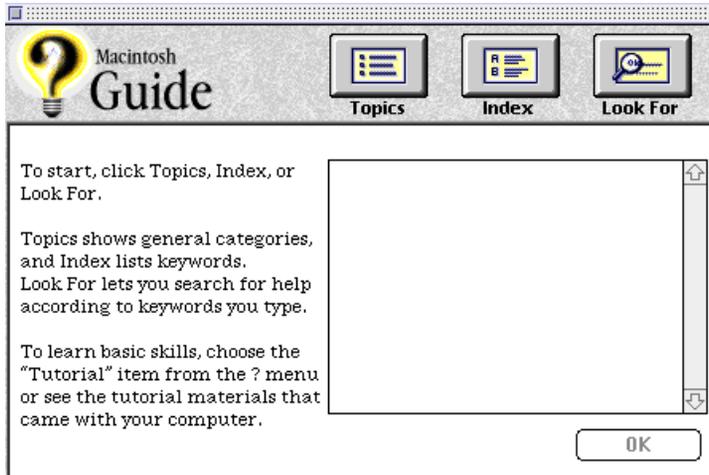
To use Macintosh Guide

1. Choose Finder from the Application menu (in the upper-right corner of the desktop) to make it the active application.



2. Choose **Macintosh Guide** from the **Guide** menu (marked with ) or press **⌘-?**.

The Macintosh Guide window appears.



3. Follow the on-screen instructions to get the information you need.

Shutting down the computer

When you are finished working with your computer, it is very important to shut it down correctly.

❑ To shut down the computer:

1. Choose Shut Down from the Special menu in Mac OS.

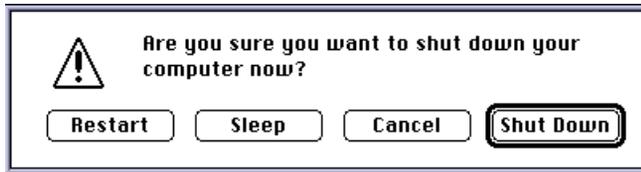
You are prompted to save any unsaved files before shutting down.



OR

2. Press the power key on the keyboard

A Shut Down dialog box is displayed



Choose the **Shut Down** option by pressing the **return** key.

CAUTION: Do not use the power button on the front panel to turn off the computer. If you do, unsaved or open documents may be lost and you may damage System files.

3. In the unlikely event that the system does not respond to mouse movement or the keyboard, see “Restarting the computer” on page 29.

Sleep

If you choose the **Sleep** option in the Special menu or shutdown dialog, the system enters energy-saving “sleep” mode. The monitor will dim if it is an energy-saving monitor running on sleep-savvy video, and the mouse will stop responding to movement.

To wake the system up, press the keyboard power key.

Chapter 4 Troubleshooting

This chapter contains information on how to resolve some of the most common issues users see and strategies you can use to fix them.

If you are unable to resolve an issue using these suggestions, visit our Web Site at

<http://www.powercc.com>

for additional troubleshooting tips or contact Power Computing's Technical Support Department. Power Computing Technical Support can be reached toll-free in the United States at **1-800-708-6227**. Before contacting Technical Support, please be certain to follow the pre-contact instructions detailed in "Technical Support Contact Information," starting on page 51.

Customers who did not purchase systems directly from Power Computing should contact the dealer they purchased their system from for assistance.

Common problems and solutions

There are a few problems which account for a relatively high proportion of those encountered. For those problems, rather than go through a general troubleshooting procedure, we just list the problem along with a logically-ordered list of their most common solutions. If your problem is on this list, try the suggested solutions before you do anything else besides restarting your computer, which resolves a gratifying number of problems. Details on how to perform the procedures involved are found in "Procedures involved in troubleshooting," starting on page 41.

If your problem does not appear in the Common problems and solutions list, go to "Isolating system software issues," starting on page 39. If following the procedures described there does not resolve your problem, go to "Technical Support Contact Information," starting on page 51.

Restarting the computer

You can eliminate some common problems by restarting the computer, which clears the computer's memory.

- If the mouse is still working, choose Restart from the Special menu. If an error dialog box is displayed, it may have a Restart button.
- If the mouse is not working, try holding down the ⌘ and Control keys while pressing the Power On key. This key combination restarts the computer, but should only be used when you cannot use the Restart menu command.
- If you cannot restart the computer from Mac OS, use the Reset button on the front panel. See the beginning of this manual for diagrams illustrating the location of the button. Be careful not to confuse the Reset button with the Interrupt button, used by programmers.
- If the Reset button does not work, use the power button on the front panel to turn off the computer. Wait at least ten seconds before turning it back on. (You need to wait to give the hard disk time to spin down.)

The monitor is dark after you turn on the computer.

- Follow the suggestions under “Problems starting up” on page 10.

Flashing question mark on start-up

In order for your computer to start-up successfully, the computer must have a valid System Folder to start from. A flashing question mark indicates that the computer is unable to locate a valid system folder on the hard disk or any other bootable device (i.e. a floppy disk, the CD-ROM, etc.). This is typically caused by lack of a bootable device, a device interfering in the boot-up process, or a corrupted System Folder.

1. **VERIFY that all external SCSI devices such as hard drives and scanners are turned on and properly configured as detailed in “Using HDT Primer PE to test and repair SCSI disks,” starting on page 44.**

One of the main causes of flashing question marks is related to poorly configured SCSI chains.

2. REMOVE all external peripherals except the monitor, keyboard, and mouse from the computer.

Examples of peripheral devices include removable drives, network connections, scanners, and modems. One of these peripherals could be interfering in the start-up process. Try booting the computer again with the external devices disconnected. If it boots with no issues, try reconnecting the external devices one-by-one until you find the interfering device. Verify the device is configured correctly. If it is, contact the device's manufacturer for assistance and configuration information.

3. INSERT the Power Computing System Software CD.

This CD contains a System Folder and tools that can be used to resolve your issue. The computer should present the "Happy Macintosh" and begin starting-up. If the computer does not begin booting from the Power CD, contact Power Technical Support for assistance.

Tip: *When the computer is finished booting up, you MAY see an error message that says, This disk is unreadable by this Macintosh. Do you want to initialize the disk? Press Cancel. This hard disk will not appear on the desktop, but nothing will eject from the computer either. That's okay. Just continue following these instructions.*

4. TEST the hard disk with Disk First Aid.

For instructions on how to use Disk First Aid, see "Using Disk First Aid," starting on page 43.

5. If Disk First Aid is unable to repair the hard disk, RE-INITIALIZE it using Hard Disk Toolkit as detailed in "Using HDT Primer PE to test and repair SCSI disks," starting on page 44.

Re-initializing the hard disk will erase all its contents. After re-initializing, re-install the system software as detailed in "Using the System Software installer," starting on page 47.

CAUTION: Re-initializing the hard disk will remove all data from it. Make certain you have backed-up your files prior to initializing the drive.

- 6. If Disk First Aid is able to repair the hard disk, but the computer still boots to a flashing question mark, CLEAN INSTALL the system software as detailed in “Clean installing system software,” starting on page 48.**

The System Folder is likely too corrupted to be used by the computer. Performing a clean install will disable the corrupted System Folder and install a fresh System Folder free of corruption.

- 7. If the hard drive does not appear in the selection list in Disk First Aid, PROBE the SCSI bus using HDT Primer PE.**

Verify that the hard disk is seen on the SCSI bus by the computer. (Most internal hard disks ship at ID 0.) If the hard disk does not appear in the HDT Primer window, contact Power Technical Support.

Tip: *Your PowerTower Pro system has two different SCSI buses. You can switch between the two buses in HDT Primer PE by selecting the appropriate bus from the SCSI Bus menu.*

- 8. If after a clean installation or re-initialization the computer still only boots to a flashing question mark, contact Power Technical Support for assistance.**

A floppy disk icon with an X in it appears.

You inserted a non-start-up floppy disk during the start-up process. If you wait a few seconds, the computer will start up normally from the hard disk. Remember to insert floppy disks only after the start-up process is complete—when the Mac OS desktop is visible.

An icon with a sad face appears when you start up.

This can indicate a problem with the system software or with the computer hardware.

- Try starting up from the Power Computing Mac OS CD-ROM. If you can start up with a different disk, it means that there is a problem with your system software.
- If the sad face icon continues to appear, contact Power Computing. There is most likely a problem with the computer hardware.

A hard disk icon does not appear on the Mac OS desktop.

- If the start-up hard disk is internal, restart your machine.
- If the hard disk was recently installed, verify that all connections are firmly in place and that the drive (if it is a SCSI drive) has a unique SCSI ID.
- If the hard disk is external, verify that it is connected and terminated properly, and that it has a unique SCSI ID. Make sure that there are no SCSI ID conflicts. See “Using SCSI devices” on page 16 for information.
- If the disk is your start-up disk, start up your computer from Power Computing Mac OS CD-ROM. You can remove the internal drive from the startup sequence (and force your system to boot from the CD-ROM if you have it in place) by holding down the **shift**, **option**, **command**, and **delete** keys (the **command** key also called the  key) when you start up. Use the Disk First Aid program to check and repair your disk. (See the Disk First Aid entry in Macintosh Guide for instructions.) If repairing the disk does not solve the problem, reinstall the system software as described in “Using the System Software installer” on page 47.

You cannot read a floppy disk.

This can indicate a damaged disk or one that is not initialized.

- If a floppy disk has never been used, it may not be initialized. See Macintosh Guide for instructions on how to initialize disks.
- If the disk is damaged, try using the Disk First Aid program to repair it. See Macintosh Guide for instructions about using Disk First Aid.

The mouse pointer does not move when you move the mouse.

This can indicate a system software problem, a problem with your mouse, or a problem with a program that you are running.

- Turn off the computer by pressing the power button on the front panel and verify that the mouse and the keyboard are connected properly. See “Connecting the mouse and keyboard” on page 7 for information.
- Try using a different mouse or input device. If it works, there is a problem with the original mouse.

- Try starting up from the Power Computing Mac OS CD-ROM. If the mouse works, there is a problem with the system software on your normal start-up disk. Reinstall the system software as described in “Using the System Software installer” on page 47.
- If the problem continues, you may be using an incompatible program. Verify that the applications, system extensions, and control panels on your computer are compatible with your system software.

No characters appear on the screen when you type.

- Use the mouse pointer to click in the window in which you want to type. This ensures that the program is active and that you have an insertion point for your text.
- Shut down the computer and verify that the keyboard is connected properly. See “Connecting the mouse and keyboard” on page 7 for information.
- Try using a different keyboard. (Turn off the computer before switching keyboards.)
- Try starting up from the Power Computing Mac OS CD-ROM. If the keyboard works, there is a problem with the system software on your normal start-up disk. Reinstall the system software as described in “Using the System Software installer” on page 47.

You see a dialog box with a bomb.

This indicates a software problem.

- If there is a number in the dialog box, write it down for future reference. Make note of what you were doing when the error occurred.
- Restart the computer. See “Common problems and solutions” on page 33 earlier in this chapter.
- Verify that the applications, system extensions, and control panels on your computer are compatible with your system software. You may need to update some of your software.
- Restart your computer without extensions. (To restart without extensions, hold down the Shift key as you restart.) If your software works properly, you probably have an incompatible system extension or control panel. See Macintosh Guide for information about using the Extensions Manager control panel to isolate the problem.

You cannot launch a program or it quits unexpectedly.

This may indicate that there is not enough RAM for the program to run. A dialog box may appear, indicating insufficient memory as the source of the problem.

- Quit programs to free up memory, then launch the application you want to use.
- Restart the computer to clear memory. See “Common problems and solutions” on page 33, at the beginning of this chapter.
- Use the Get Info window to allocate more memory to the program. See Macintosh Guide for information about Get Info.
- Rebuild the desktop by restarting and holding down the command and option keys. Answer Yes when the computer asks you if you want to rebuild the desktop.
- Turn on virtual memory to use some of the computer’s hard disk space as memory. See Macintosh Guide for information about turning on virtual memory.
- Install additional memory modules. See Chapter 6, “Adding Memory,” on page 67 for information.

Isolating system software issues

If the problem you are trying to troubleshoot is not in the list in the preceding section, or if the procedures suggested there do not resolve them, you may need to use a more general troubleshooting approach outlined in this section. Most of the issues you will encounter will be caused by incompatible or corrupted software.

In order to isolate the issue, it is necessary to use a process of elimination to find the single element that is the source of your issue. The method presented here is a general one designed to demonstrate the way to approach troubleshooting your computer. Though variation may need to be made in this approach for specific situations, this process provides a general guideline you may follow to isolate most issues. If this process does not result in a solution to your problem, go to “Technical Support Contact Information,” starting on page 51.

1. REMOVE all peripherals from the back of the computer except the mouse, monitor, and keyboard.

Examples of peripheral devices include removable drives, network connections, scanners, and modems. It always easiest to test for conflicts caused by external devices first. If, after removing your peripherals, your issue goes away, add back your peripherals one-at-a-time, restarting each time to verify whether or not the newly added peripheral is the source of your issue.

2. Use the Extensions Manager to test the computer with System 7.5.x extensions only.

The Extensions Manager is located in the Control Panels folder and can be accessed via the Apple menu. You can also access the Extensions Manager during startup by holding down the Space bar as the computer boots. You can use the Extensions Manager to test the computer with only the Apple system software, excluding all non-Apple extensions and control panels which may be causing conflicts. You can do this by selecting “System 7.5.x” from the Sets pull-down menu. Once you select “System 7.5.x” you will notice that the check marks next to several items in the Extensions Manager’s extensions list disappear. A check mark next to an item indicates that the item is active. The items without checks marks are non-Apple system software and were disabled when you selected “System 7.5.x”.

3. If after setting the computer to “System 7.5.x” the issue does not occur, it is most likely related to a conflicting or corrupted extension. Turn the disabled extensions on one-by-one, restarting the computer each time, and verifying that the extension you just added back is not the source of your issue.

If your issue returns after adding back an extension, disable that extension. Remove the suspect extension and try re-installing it to see if the copy on you hard drive is corrupted. If replacing the suspect extension with a fresh copy fails, contact the manufacturer of the extension to report your issue. They may have a newer version which resolves your issue.

4. TEST the issue when booted from the Power CD.

If the issue does not occur when booted from the CD your issue may be a corrupted System Folder. If it continues to occur, the application you are trying to use may be corrupted.

5. If the issue appears to be related to one application and does not occur in other applications, **RE-INSTALL** the failing application.

The application may be corrupted. Replacing the suspect application with a fresh copy may resolve your issue.

6. If the issue seems related to a specific type of system software like printing software, **CUSTOM RE-INSTALL** that software as detailed in “Custom installing system software,” starting on page 48.

7. If the issue seems to occur system-wide, regardless of the application you are using, or a re-installation of a suspect application did not fix the issue, **CLEAN INSTALL** the system software as detailed in “Clean installing system software,” starting on page 48.

The issue may be corruption of your core system software. Replacing this software with a fresh copy may resolve your issue.

8. If a clean installation of the system software is unsuccessful, **RE-INITIALIZE** the hard disk as detailed in “Initializing a disk:,” starting on page 47.

The issue may be related to a low level software issue on the hard disk. Re-initializing the hard disk will remove all data from the hard drive eliminating possible corruption.

CAUTION: Re-initializing the hard disk will remove all data from it. Make certain you have backed-up your files prior to initializing the drive.

9. If you are still unable to resolve your issue, **CONTACT** Power Computing Technical Support as detailed in “Technical Support Contact Information,” starting on page 51.

Procedures involved in troubleshooting

Rather than describe in detail how to perform each procedure you perform in the process of troubleshooting every time it shows up in a troubleshooting chain, we have consolidated the instruction for the procedures in this section. So if in the process of troubleshooting a problem, you get to the point that you need to start up your system from the Power CD, just turn to those instructions and follow them.

Starting up from the Power CD

In order to test the hard disk or reinstall system software, it is necessary to startup from the Power Computing System Software CD. There are two primary methods for booting from the Power CD:

Method 1 - The Startup Disk control panel

If the computer boots off the hard disk normally and mounts the Power CD on the desktop when it is inserted in the CD-ROM, you can boot from the Power CD using the Startup Disk control panel located in the Control Panels folder underneath the Apple menu.

When you open the Startup Disk control panel, you should see icons of all the volumes you have mounted on the desktop including the hard disk and the Power CD. The hard disk will most likely be highlighted.

1. **SELECT** the Power CD icon by clicking on it one time.
2. **CLOSE** the Startup Disk control panel.
3. **SELECT** Restart from the Special menu.

Tip: *If the CD-ROM ejects upon restart, push it immediately back in. Otherwise, the CD will not be present when the computer needs it for startup.*

Method 2 - The Startup Key sequence

If the computer is unable to boot, or the CD-ROM is unable to mount when you're booted up from the hard drive, you will be unable to access the Startup Disk control panel. In these instances, you should use the startup key command sequence to boot-up from the Power CD. To do this:

1. **Insert the Power Computing System Software CD into the CD-ROM player with the artwork side of the CD facing up.**

- 2. HOLD down the Command, Option, Shift, and Delete keys on the keyboard all at the same time.**

Tip: There are Command, Option, and Shift keys on both the left and right sides of the keyboard, these keys are identical in function. For the purposes of starting up from the Power CD, it is always easier to hold down the Command, Option, and Shift keys on the right-hand side of the keyboard. The Delete key is also on the right-hand side, but has no counterpart on the left. By holding all keys down on the right-hand side, only one hand is needed to hold all keys, freeing your other hand to use the mouse.

- 3. While continuing to hold these four keys, SELECT Restart from the Special menu.**

- 4. Continue holding the keys down. You will see a flashing question mark, then a Happy Macintosh face. RELEASE the four keys. The computer should now boot from the Power CD.**

Tip: When you use the Startup key sequence to boot from the Power CD, you will notice that hard disk does not automatically show up on the desktop when the computer is finished booting. This is because the startup key sequence suppresses the hard disk at startup allowing the computer to start from the Power CD. (In order to test or repair the hard disk, you must first mount it by following the instructions for mounting the hard disk as detailed in “Mounting the hard disk,” starting on page 45.)

Using Disk First Aid

Disk First Aid can be used as a first step to fixing minor issues on most Macintosh storage volumes such as hard disks (SCSI and IDE) and removable cartridges. Disk First Aid can be found in the Apple Utilities folder by opening the Power CD, then opening the Utilities folder, and finally opening the Apple Utilities folder. Double-click on Disk First Aid to launch it.

When Disk First Aid is open you will see “Select volume(s) to verify” at the top of the Disk First Aid window. Underneath it you will see the icons of the Power CD, your hard disk, and any other volumes mounted on the system.

- **SELECT** the volume you want to verify by clicking one time on its icon. Typically you will want to verify your hard disk, but you can verify any Macintosh (HFS) volume.

Disk First Aid will then test the selected volume for directory issues. If any issues are found, they will be displayed in the “Review instructions and results” field in the Disk First Aid window. If no issues are found, Disk First Aid will report that, “The volume (your disk name) appears to be OK.”

If Disk First Aid does find issues with this disk, you will see one of two responses:

A. “The volume (your volume) needs to be repaired.” – Disk First Aid has detected minor issues on your hard disk which it can repair for you. To repair the hard disk:

1. SELECT the device you wish to repair, then

2. PRESS the “Repair” button in the lower-left-hand corner of the Disk First Aid window.

B. “Issues were found but Disk First Aid could not repair them.” – The issues found were too severe to be fixed by Disk First Aid. If you own another disk repair program, you may try using it to repair the drive. If the second disk repair program is unsuccessful, or you do not have another disk repair program, re-initialize the damaged drive using Hard Disk Toolkit as detailed in “Re-initializing the hard disk,” starting on page 46.

Using HDT Primer PE to test and repair SCSI disks

HDT Primer PE is the formatting software Power Computing includes for formatting, initializing, and testing SCSI storage devices. If your problem involves an IDE drive, go to “Using Drive Setup for test and repair IDE hard disks,” starting on page 46.

Although most devices can be formatted by HDT Primer PE, it does not support all devices. To verify that HDT Primer PE supports your SCSI device, consult the “Supported Devices” file accompanying HDT Primer in the Hard Disk Toolkit PE folder. The Hard Disk Toolkit PE folder is located in the Utilities folder on Power CD.

This section includes explanation of only the most frequently used functions of HDT Primer PE. For more detailed information on how to use HDT Primer PE, consult “What is HDT Primer PE?” on page 177.

When HDT Primer is launched, you will be presented with a list of SCSI devices connected to your computer. Your hard disk will most likely be the device located at ID 0. The volume name will normally be that of your hard drive. However, if the hard drive has not been mounted yet, the volume name “N/A” will appear in its place.

Mounting the hard disk

If your hard disk icon does not appear on the desktop, you can use HDT Primer PE to make it appear by mounting it. To mount a hard disk:

- 1. SELECT the device you wish to mount, then**
- 2. PRESS the ‘mount’ icon on the toolbar on the right hand side of the HDT Primer PE window.**

Testing the hard disk

If a hard disk seems to be performing unreliably, you may use HDT Primer PE to test the physical integrity of the hard disk. This test goes a step further than Disk First Aid as it tests the actual medium rather than only testing the software structures on the medium.

To test a disk:

- 1. SELECT the device you wish to test, then**
- 2. PRESS the ‘test’ icon on the toolbar on the right hand side of the HDT Primer PE window.**
 - If the drive passes, the drive is physically fine, but may contain software imperfections which could be the source of your issue. RE-INITIALIZING the hard disk should erase all software on the drive, removing the corruption.
 - If the drive fails, the actual hardware of the drive is most likely damaged, CONTACT Power Computing Technical Support for further assistance.

Re-initializing the hard disk

If the low level data on your hard disk becomes corrupted and cannot be repaired by Disk First Aid or another drive maintenance program, it may be necessary to remove all software from the hard drive to eliminate the data corruption. You can do this by re-initializing the hard disks. To re-initialize the hard disk:

CAUTION: Re-initializing the hard disk will remove all data from it. Make certain you have backed-up your files prior to initializing the drive.

- 1. SELECT the device you wish to mount, then**
- 2. CHOOSE the ‘initialize’ command from the “File” menu.**

You will be presented with a warning message which states, “The disk at ID x already has data on it. Initializing it will wipe out all existing data with no possibility of recovery.”

- 3. PRESS the “continue” button.**

A dialog box will appear which asks you to “Choose a partitioning method”.

- 4. Unless you wish to partition the drive into multiple volumes, select “Maximum Macintosh” and press the “OK” button. To partition the drive into multiple volumes see “Partitioning,” starting on page 187.**

Using Drive Setup for test and repair IDE hard disks

If your computer comes with an IDE hard disk, you will not be able to use HDT Primer PE to format or test it. To format and test IDE hard drives, you should instead use Apple’s Drive Setup application. Drive Setup can be found on the Power CD in the For Apple IDE and Apple HDs Only folder. This folder is located in the Utilities folder in the Apple Utilities folder.

When you launch Drive Setup, you will be presented with a window that lists all the connected SCSI and IDE devices. Some of these devices may appear with the name <not supported>. These devices are meant for use with HDT Primer PE or some other SCSI driver. Your IDE drive will appear on the list with the type IDE. SCSI devices will appear the type SCSI.

Testing a device:

1. **SELECT** the drive you wish to test from the list of drives.
2. **SELECT** Test Disk from the Functions menu.

Initializing a disk:

1. **SELECT** the drive you wish to initialize from the list of drives.
2. **PRESS** the initialize button.
3. **You will be presented with an Initialize window. Press the initialize button in this window.**

CAUTION: Re-initializing the hard disk will remove all data from it. Make certain you have backed-up your files prior to initializing the drive.

Using the System Software installer

The System Software installer can be used to refresh an old System Folder with a new copy of the system software. The installer allows for both “easy” and custom installs. Either of these install types can be used to update the existing System Folder or to create a whole new System Folder altogether. Please make certain you are booted up from the Power CD as detailed in “Starting up from the Power CD,” starting on page 42 before performing any system software installations.

Launching the installer

1. **OPEN** the Power CD,
2. **OPEN** the System Software Installers folder,
3. **OPEN** the Install System Software icon.
4. **When the installer is open you will be presented with a welcome message. PRESS** continue to this message.

Easy installing system software

In most cases, you will want to do an easy install when re-installing system software. This allows the computer to determine which components are appropriate for your computer and install them for you. The easy install is the default of the system software installer.

The easy install option should appear in the upper left-hand corner of the system software installer window.

Custom installing system software

The system software installer also allows you to custom install specific categories or pieces of system software without having to re-install all the system software. For example, using the custom install option, you can re-install a general class of software such as the Printing software or a specific file such as the LaserWriter 8 driver. A custom install is most often used for replacing a specific component of corrupted or missing software. For example, if the Chooser crashed with a Type -39 error every time you opened it, it would be quicker to replace only the Chooser instead of re-installing all the system software. To perform a custom install:

- 1. SELECT “easy install” from the upper left-hand corner of the installer window and continue holding your mouse button.**
- 2. You should be presented with a list of options including “custom install”. SELECT “custom install” and release the mouse button.**

Clean installing system software

A clean installation of the system software disables the existing System Folder, re-naming it “Previous System Folder”, and create a fresh System Folder on the hard drive. A clean installation of the system software does not delete or erase any of the software on your hard drive.

To clean install:

- 1. Once you see the system software installer window, HOLD down the Command, Shift, and ‘K’ keys simultaneously.**
- 2. This should present a dialog box asking you to “Select type of installation.” SELECT “Install new System Folder”.**

3. PRESS the “OK” button.**4. The “Install” button should now read “Clean install.”**

After the clean installation, you will have a new System Folder containing only the licensed Apple system software, and a Previous System Folder which contains all your old system software. Because the new System Folder contains only Apple system software, non-Apple peripherals which require their own drivers will not function until the driver is reinstalled.

5. One such peripheral is the CD-ROM drive. Power Computing computers use the FWB CD-ROM Toolkit instead of the Apple CD-ROM extension. You must re-install the CD-ROM software after performing a clean install.**6. VERIFY that the issue has been solved. Do not add back non-Apple system software until you are certain that all your issues were fixed by a clean install.****7. RE-INSTALL any non-Apple system software into the new system folder one item at time. After adding an item to the system folder, restart and verify that the issue does not return. If the issue does return, remove the software you just added and contact that software’s manufacturer.****8. Once all non-Apple system software has been reinstalled into the new System Folder, REMOVE the Previous System Folder from the hard drive by dragging it to the trash.**

Rebuilding the desktop file

The desktop file is an invisible file on your hard disk which serves as both a table-of-contents and an index for all the data on your hard drive. If are experiencing issues with proper linking to aliases or with generic or incorrect icons appearing for your files, rebuilding the desktop may help resolve these issues.

To rebuild the desktop:

1. OPEN the Extension Manager. The Extensions Manager is located in the Control Panels folder and is accessible via the Apple menu.

2. **SELECT** “All off” from the Sets pop-up menu. This will disable all your extensions. To insure the desktop is rebuilt properly, it is necessary to disable all non-essential extensions and control panels to eliminate the possibility of interference.
3. **LOCATE** the Macintosh Easy Open control panel and turn it on. The Macintosh Easy Open control panel writes information to the desktop file and will need to be active when re-building the desktop.
4. **HOLD** down the Command and Option keys.
5. **SELECT** restart from the Special menu while continuing to hold Command and Option.
6. **CONTINUE** holding Command and Option as the computer restarts.
7. When the computer is finished starting-up you will see a dialog box which says, “Are you sure you want to rebuild the desktop?” **PRESS** “OK”.

Resetting (Zapping) the PRAM

Your computer maintains settings for the various peripherals connected to it, among other things, in the PRAM (parameter read-only memory). If the information in PRAM is not properly updated, your peripherals may not function properly. Mysterious peripheral issues can often be solved by resetting the PRAM and allowing it to re-build from scratch. The process to do this is known as zapping the PRAM. To zap the PRAM:

1. **HOLD** down the Command, Option, ‘P’, and ‘R’ keys on the keyboard simultaneously.
2. As you continue to hold these keys, **SELECT** Restart from the Special menu.

- 3. Continue holding these keys. You will hear a startup chime followed a few seconds later by another startup chime. The display will also flash on and off. After the second chime, RELEASE the keys.**

The PRAM should be reset. Some of your computer's settings will be set to the factory default. For example, AppleTalk will be set to connect via the printer port instead of the Ethernet port. You may need to reset such preferences.

Technical Support Contact Information

Our goal at Power Computing is to provide you with the most accurate technical support possible. Please collect the following information before calling. It will enable us to diagnose and resolve your issue as quickly and efficiently as possible.

- Back Up and Save.

It is always a good idea to back up and save your information prior to calling Power's technical support team.

- Be in front of the computer when you call.

In some cases in depth troubleshooting may be required to identify the issue you are experiencing. The technician may request that you perform a series of troubleshooting steps in an effort to more accurately identify and resolve the issue. Having access to your computer while on the phone with the technician will help facilitate this process.

- Know the versions of both the software and the MAC OS you are using.

There can be significant differences between various versions of software, some of which will conflict with other specific versions of software. The more information of this type we have the easier it will be for us to resolve issues that may occur from their use. You can usually obtain the version number of the software you are using by clicking once on the programs application icon and selecting "Get Info" from the File menu.

- Have your computer serial number available.

The serial number is located on a white sticker either on the back or bottom of the computer. This will help our technicians identify the configuration of your system as well as your warranty information and will help them identify and resolve issues with your computer more easily.

- Have your Power CD and disks for any other software which may be involved easily available.

In some cases it may be necessary to reinstall system software, or if you are having a issue with a particular application, control panel or extension, it may be necessary to reinstall that piece of software. Having your CDs or disks available will help facilitate the troubleshooting process.

- Have your invoice, this User's Guide and the Mac OS manual available.

Throughout the troubleshooting process, the technician will point out relevant information in the manual that will enable you to resolve the issue should it occur again.

- Isolate your computer.

Your technician may ask you to disconnect external devices, such as scanners and printers in an effort to isolate the issue to its true source. Isolating your computer prior to contacting Power Technical Support will help facilitate the resolution of the issue you are experiencing in a timely manner.

Thank you for calling.

Our technicians are trained to assist you as quickly and efficiently as possible. Be assured when you call Power Technical Support that we will make every effort to assist you in resolving your issue and in answering any questions you may have.

Chapter 5

Installing PCI Expansion Cards

This chapter explains how to enhance the capabilities of your computer by adding PCI expansion cards.

Required tools

- A small regular (slot-head) screwdriver or a small coin.
- A small Phillips-head screwdriver.

Removing the cover

In order to install a PCI expansion card, you remove the computer's cover.

CAUTION!

1. If you are not proficient with electronic equipment, Power Computing Corporation recommends that you have a certified technician install RAM, drives, and expansion cards. If you attempt to install RAM, drives, or cards yourself, any damage you may cause to your equipment will not be covered by the limited warranty on your computer. Please call technical support at 1-800-708-6227 for additional information about this or any other warranty question.

2. If an anti-static bracelet is available, put it on and ground it to the computer chassis before touching any components inside the computer.

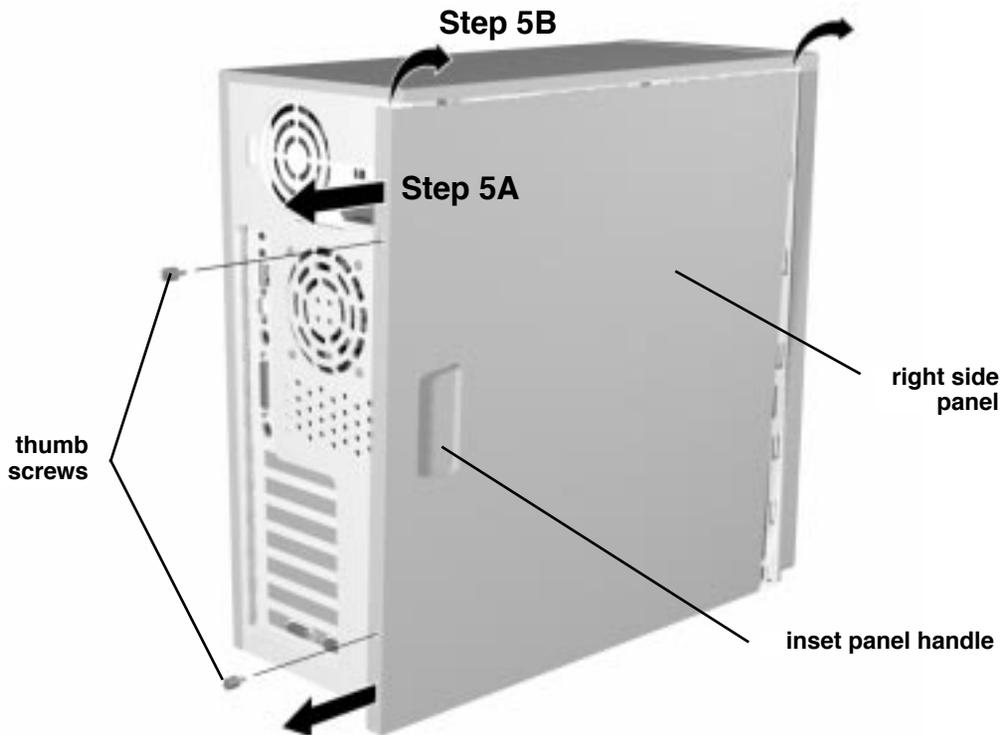
3. Never turn the computer on or operate the computer with the cover removed.

How to remove the cover

1. **Shut down the computer and turn off the monitor, but leave the computer plugged in to the electrical outlet.**

Leaving the computer plugged in ensures that it is grounded.

2. **Disconnect everything but the power cord from the back of the computer.**
3. **Rotate the computer so that its rear panel faces you.**
4. **Remove the two thumb screws from the rear of the right side panel.**



Put the thumb screws somewhere safe where you'll be able to find them when you're ready to replace the cover.

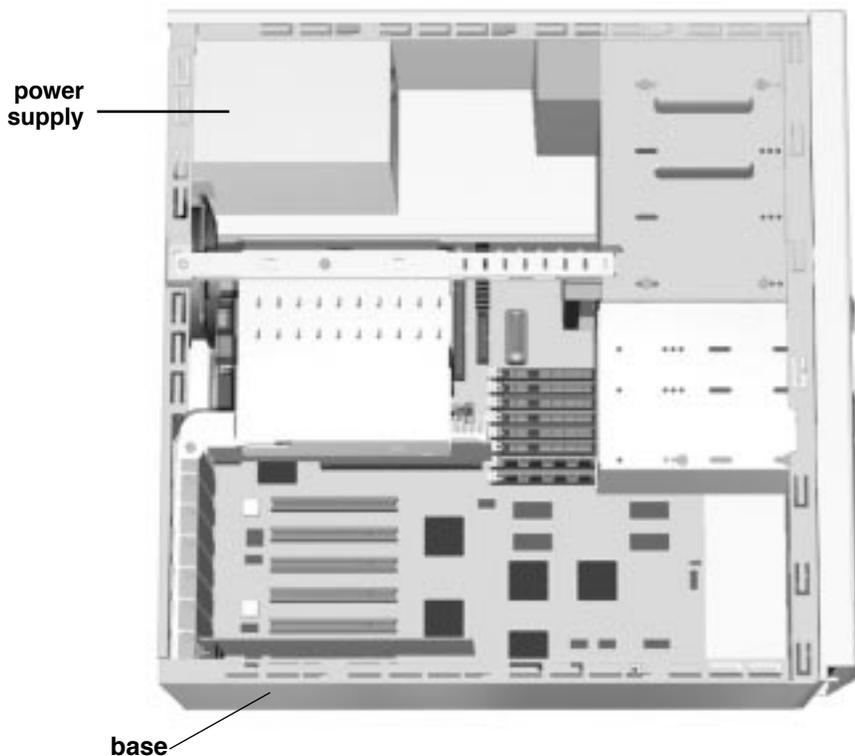
- 5. A. Grasp the inset panel handle and slide the right side panel back about an inch.**

B. Gently, but firmly, pull the top of the side panel to the rear and away from the chassis.

Set the side panel aside.

6. Lay the computer down with its open side up and rotate it so that the base faces you.
7. Before touching any components inside the computer, touch the metal plate over the power supply to discharge any static electricity that might have built up on your clothes or body.

The system must be plugged in (see step 2 on page 56) for this to work.



8. To replace the side panel, reverse steps 4 through 7; then you can reconnect everything.

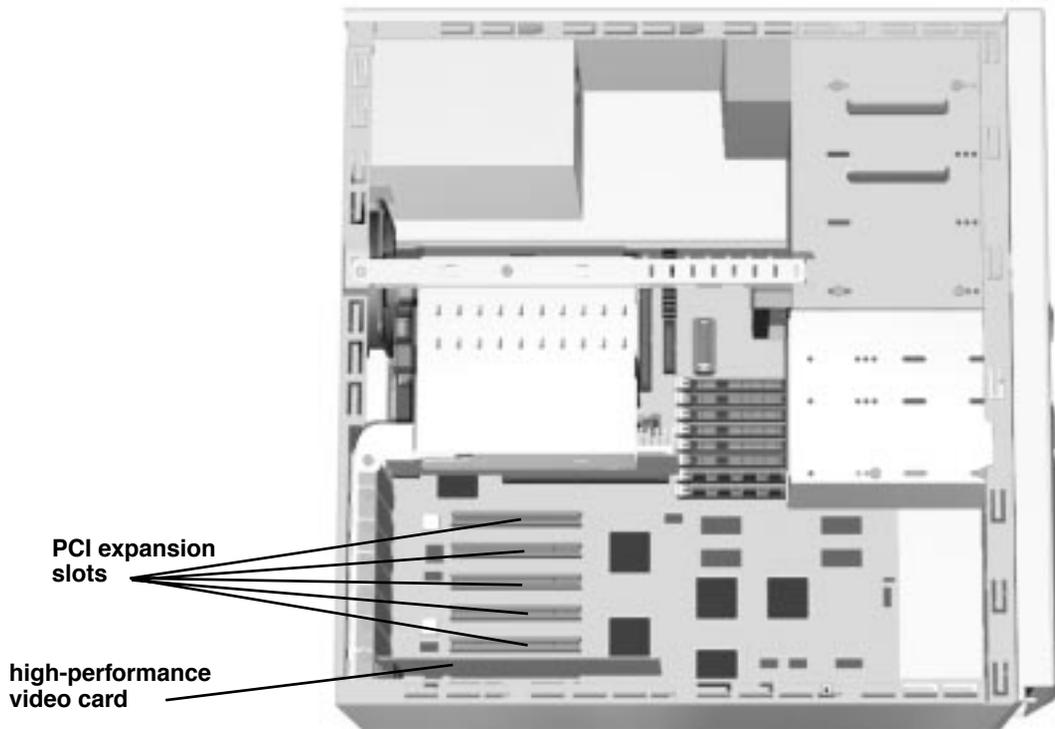
CAUTION! Be careful not to get any of the cables caught in the cover or stuck in the fan housing when you put the cover back on the computer.

Installing expansion cards

Follow the procedure below to install expansion cards.

What you need to know about adding expansion cards

You can install PCI cards in the PCI expansion slots on your motherboard to enhance your computer's capabilities. For example you can add video, networking, special-purpose acceleration, or communications capabilities to your computer by adding PCI cards. The motherboard allows you to install up to six standard PCI cards, one of which is normally the high-performance video card which comes with system.



Before you install any expansion cards, be sure to follow these guidelines to protect your computer:

- Do not remove factory-installed cards from inside the computer. Removing a card incorrectly can damage it and the computer. Contact Technical Support if you believe a factory-installed card requires repair or replacement.

- The combined power consumption of the expansion cards you install must not exceed the limits of your computer. Refer to the documentation that came with your cards for their power consumption rating and to “Power requirements” on page 159 in this manual for the power consumption limit for your computer. PCI cards are normally limited to 15 Watts or less power consumption per card.
- Some cards may need to be installed by an authorized service provider. Refer to the documentation that came with the card.

Install an expansion card

1. Remove the computer’s cover.

See “Removing the cover,” starting on page 55 for instructions.

WARNING! Make sure the computer is powered down before removing the cover.

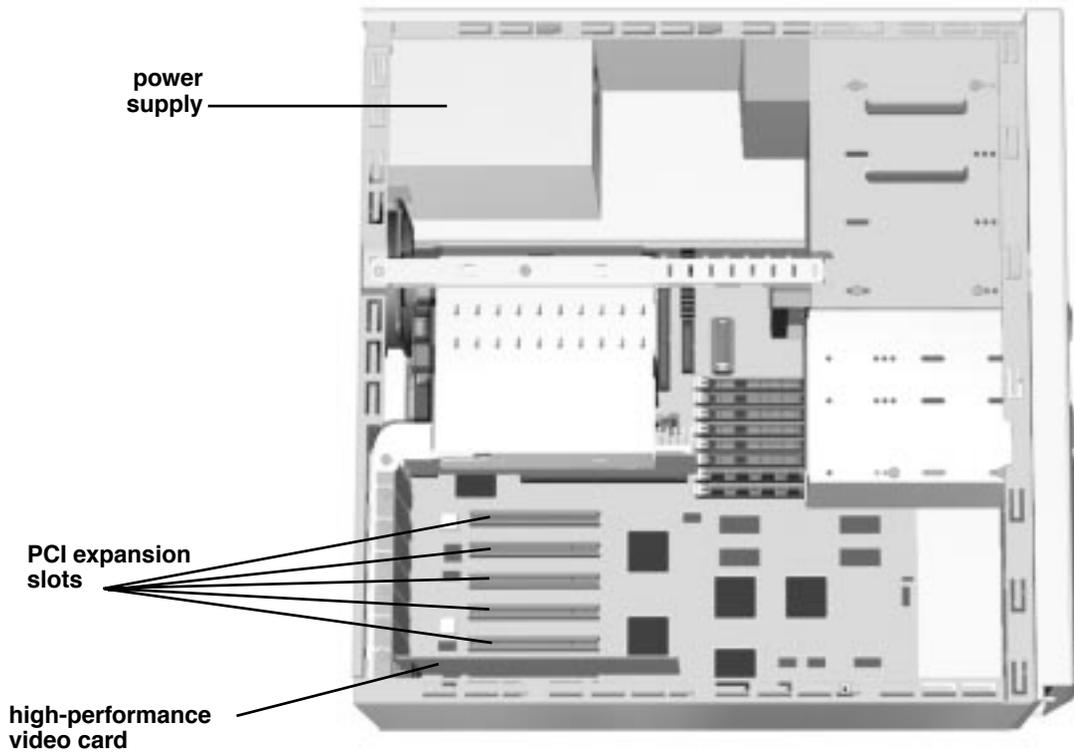
CAUTION! Touch the metal plate over the power supply to discharge any static electricity that might have built up on your clothes or body.

The system must be plugged in (see step 2 on page 56) for this to work.

Use an anti-static bracelet and handle cards by the non-metallic edges only.

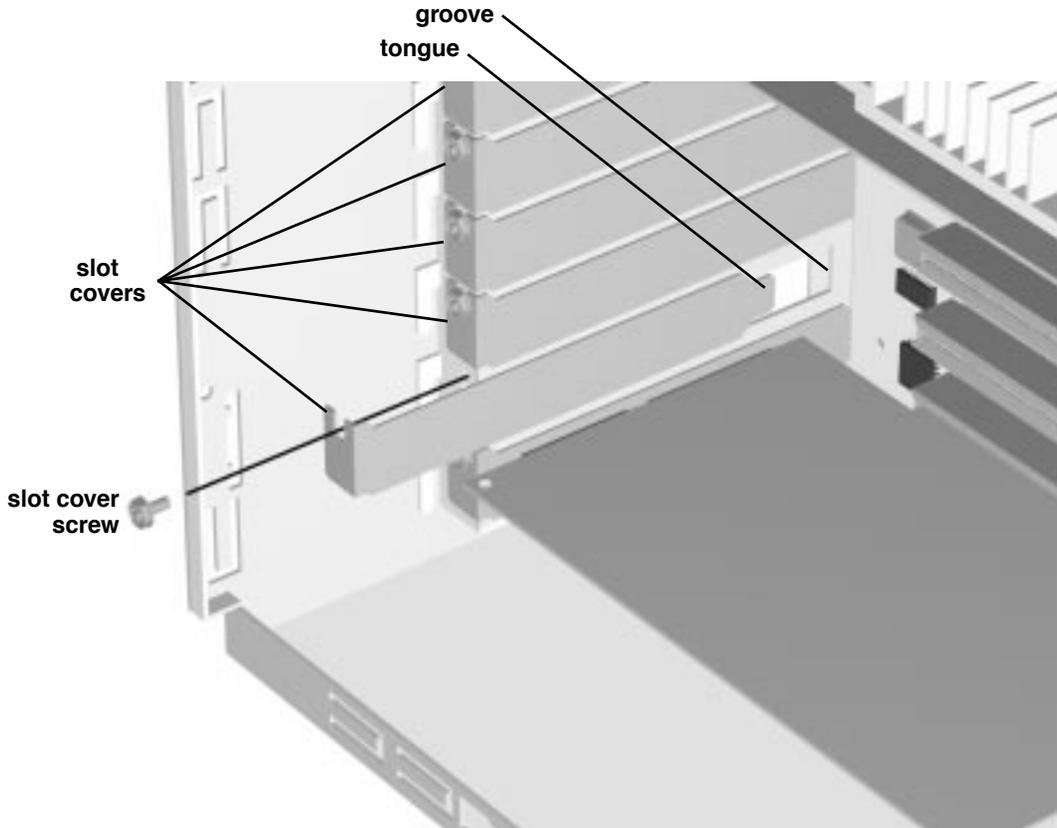
2. Select an unoccupied PCI expansion slot on the motherboard to install the expansion card into.

There is no inherent reason to pick one slot over another, however, practical considerations, such as clearance for connectors, cooling considerations, etc. often dictate the choice of slot.



3. Remove the metal slot cover from the back of the chassis for the slot you want to use.

Remove the screw holding the slot cover at the top of the slot and put it somewhere you will be able to find it later; then pull the cover toward you so that the tongue at the bottom of the cover slides out of the groove the chassis



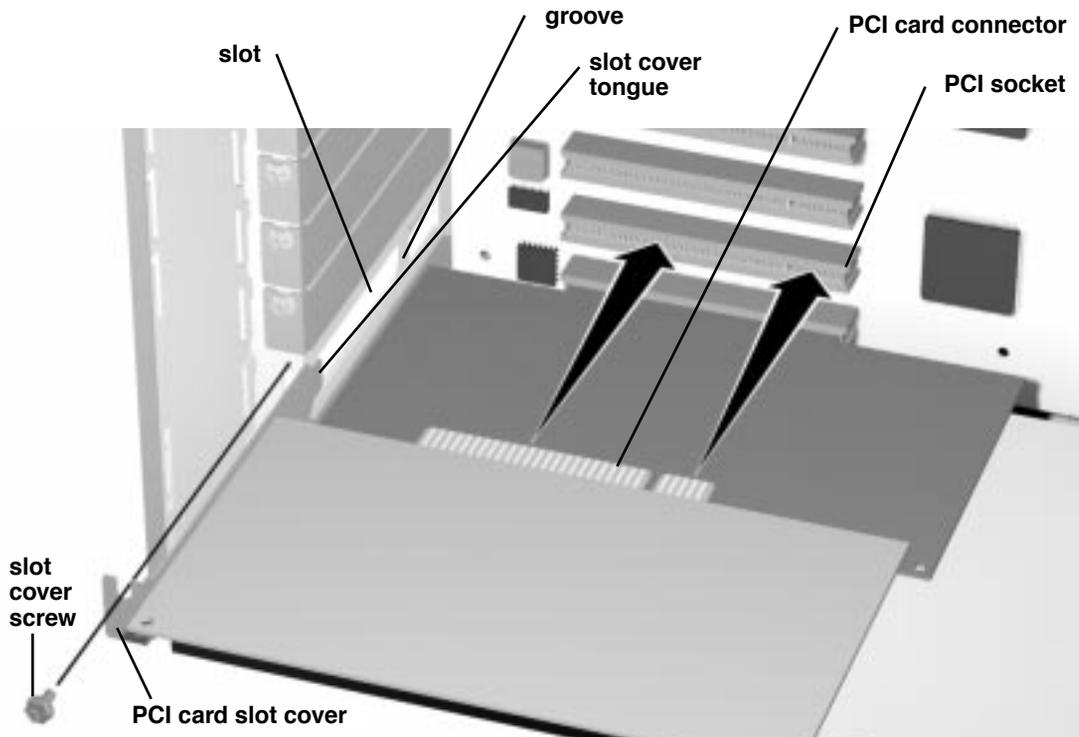
4. Remove the card to be installed from its static-proof bag.

Hold the card by its non-metallic edges and its metal slot cover to avoid touching components or connector contacts on the card.

5. Align the card over the card slot.

Make sure that

- the PCI connector on the bottom of the card lines up with the PCI socket on the riser card.
- the slot cover on the PCI card lines up with the slot in the back panel.
- the slot cover tongue fits into the groove at the base of the slot.



6. Push the card into the PCI socket until it is firmly seated.

Do not force the card. If you feel a lot of resistance, pull the card out, realign it, and insert it again.

7. Replace and tighten the slot cover screw you removed earlier.

8. If you have no more internal components to install, replace the side panel, and the thumb screws which hold it in place, and re-connect everything.

CAUTION! Be careful not to get any of the cables caught in the side panel or the case when you put the panel back on the computer.

WARNING! To prevent electrical shock, always replace the side panel before turning on the computer.

Chapter 6 Adding Memory

This chapter explains how to enhance the processing and video capabilities of your computer by adding additional memory.

Required tools

- A small regular (slot-head) screwdriver or a small coin.
- A small Phillips-head screwdriver.

Removing the cover

To install additional memory, you must first remove the computer's cover.

CAUTION!

1. If you are not proficient with electronic equipment, Power Computing Corporation recommends that you have a certified technician install RAM, drives, and expansion cards. If you attempt to install RAM, drives, or cards yourself, any damage you may cause to your equipment will not be covered by the limited warranty on your computer. Please call technical support at 1-800-708-6227 for additional information about this or any other warranty question.

2. If an anti-static bracelet is available, put it on and ground it to the computer chassis before touching any components inside the computer.

3. Never turn the computer on or operate the computer with the cover removed.

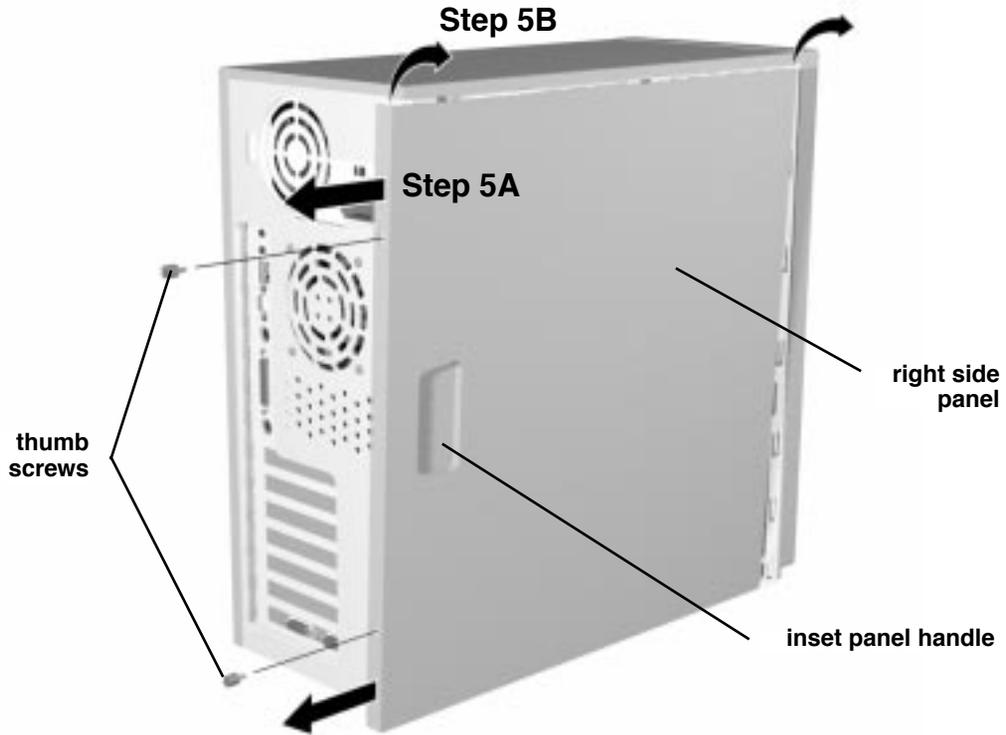
How to remove the cover

1. **Shut down the computer and turn off the monitor, but leave the computer plugged in to the electrical outlet.**

Leaving the computer plugged in ensures that it is grounded.

2. **Disconnect everything but the power cord from the back of the computer.**
3. **Rotate the computer so that its rear panel faces you.**

4. Remove the two thumb screws from the rear of the right side panel.



Put the thumb screws somewhere safe where you'll be able to find them when you're ready to replace the cover.

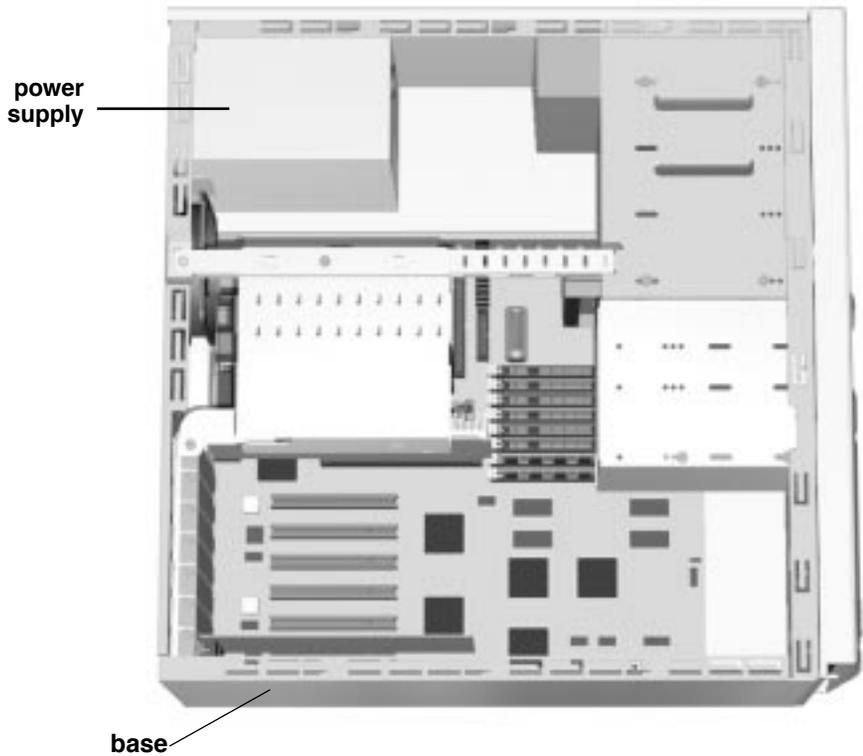
5. **A. Grasp the inset panel handle and slide the right side panel back about an inch.**

B. Gently, but firmly, pull the top of the side panel to the rear and away from the chassis.

Set the side panel aside.

6. **Lay the computer down with its open side up and rotate it so that the base faces you.**
7. **Before touching any components inside the computer, touch the metal plate over the power supply to discharge any static electricity that might have built up on your clothes or body.**

The system must be plugged in (see step 2 on page 68) for this to work.



8. To replace the side panel, reverse steps 4 through 7; then you can re-connect everything.

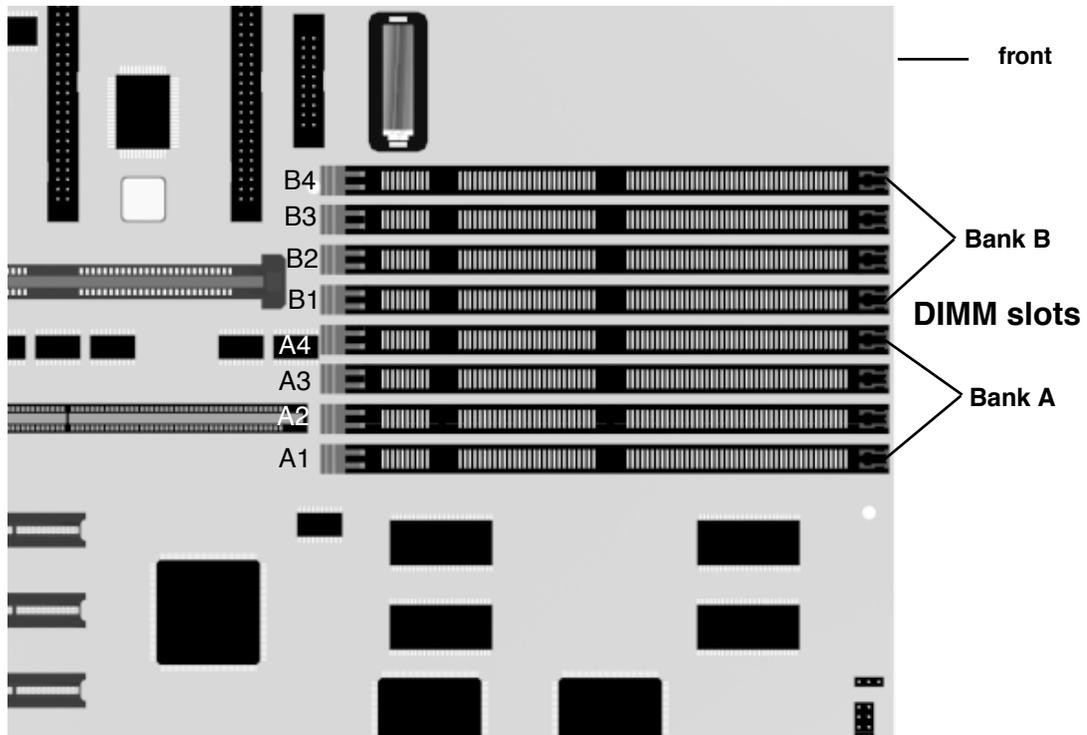
CAUTION! Be careful not to get any of the cables caught in the cover or stuck in the fan housing when you put the cover back on the computer.

Adding memory

Your computer's random-access memory (RAM) can be increased. Memory is increased by installing or replacing memory modules. The computer uses DIMMs, or dual in-line memory modules for RAM. Make sure that the memory modules you purchase are the right ones for your computer. See Appendix B, "Technical Information," on page 153 for technical specifications.

What you need to know about adding RAM

The computer has eight DIMM slots on the motherboard, near the front of the computer, (see the following motherboard illustration).



The DIMM slots are organized into two banks, A and B. Bank A is toward the bottom and Bank B is above it, as labeled on the motherboard. Each bank has four slots, numbered A1–A4 and B1–B4.

DIMMs can be inserted in any order, but to achieve best performance, insert DIMMs of the same capacity in corresponding slots (A1 with B1, A2 with B2, etc.), to interleave RAM memory.

All DIMMs must be 168-pin, fast-paged mode, 70-nanosecond RAM access time or faster. You can install 8 MB, 16 MB, 32 MB, 64 MB, or 128 MB DIMMs up to a total capacity of 1 GB (i.e. 1024 MB).

To increase your system's RAM, install additional DIMM modules in vacant DIMM slots; if there are no vacant slots, remove one or more lower-capacity DIMMs (see “Removing a DIMM” on page 80) and replace them with modules of higher capacity. (see “Inserting a DIMM” on page 80.)

Installing and removing RAM

CAUTION!

1. If you are not proficient with electronic equipment, Power Computing Corporation recommends that you have a certified technician install RAM, drives, and PCI expansion cards. If you attempt to install RAM, drives, or cards yourself, any damage you may cause to your equipment will not be covered by the limited warranty on your computer. Please call technical support at 1-800-708-6227 for additional information about this or any other warranty question.

2. If an anti-static bracelet is available, put it on and ground it to the computer chassis before touching any components inside the computer.

3. Handle DIMMs by the ends and avoid touching their contacts or other metal components.

4. Always store DIMMs in anti-static bags.

5. Take your time; don't hurry.

Prepare the computer

1. If you haven't done so, remove the cover from the computer.

See "Removing the cover," starting on page 67 for instructions.

WARNING! Make sure the computer is powered down before removing the cover.

CAUTION! Touch the metal plate over the power supply to discharge any static electricity that might have built up on your clothes or body.

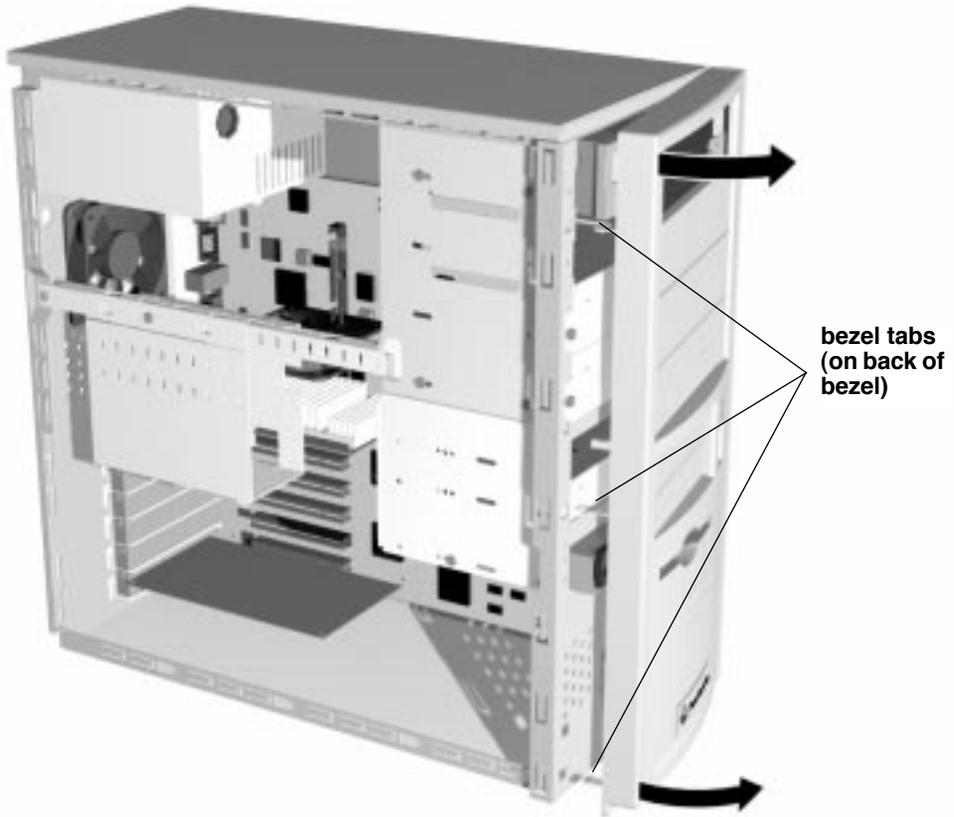
The system must be plugged in (see step 2 on page 68) for this to work.

Use an anti-static grounding strap and handle DIMM modules by the non-metallic edges only.

2. Set the computer upright.

Starting with the top bezel tab, push on the three tabs on the left side which hold the bezel in place.

Press up on the top tab and down on the other two, and pull the tabbed side of the bezel away from the case until the tabs on the other side of the bezel clear the front of the computer, and set the bezel aside.



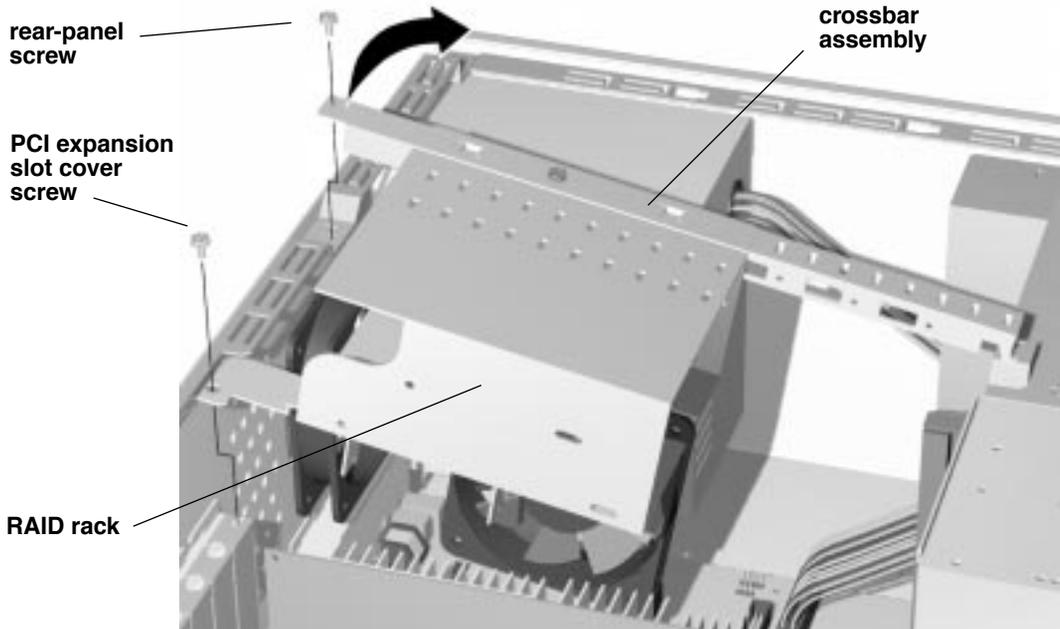
3. Remove the crossbar assembly.

The crossbar assembly consists of a crossbar, a RAID rack, and a fan; the entire assembly must be removed to install RAM.

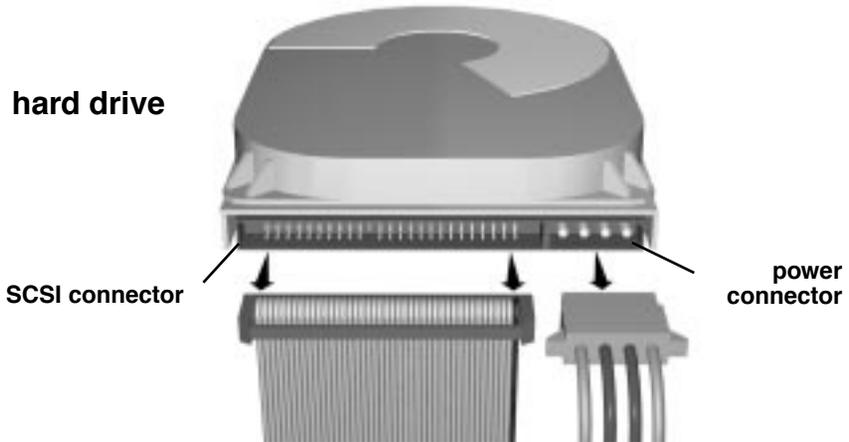
Place the computer on its side with its open side up.

Remove the screw that secures the crossbar to the rear panel.

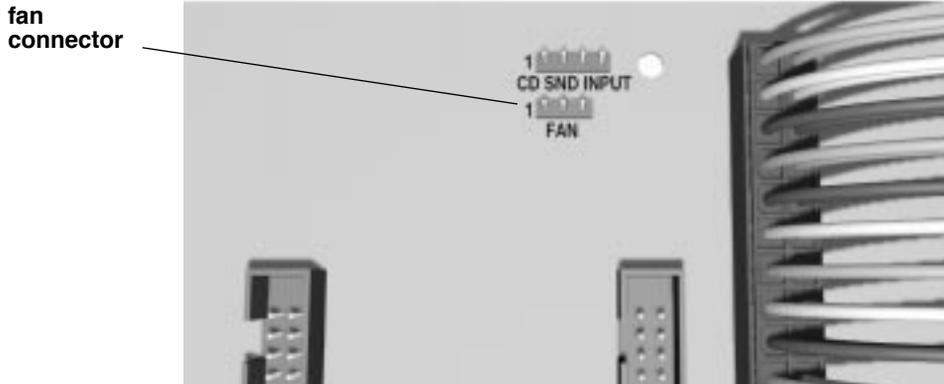
Remove the screw that secures the crossbar to the PCI expansion slot cover.



If there are drives installed in the RAID rack, lift the crossbar assembly high enough to have access to the RAID drive power and SCSI cable connectors, and then disconnect the cables from the RAID drives. Note which cable attaches to which RAID drive.

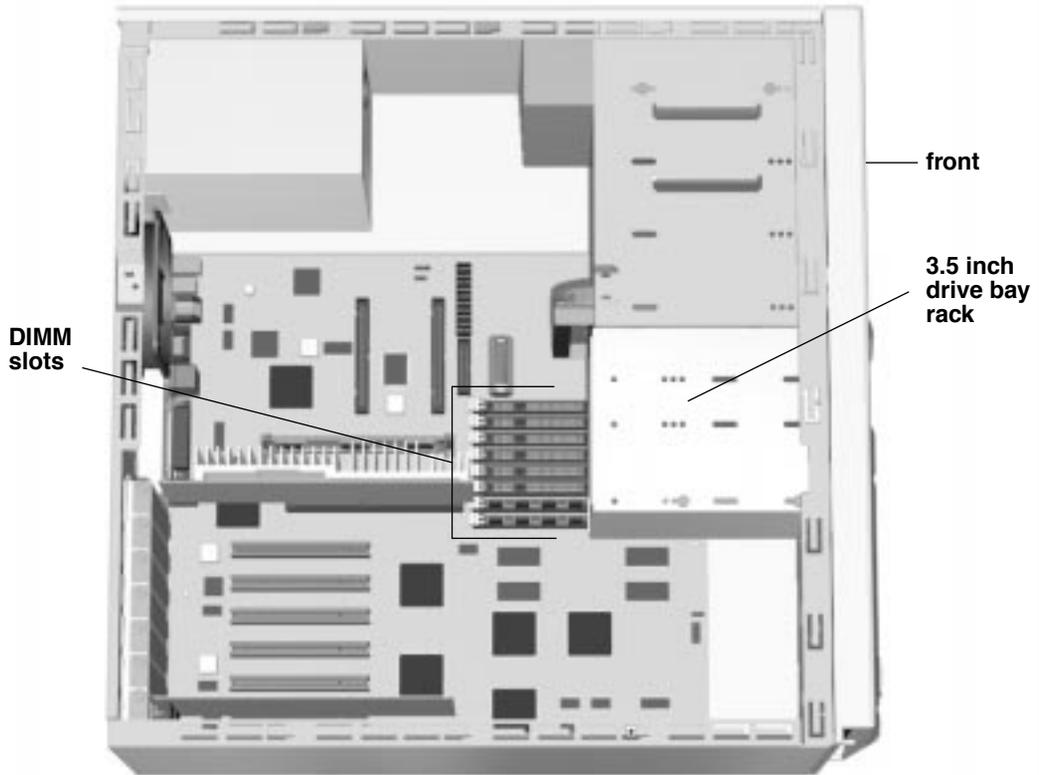


Lift the crossbar assembly higher to access the fan cable connector, and disconnect the fan cable from the connector.

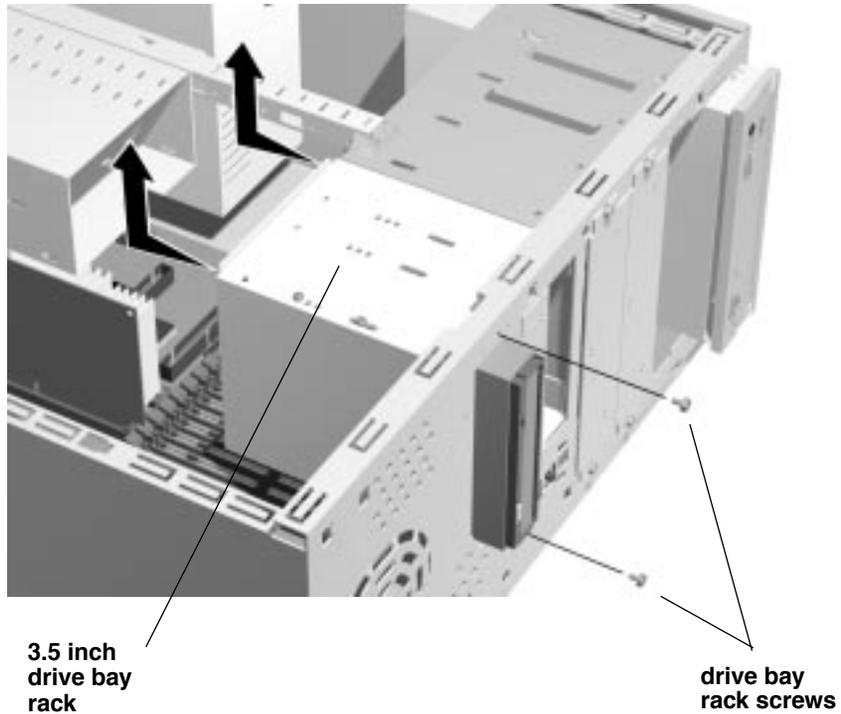


Place the crossbar assembly, the expansion slot cover, and the screws in a safe place where you will be able to find them later.

Disconnect the cables from the drives in the front 3.5 inch drive bay rack above the DIMM slots.

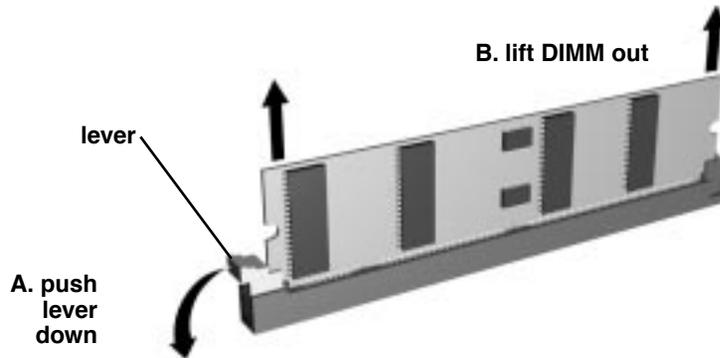


4. Remove the two screws holding the front 3.5 inch drive bay rack to the front of the chassis, and slide the drive bay rack back to remove the it from the chassis.



Removing a DIMM

1. If you need to remove a DIMM module to make room for a higher-capacity one, reach in and push down on the tiny lever at the end of the DIMM slot.



2. The DIMM should pop loose from the slot at the lever end.
3. If the DIMM module does not come free, press the DIMM lever down again.
4. Grasp the DIMM module with one hand at each end and pull the module up and out of the slot.
5. When you are finished with DIMM removal and insertion, put the cover back on the computer, and re-connect the external cables.

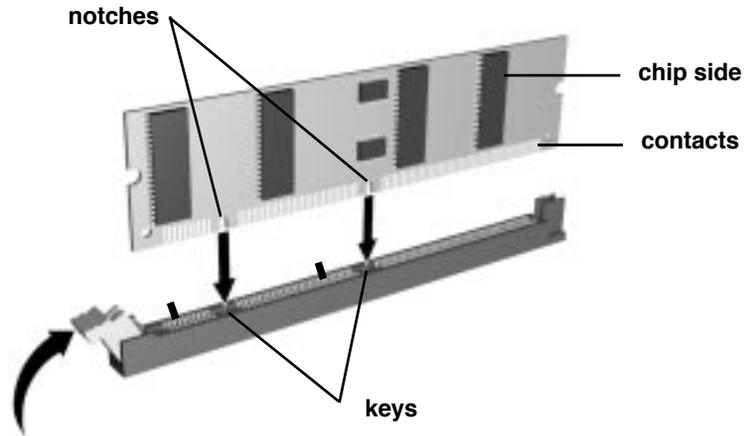
CAUTION! Be careful not to get any of the cables caught in the cover or stuck in the fan housing when you put the cover back on the computer.

Inserting a DIMM

CAUTION! Touch the metal plate over the power supply to discharge any static electricity that might have built up on your clothes or body.

The system must be plugged in (see step 2 on page 68) for this to work.

Use an anti-static bracelet and handle memory modules by the non-metallic edges only.



1. To insert a DIMM module, hold the module with one hand at each end with the contacts down and the chip side of the DIMM toward the front of the computer.

Notice that there are two notches in the contact edge of the DIMM module.

2. Lower the DIMM squarely into the slot so that the notches line up with the raised key areas of the DIMM socket.

- 3. Slide the contacts straight into the slot and make sure the contacts are firmly seated in the slot.**

Don't force the DIMM module into the slot; if the motherboard starts bending significantly, pull the DIMM out, reposition it, and try again.

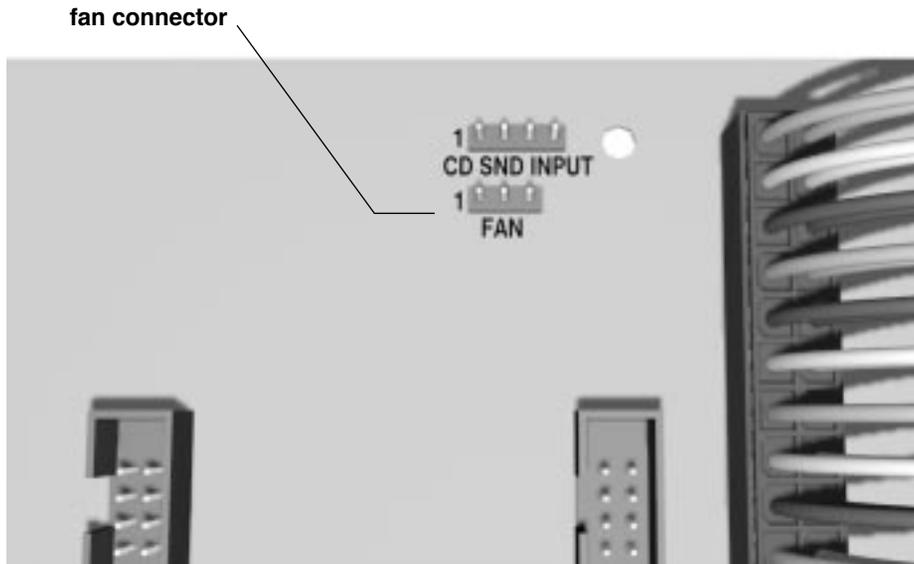
Note: Some DIMM modules have sharp, square edges which are difficult to get into the DIMM slot. If you have repeated difficulty getting the DIMM into the slot, return it to your vendor for replacement.

- 4. If the DIMM module is seated, the DIMM lever should rise by itself so it lines up with the other levers.**
- 5. When you are finished, replace the front 3.5 inch drive bay cage, and re-connect the drives in the drive cage.**
- 6. Re-assemble the computer as described in "Putting the computer back together" on page 83.**

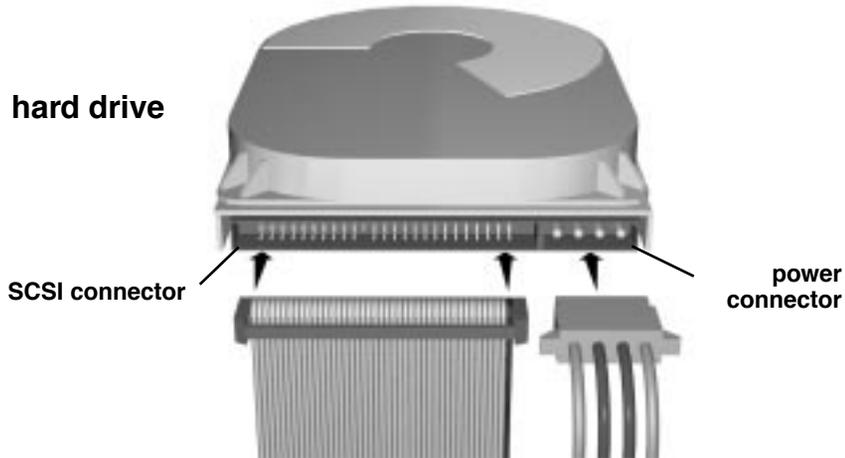
Putting the computer back together

Follow the instructions in this section to put the computer back together and to verify that the installed drive is operating properly.

1. **Re-connect the crossbar assembly fan cable to the fan connector on the motherboard.**



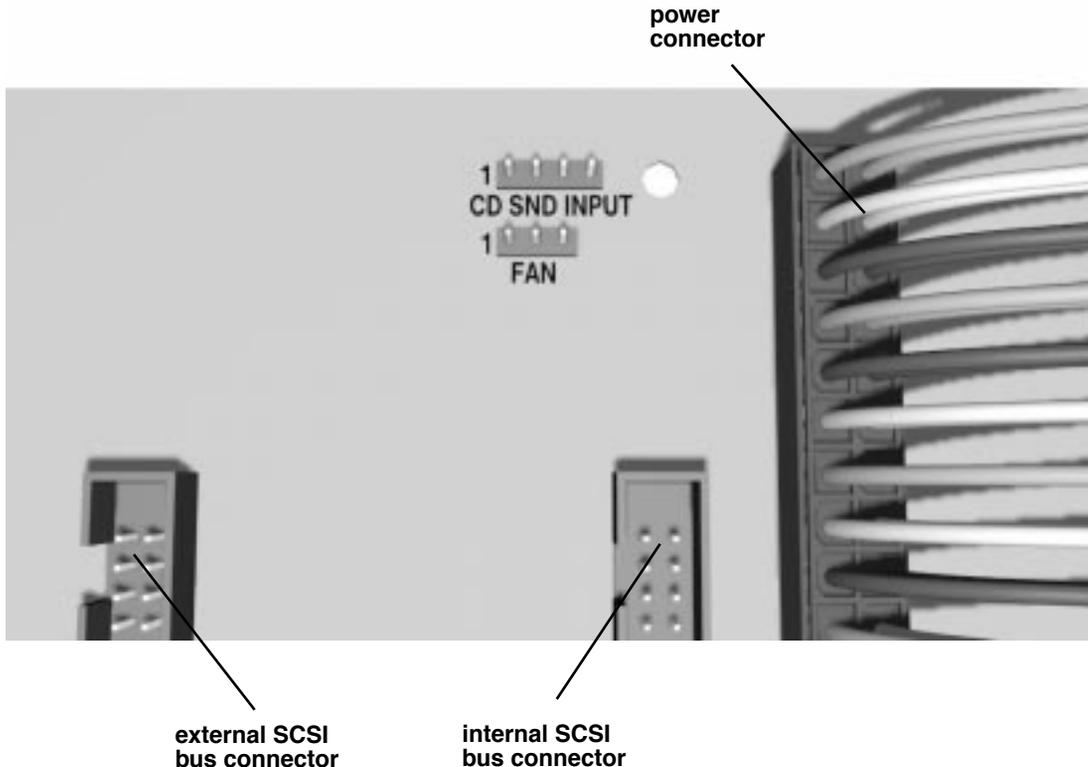
2. If drives are installed in the RAID rack, connect the RAID drive power and SCSI cable connectors.



Find the internal SCSI cable inside the computer (it is the wide flat ribbon cable connected to the hard drive). The internal SCSI cable should have one or more unused connectors on it. You may have to detach and re-attach the SCSI connectors on one or more other drives to get connectors where you need them. Remember, this is SCSI, so the ends have to be terminated. See “Ensuring proper termination” on page 17 for details.

Note: Because this system has a total of 9 drive bays, and a SCSI chain can handle a maximum of 7 devices, including the pre-installed hard drive and the CD-ROM drive, there is a separate cable, connected to the external SCSI chain, to be used if the internal SCSI chain is filled to capacity. The external SCSI cable is set up to be used for devices in the RAID rack. The internal SCSI bus operates at 10 MB/sec; the external SCSI bus operates at 5MB/sec.

If you are installing a drive in the RAID rack and there are no other SCSI connectors available, connect these drives to the external bus cable.

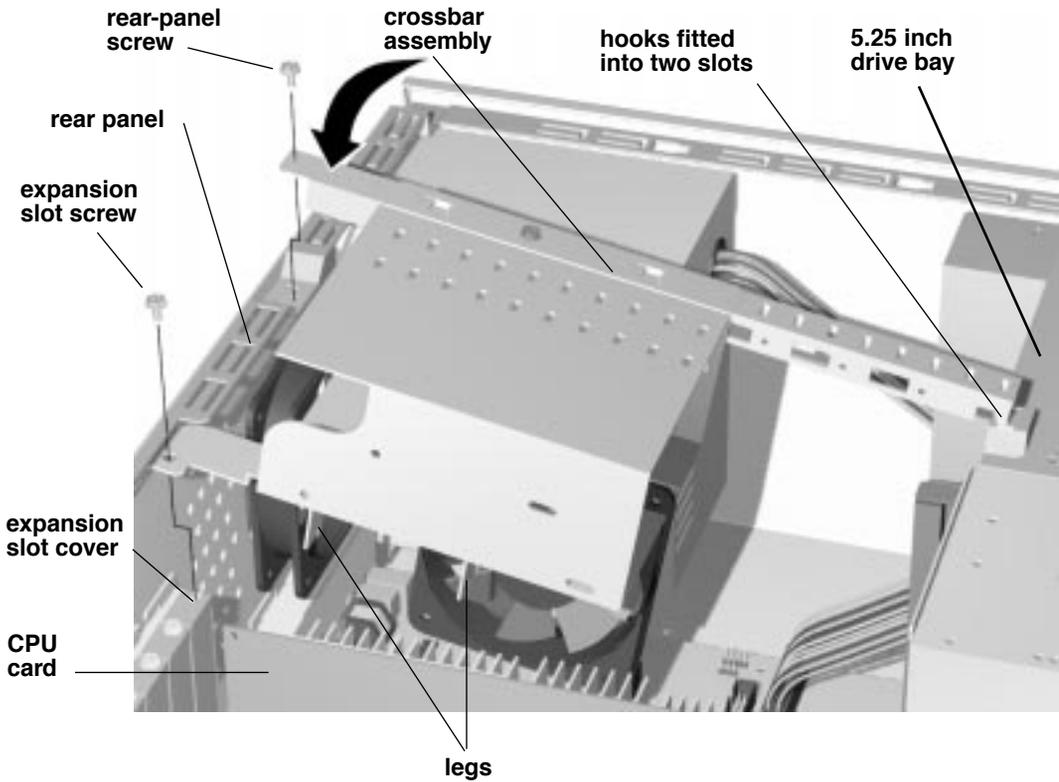


- 3. Place the expansion slot cover over the PCI expansion slot, but do not reinsert the screw.**
- 4. Read this step before proceeding.**

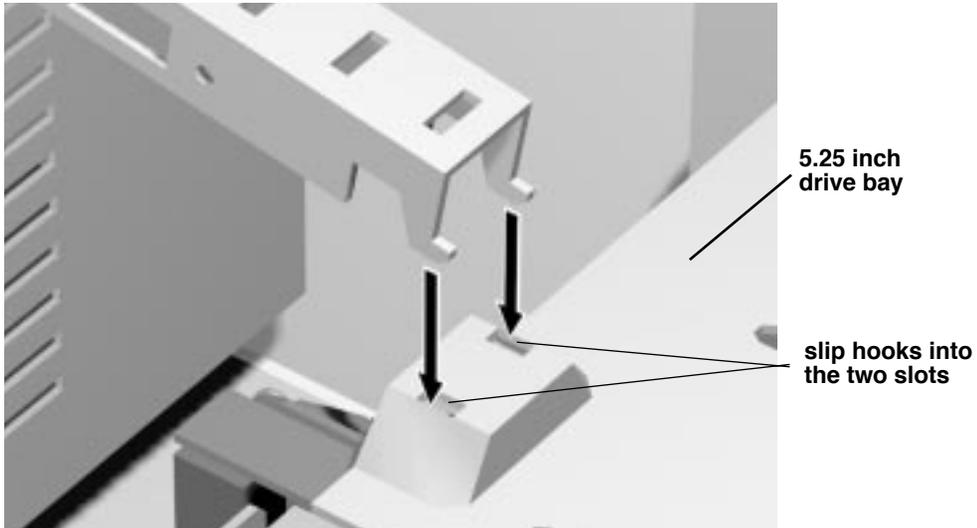
This step is intended to provide an overview of the crossbar assembly installation procedure. Use the following illustration for reference only. Detailed installation instructions follow.

In general, the crossbar assembly must be secured to the chassis by two hooks on the front end of the beam, which fits into two slots on the 5.25 inch drive bay rack.

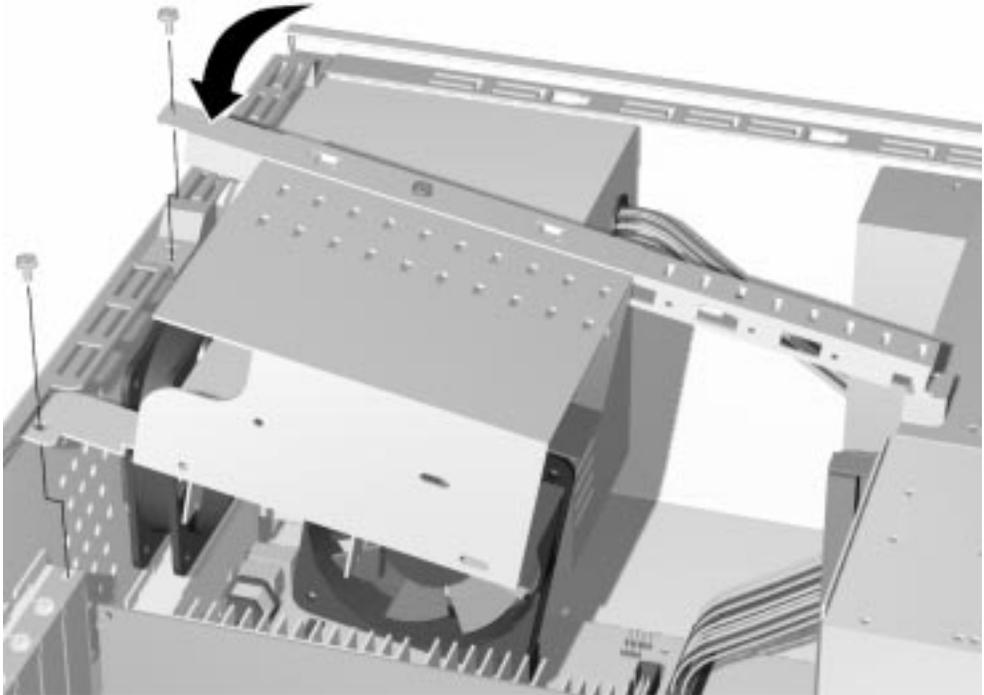
A screw attaches the rear of the beam to the rear chassis panel, and a second screw attaches the RAID rack cage to the PCI expansion slot closest to the CPU card. The RAID rack rests on two legs on top of the CPU card.



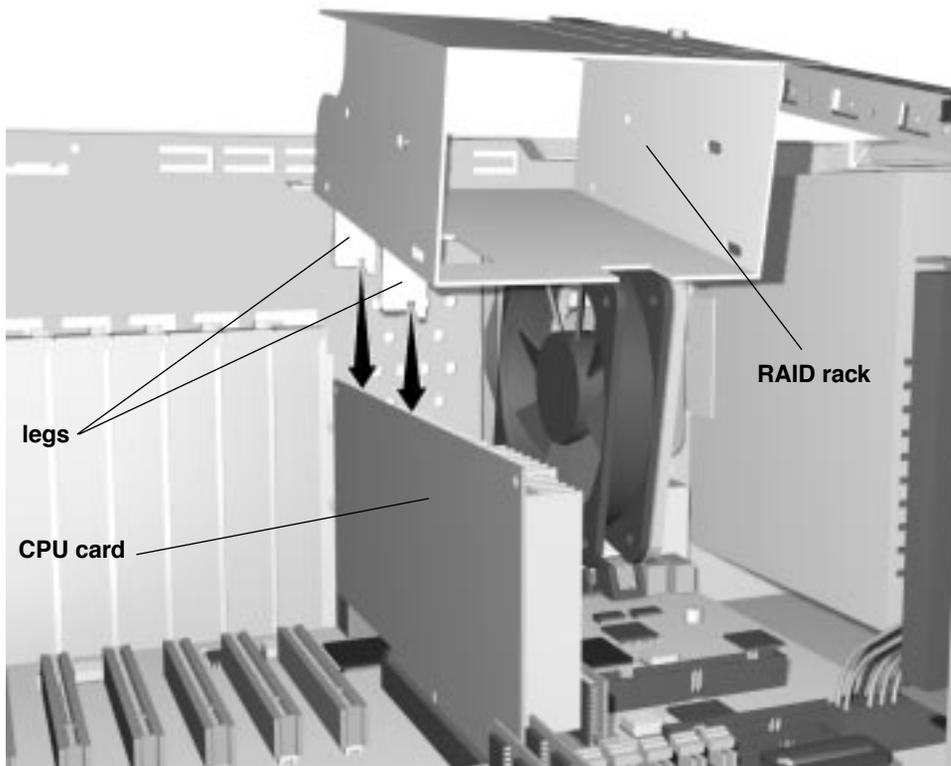
5. To re-install the crossbar assembly, first slip the two hooks on the front end of the crossbar beam into the two slots on the 5.25 inch drive bay rack.



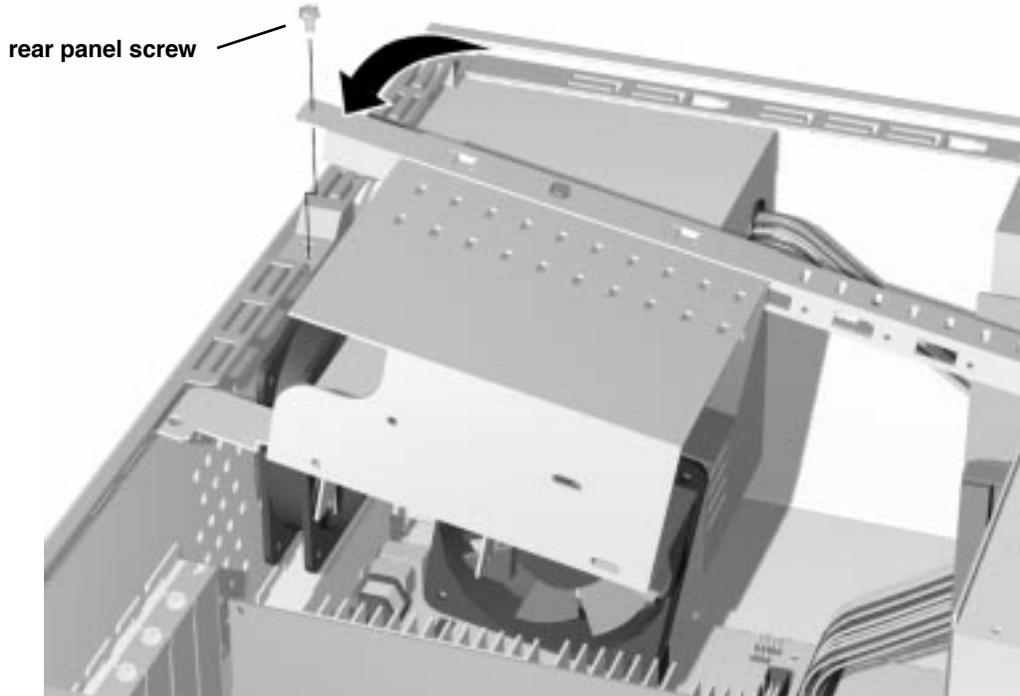
6. Lower the crossbar until the other end is almost to the rear panel.



7. Make sure the slots on the two legs on the bottom of the RAID rack are aligned with the CPU card.

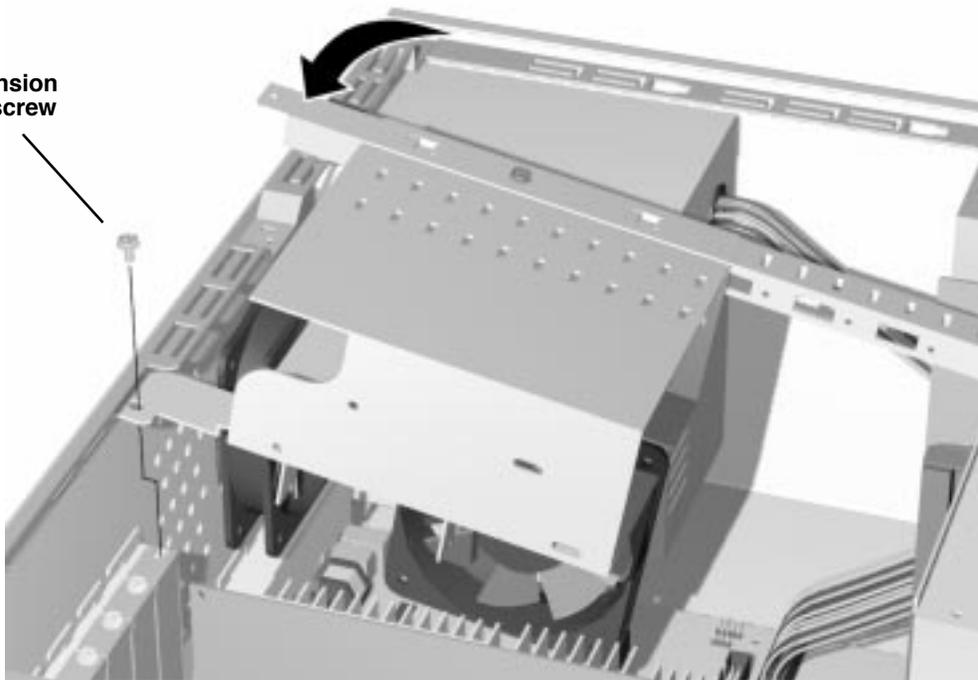


8. After making sure of proper alignment, lower the end of the crossbar so that it is flush with the rear panel, and re-insert the rear-panel screw.



9. Align the holes in the crossbar assembly and expansion slot cover, and then re-install the expansion slot screw.

expansion
slot screw



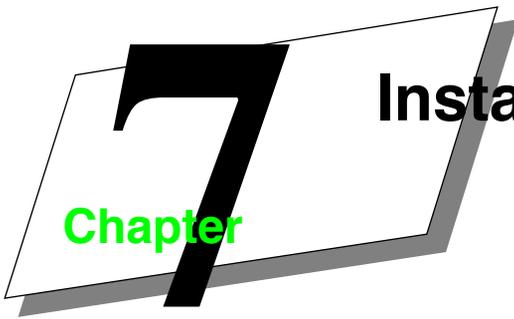
10. Replace the side panel, re-connect system components, and restart the computer.

CAUTION! Be careful not to get any of the cables caught in the cover or stuck in the fan housing when you put the cover back on the computer.

Adding video memory

The quantity of video memory in your computer's video subsystem determines the number of colors that can be displayed on monitors of various sizes. See "VRAM information," starting on page 157 for information on the number of colors that can be displayed on various-sized monitors with different quantities of video memory.

If you have the 64-bit video accelerator card, it comes with 2 MB of video RAM. You can replace the 64-bit video card with the high-performance 128-bit 4 or 8 MB video RAM video accelerator card by calling our sales department at 1-800-999-7279. Be sure to specify that you want the IMS Twin Turbo video card for the PowerTower Pro system and specify either the 4 MB or the 8 MB version. See the table on page 158 for information on the difference between a video card with 4 MB of VRAM as opposed to 8 MB of VRAM.



Installing Internal Drives

What you need to know about installing internal drives

This chapter explains how to enhance the capabilities of your computer by adding internal devices such as an additional hard disk.

Installing an internal drive involves these steps:

- Preparing the drive (page 100)
- Removing the cover (page 103)
- Installing the drive (page 106)
- Installing any required software drivers (page 147)

CAUTION: The power supply for the computer will support a total of nine internal drives, including the floppy drive. Do not exceed a total of nine such drives in the internal drive bays, and do not exceed the power consumption levels specified in “Power requirements” on page 159. Additional *external* drives, with their own power supplies, are fine, however.

Required tools

- A small Phillips-head screwdriver.
- A 3.5 inch to 5.25 inch drive adapter, if you are installing a 3.5 inch drive in a 5.25 inch bay.
- A drive rail, if you are installing a drive in a 5.25 inch bay other than the bottom one.

- Software drivers, if required.

CAUTION!

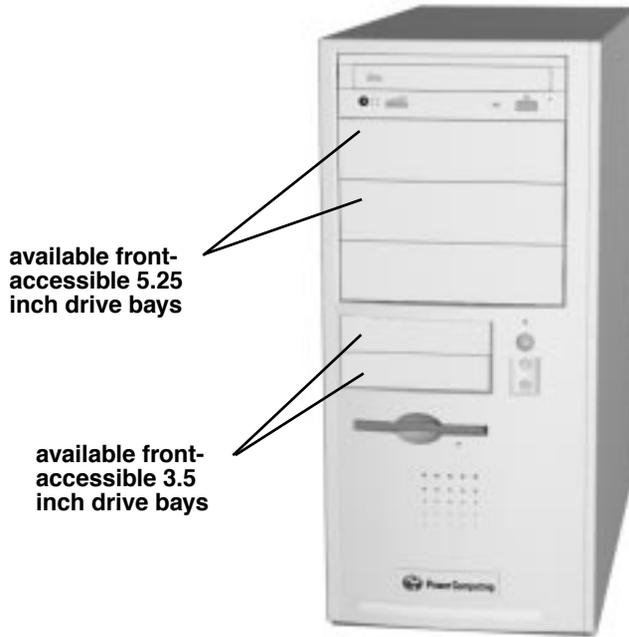
- 1. If you are not proficient with electronic equipment, Power Computing Corporation recommends that you have a certified technician install RAM, drives, and expansion cards. If you attempt to install RAM, drives, or cards yourself, any damage you may cause to your equipment will not be covered by the limited warranty on your computer. Please call technical support at 1-800-708-6227 for additional information about this or any other warranty question.**
- 2. If an anti-static bracelet is available, put it on and ground it to the computer chassis before touching any components inside the computer.**
- 3. Never turn the computer on or operate the computer with the cover removed.**

Drive bay locations

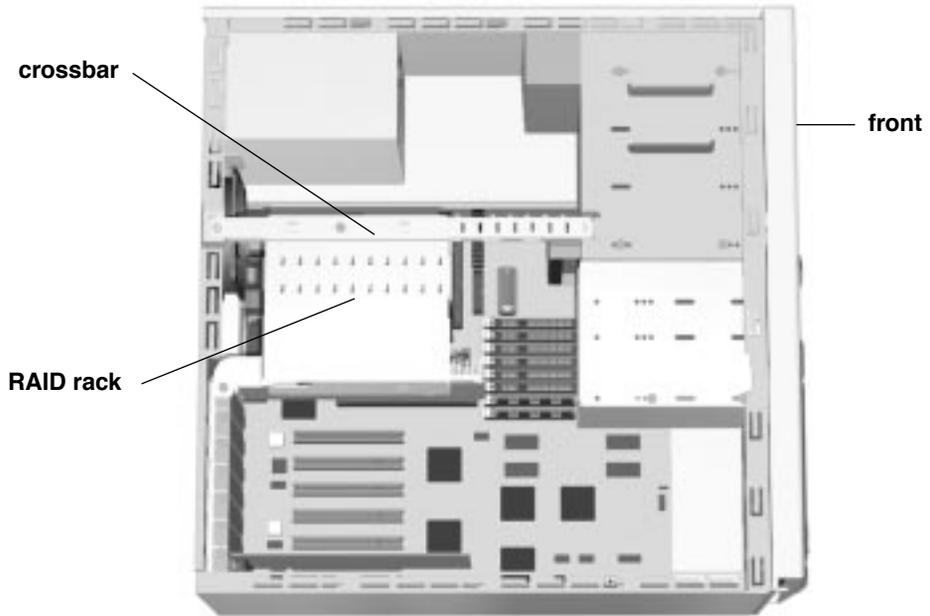
The PowerTower Pro uses two SCSI (Small Computer Systems Interface) buses to connect drives; a 10 MB/sec. internal bus and a 5 MB/sec. external bus. For a discussion of how the SCSI bus on your computer is set up, see “Using SCSI devices,” starting on page 16. Pay particular attention to the discussion of SCSI termination, discussed in “Ensuring proper termination” on page 17.

Besides the floppy disk drive, the built-in hard disk, and the CD-ROM drive, the computer has two front-accessible 5.25-inch drive bays below the CD-ROM drive. Each of these drive bays allows you to install one full-height or two half-height drives.

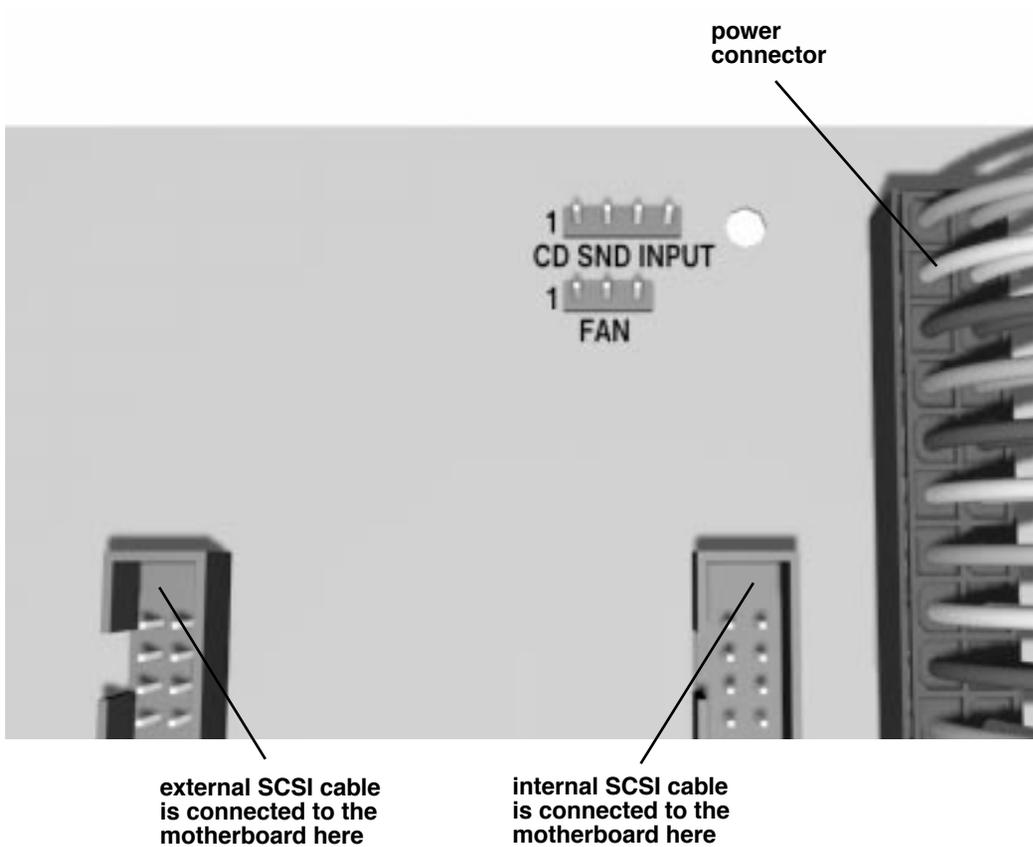
There are also two front-accessible 3.5 inch drive bays above the floppy disk drive.



You can also install 3.5 inch hard drives in the RAID rack attached to the crossbar.



If you install 3.5 inch drives in the RAID rack and there are no other SCSI connectors available, connect these drives to the external SCSI bus cable.



Since the internal drive bays are designed to accommodate 5.25 inch drives, if you are installing a 3.5 inch drive in a 5.25 inch drive bay other than the bottom one, you will need to mount it in a 3.5 to 5.25 inch adapter, and then install a rail on the right adapter. The end of the rail with the flexible tab goes toward the front. 3.5 to 5.25 inch adapters are available at most computer parts stores. See “Prepare the drive” on page 100 for more information about drive adapters and rails.

Prepare the drive

1. Set the SCSI ID

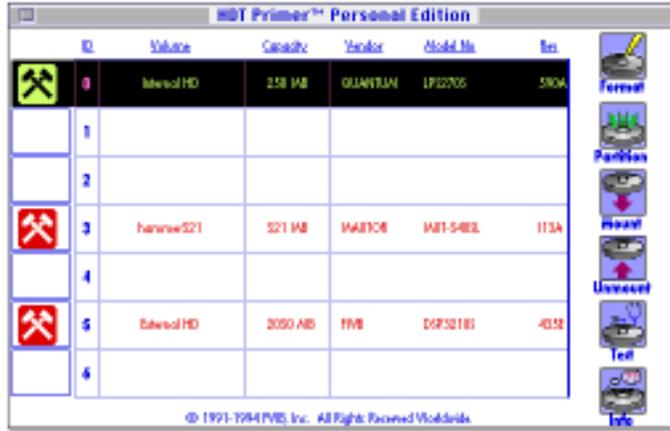
Following the instructions which came with your device, set its SCSI ID.

Each device in a SCSI chain requires a unique number called a SCSI ID, which the computer uses to identify the device. The computer itself is assigned SCSI ID 7 and the primary internal hard disk is assigned SCSI ID 0. Every other device you install must have a unique number from 1 to 6.

Drives provided by Power normally come with SCSI ID pre-set as follows:

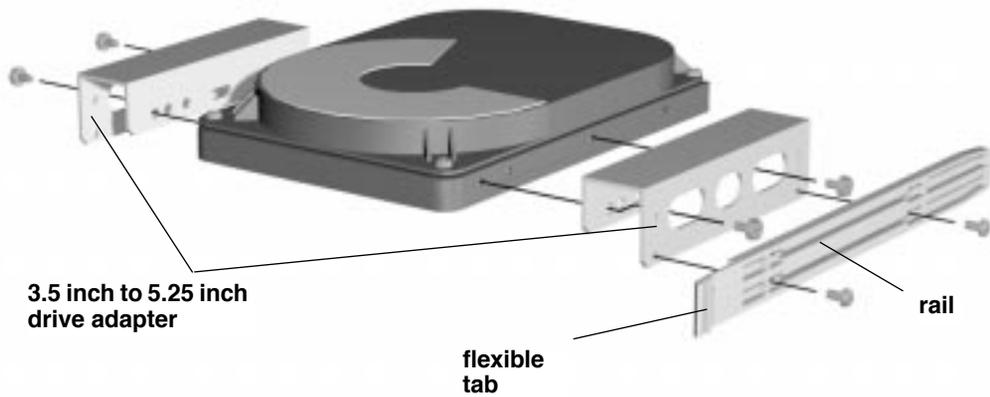
SCSI ID	Device
0	primary internal hard drive (terminated)
1	optional additional hard drive
3	CD-ROM drive
5	optional removable-cartridge drive
7	motherboard (self-terminated)

To determine what SCSI IDs have already been assigned to which devices, go to the **Hard Disk Toolkit™ PE** folder in the **Utilities** folder on your hard disk and run **HDT Primer™ PE**. HDT Primer will scan your SCSI bus and display the SCSI ID, name, and other parameters of all of the SCSI devices on the bus.



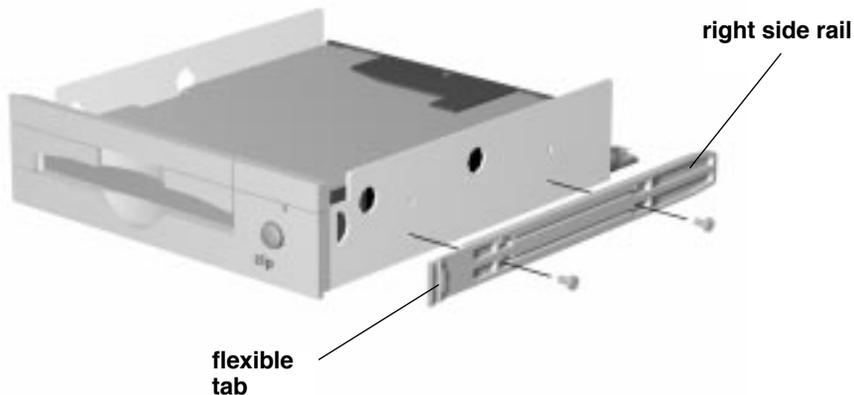
2. Attach a 3.5 inch drive in a 3.5 to 5.25 inch adapter

Since the internal drive bays are designed to accommodate 5.25 inch drives, if you are installing a 3.5 inch drive in a 5.25 inch drive bay other than the bottom one, you will need to mount it in a 3.5 to 5.25 inch adapter, and then install a rail on the right adapter. The end of the rail with the flexible tab goes toward the front. 3.5 to 5.25 inch adapters are available at most computer parts stores.



3. Install a drive rail on the right side of the drive.

If you are installing a drive in a 5.25 inch drive bay, install a drive rail on the right side of the drive. The end of the rail with the flexible tab goes toward the front. If rails did not come with your drive, they are available from Power Computing for a nominal fee through our Sales Department at 1-800-999-7279. Rails, as well as adapter trays for installing 3.5 inch drives in the 5.25 inch bays, are also available at most computer parts stores.



Removing the cover

In order to install internal drives into your system, you must first remove the computer's cover.

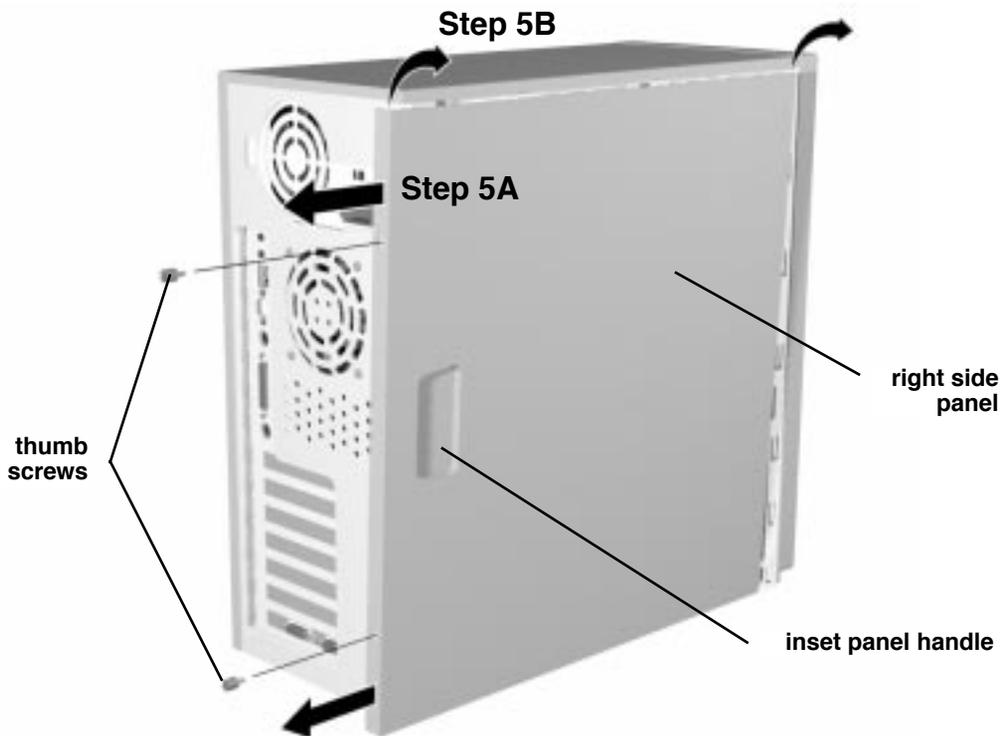
1. Shut down the computer and turn off the monitor, but leave the computer plugged in to the electrical outlet.

Leaving the computer plugged in ensures that it is grounded.

2. Disconnect everything but the power cord from the back of the computer.

3. Rotate the computer so that its rear panel faces you.

4. Remove the two thumb screws from the rear of the right side panel.

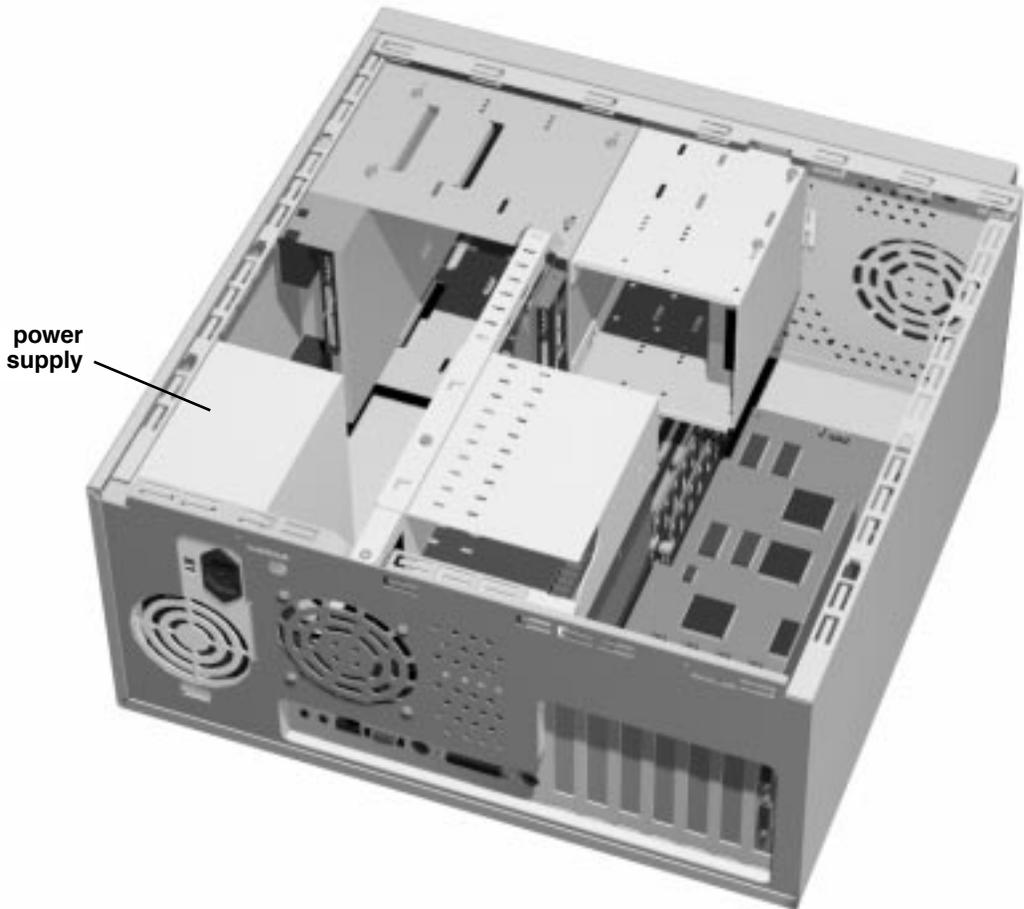


Put the thumb screws somewhere safe where you'll be able to find them when you're ready to replace the cover.

5. **A. Grasp the inset panel handle and slide the right side panel back about an inch.**
B. Gently, but firmly, pull the top of the side panel to the rear and away from the chassis.

Set the side panel aside.

6. Lay the computer down with its open side up and rotate it so that the base faces you.



7. Before touching any components inside the computer, touch the metal plate over the power supply to discharge any static electricity that might have built up on your clothes or body.

The system must be plugged in (see step 2 on page 103) for this to work.

8. To replace the side panel, reverse steps 4 through 7; then you can re-connect everything.

CAUTION! Be careful not to get any of the cables caught in the cover or stuck in the fan housing when you put the cover back on the computer.

Installing the drive

1. Be sure you have set the SCSI ID.

Set the SCSI ID as explained in “Prepare the drive” on page 100.

2. If you haven’t done so, remove the cover from the computer.

See “Removing the cover,” starting on page 103 for instructions.

WARNING! Make sure the computer is powered down before removing the cover.

CAUTION! Touch the metal plate over the power supply to discharge any static electricity that might have built up on your clothes or body.

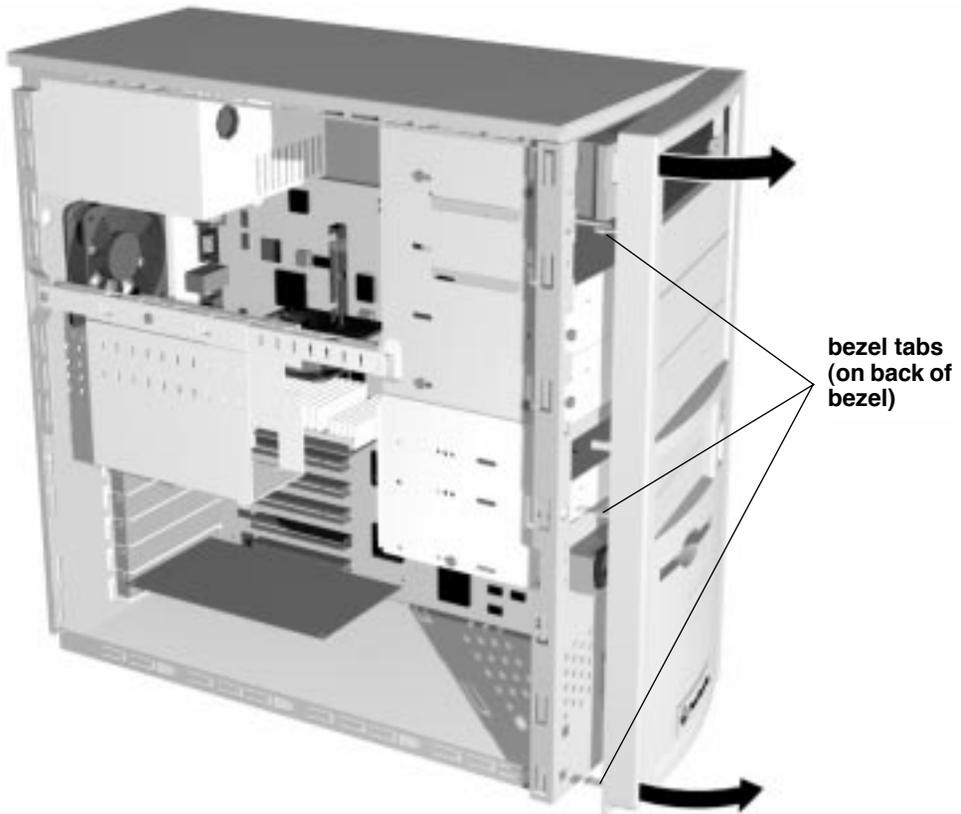
The system must be plugged in (see step 2 on page 103) for this to work.

Use an anti-static grounding strap and handle hard drives by the housing only; avoid touching any exposed electronics or connectors.

3. Set the computer upright.

Starting with the top bezel tab, push on the three tabs on the left side which hold the bezel in place.

Press up on the top tab and down on the other two, and pull the tabbed side of the bezel away from the case until the tabs on the other side of the bezel clear the front of the computer, and set the bezel aside.



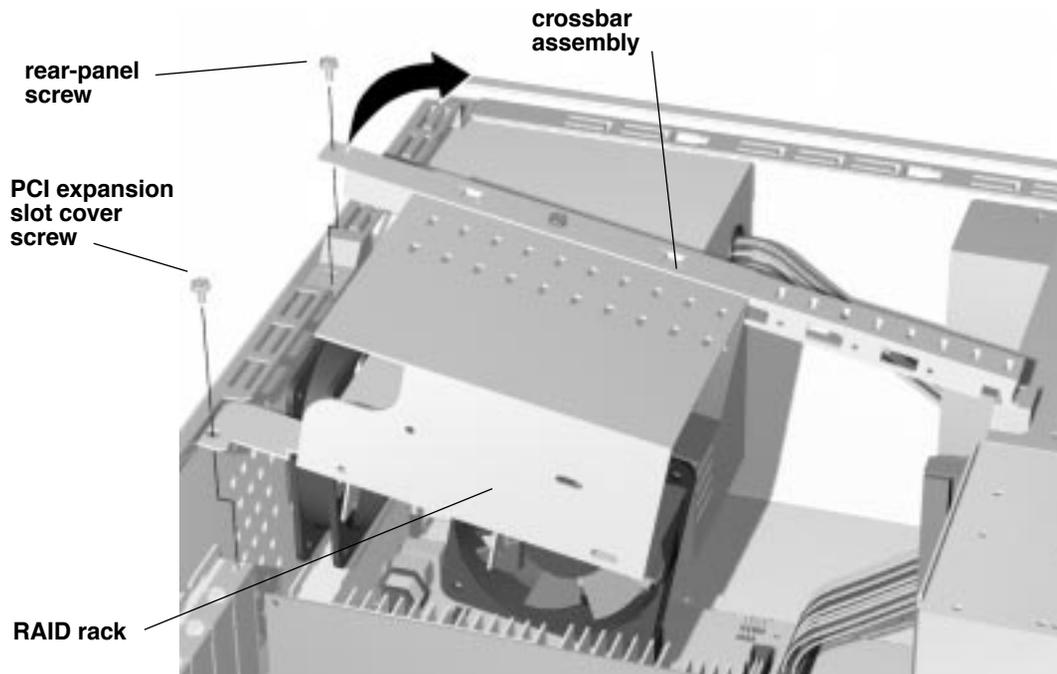
4. Remove the crossbar assembly.

The crossbar assembly consists of a crossbar, a RAID rack, and a fan; you must remove the crossbar assembly to install internal drives.

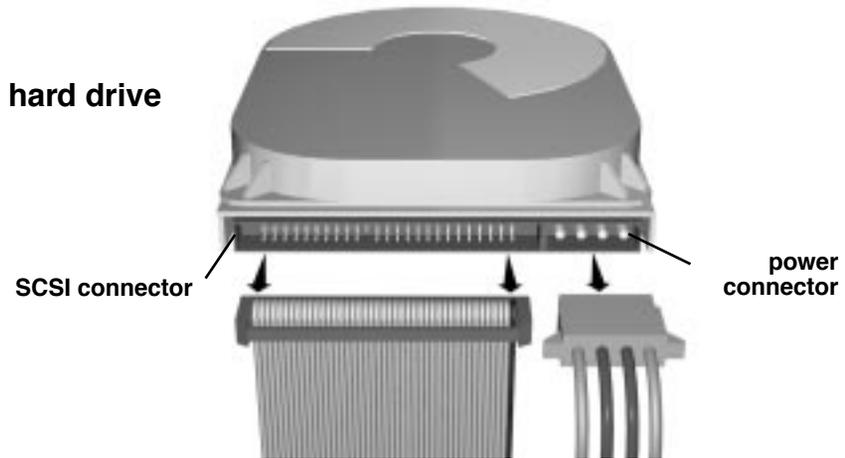
Place the computer on its side with the open side up.

Remove the screw that secures the crossbar to the rear panel.

Remove the screw that secures the crossbar to the PCI expansion slot cover.

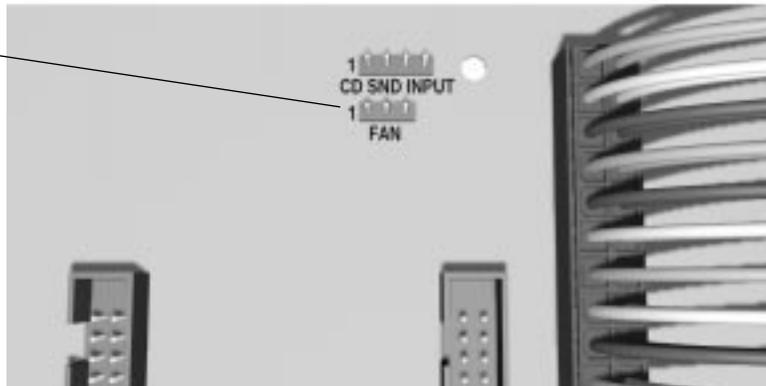


If there are drives installed in the RAID rack, lift the crossbar assembly high enough to have access to the RAID drive power and SCSI cable connectors, and then disconnect the cables from the RAID drives. Note which cable attaches to which RAID drive.



Lift the crossbar assembly higher to access the fan cable connector, and disconnect the fan cable from the connector.

fan
connector



Place the crossbar assembly, the expansion slot cover, and the screws in a safe place where you will be able to find them later.

Drive replacement and installation considerations

Before installing a drive in the computer, you should first consider the best location for its purpose. Obviously, a 5.25 inch drive must be installed in the 5.25 inch drive rack. If you are installing a 3.5 inch drive, it may go in any drive bay, although it will require a 3.5 to 5.25 inch drive adapter if it is installed in a 5.25 inch bay.

If a 3.5 inch hard drive is installed in the RAID rack, and there are no available SCSI cables to connect to it, then it must be connected to the external bus, which operates at 5 MB/sec. (For a discussion of how the SCSI bus on your computer is set up, see “Using SCSI devices,” starting on page 16. Pay particular attention to the discussion of SCSI termination, discussed in “Ensuring proper termination” on page 17.)

Another consideration is power. The power supply for the computer will support a total of nine internal drives, including the floppy drive. Do not exceed a total of nine such drives in the internal drive bays, and do not exceed the power consumption levels specified in “Power requirements” on page 159. Additional *external* drives, with their own power supplies, are fine, however.

Therefore, after deciding where you want to install the drive, refer to the appropriate section for instructions on:

- “Replacing a drive in the bottom 5.25 inch rack position” on page 110
- “Replacing and installing drives in the upper 5.25 inch rack positions” on page 119
- “Replacing and installing drives in the front 3.5 inch rack positions” on page 130
- “Replacing and installing drives in the RAID rack” on page 135

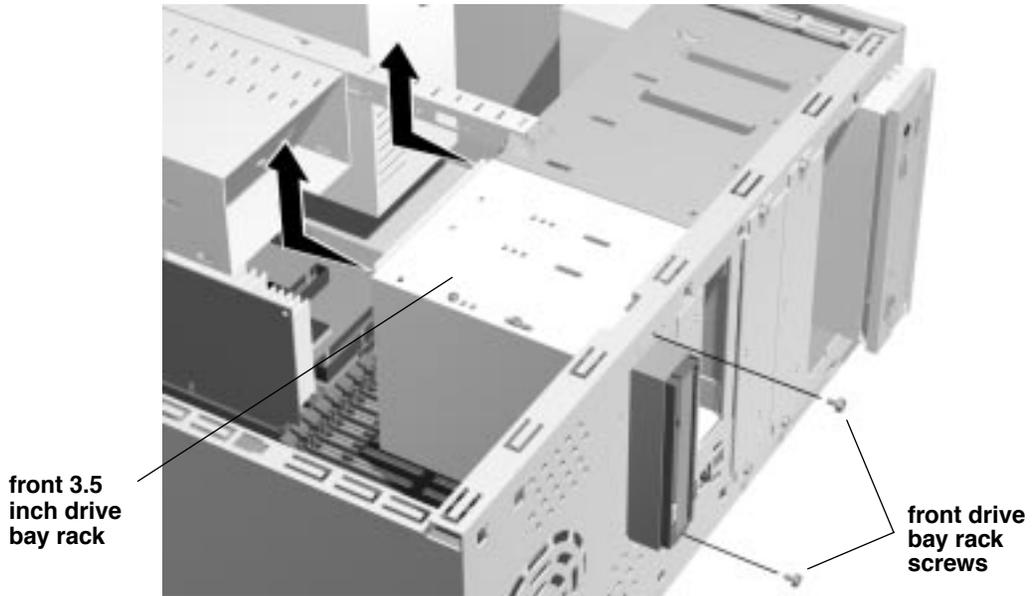
Replacing a drive in the bottom 5.25 inch rack position

1. If you are replacing the bottom front primary hard drive, the front 3.5 inch drive bay rack, which is below the 5.25 inch drive bays, must first be removed.

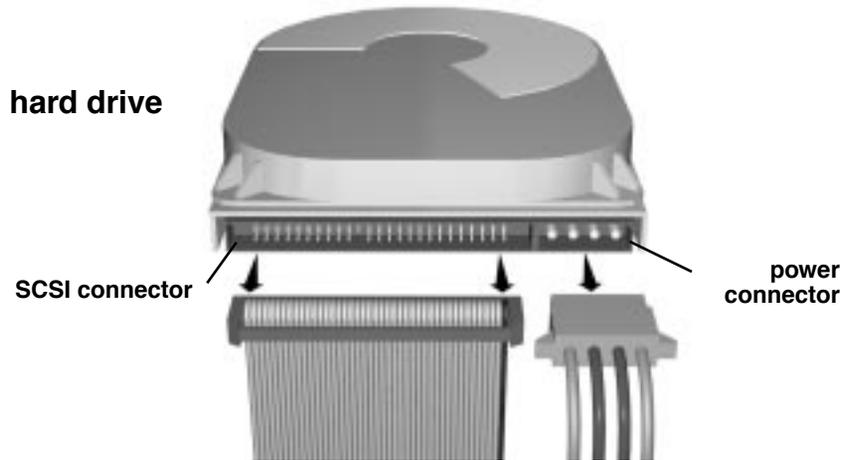
2. To remove the front 3.5 inch rack, remove the two screws holding the front drive bay rack to the front of the chassis.

Remove the drive bay rack by sliding it to the rear.

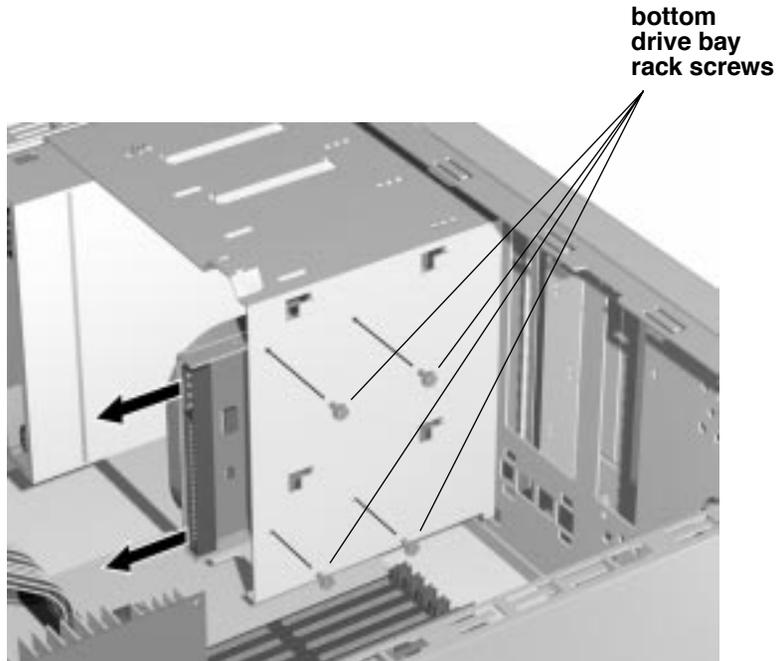
Rest the rack on the metal power supply cover until you are ready to re-install it.



3. Disconnect the power connector and the SCSI connector from the rear of the bottom hard drive.

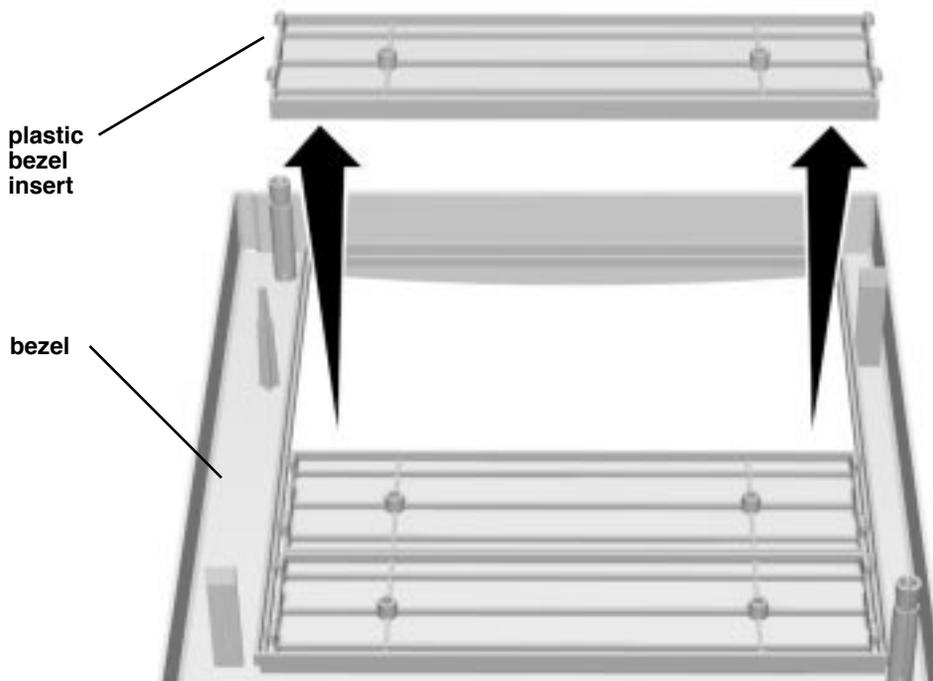


The bottom hard drive is secured to the 5.25 inch drive bay rack by four bottom drive bay rack screws. Remove and save the four screws. Gently slide the hard drive backward until it clears the chassis.



4. If you are installing a removable-media drive, remove the plastic bezel insert covering the bay you are planning to use. To remove the insert, press it out from the inside.

The plastic insert is very flexible and should pop out quite easily.

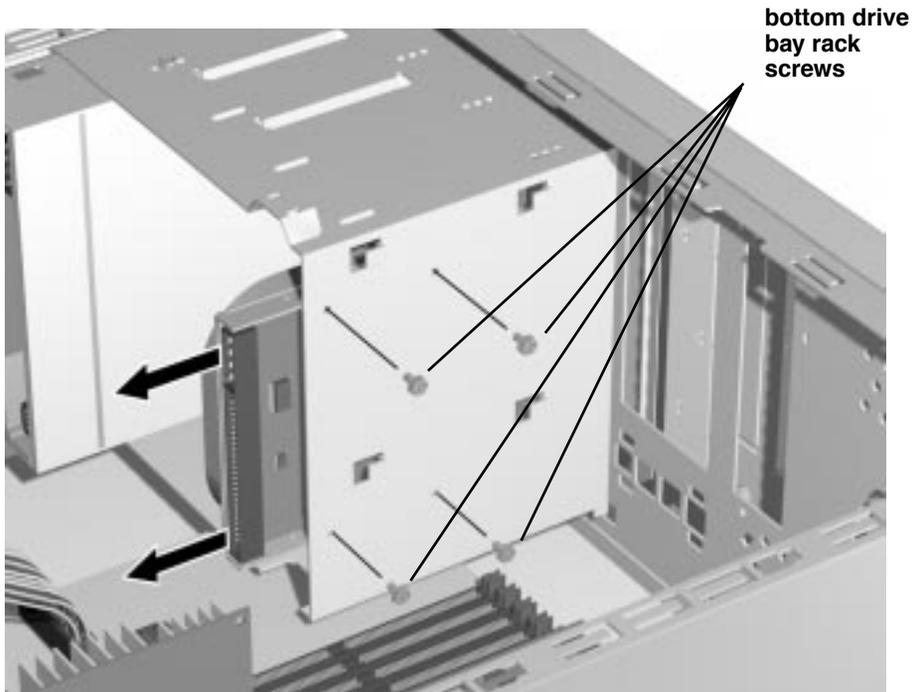


Once you have prepared the drive (see “Prepare the drive,” starting on page 100), you are ready to install the drive.

5. Slide the drive into the bay from the front, being careful not to crimp or fold any cables.

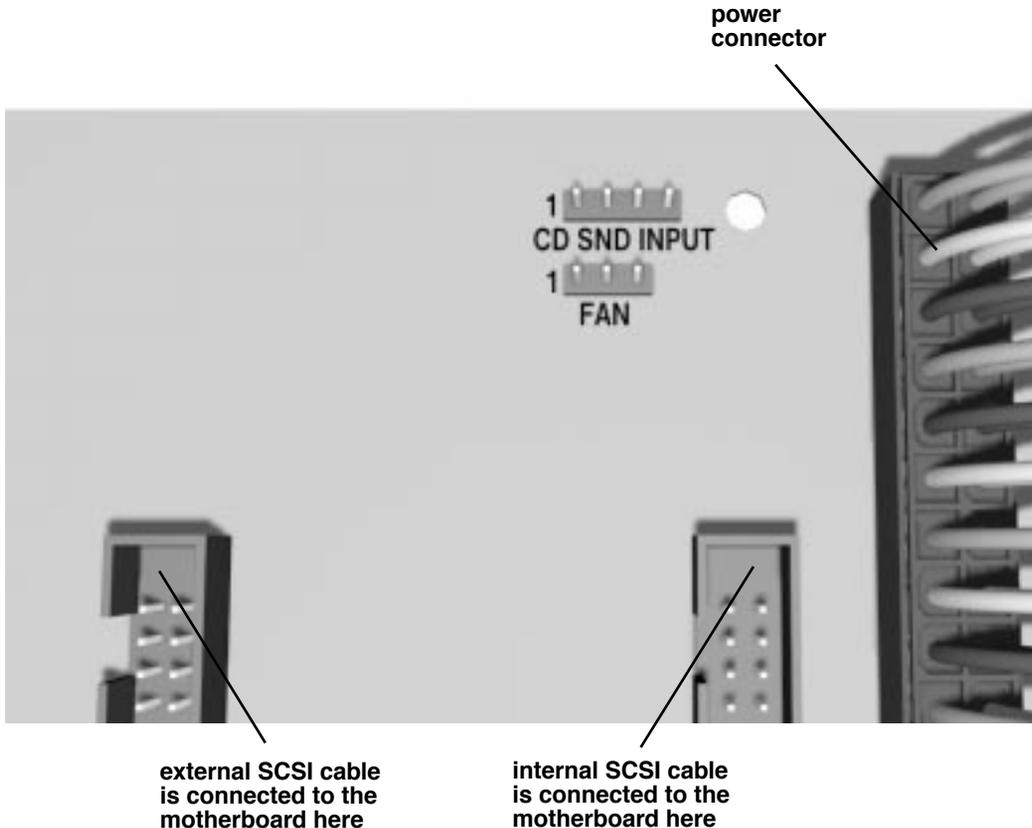
Install the drive so that it faces up; if it isn't clear which way the drive should face (e.g. hard drives), assume that the SCSI connector (see illustration at the beginning of this procedure) should be in the back and the SCSI connector key should face up.

6. Secure the drive to the bottom 5.25 inch drive bay rack position by replacing the four bottom drive bay rack screws.



7. Connect one of the unused connectors on the SCSI cable to the wide connector on the drive (see illustrations following).

Find the internal SCSI cable inside the computer (it is the wide flat ribbon cable connected to the motherboard connector to the immediate left of the power cable).



The internal SCSI cable should have one or more unused connectors on it. You may have to detach and re-attach the SCSI connectors on one or more other drives to get connectors where you need them. Remember, this is SCSI, so the ends have to be terminated. See “Ensuring proper termination” on page 17 for details.

Note: There is a *key* in the middle of the top of the SCSI connector and a *notch* in the cable connector which matches the key, to ensure that the cable is not plugged in upside down. If the cable resists being plugged in, check to make sure the key and slot are mating correctly.

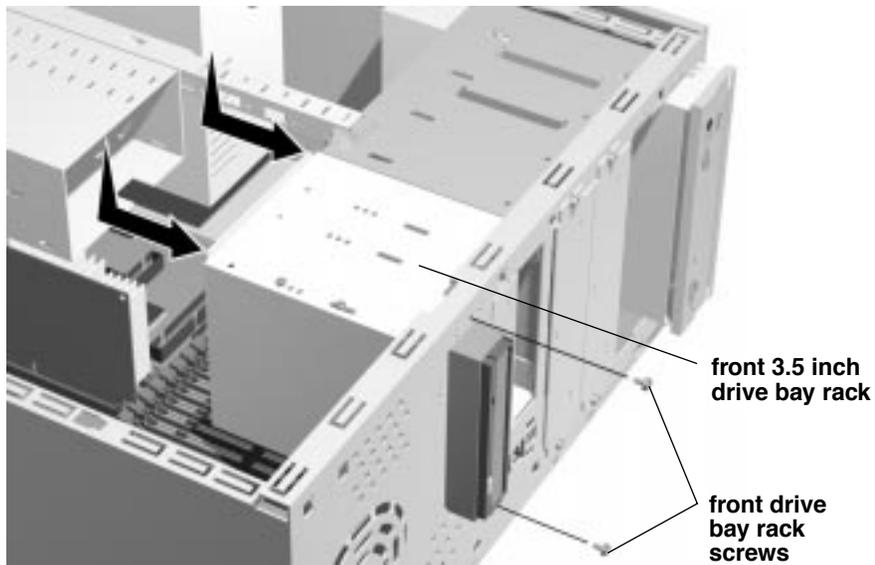


8. Find an unused four-pin power cable in the set of cables coming from the power supply (the power supply is in the right rear of the computer, on the bottom) and connect that cable to the rear of the drive, being careful to match the beveled corners of the plug to those of the socket.

Make sure the connectors are replaced and snug.

Check the instructions that came with the drive for jumper or switch settings and check to make sure that they are properly set before going to the next step.

9. Replace the front 3.5 inch rack by sliding it to the front, and secure the drive to the front of the chassis with the two front drive bay rack screws.

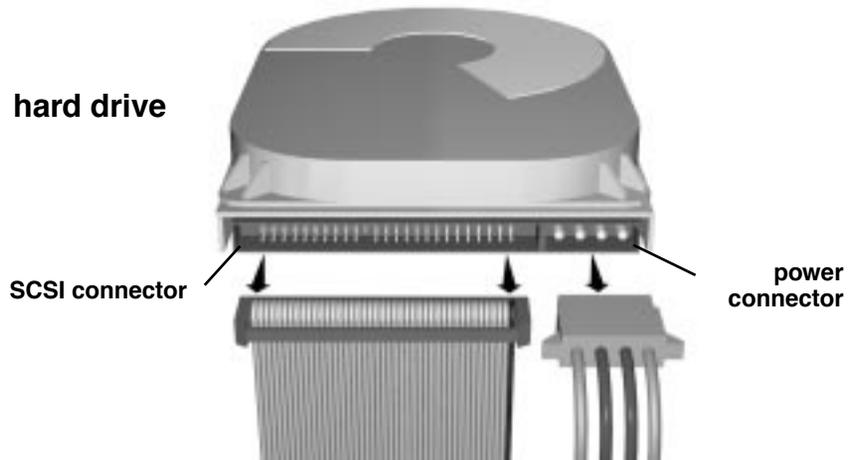


10. Replace and re-connect any drives removed to obtain access to the drive bay.
11. If you are finished, proceed to “Putting the computer back together” on page 137.

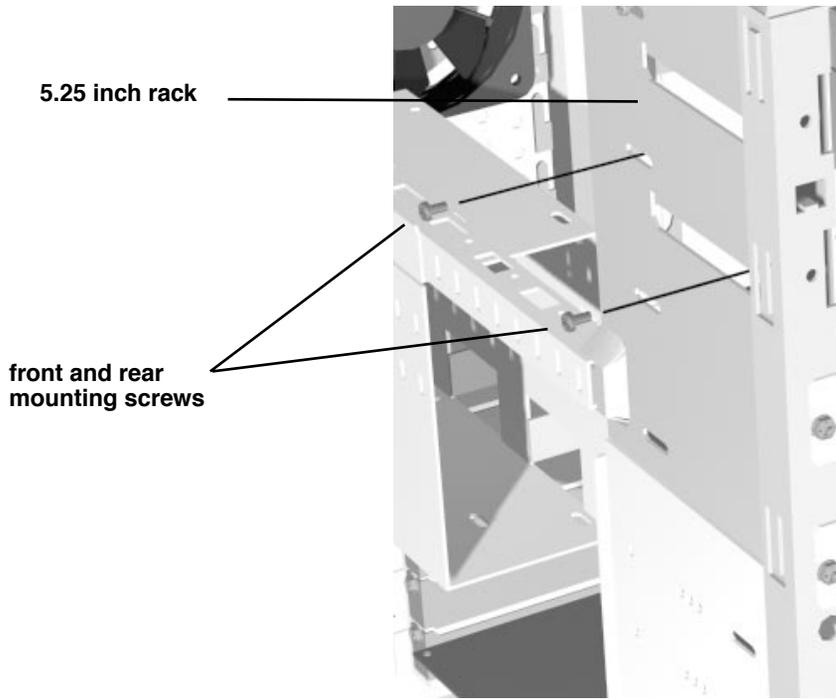
Replacing and installing drives in the upper 5.25 inch rack positions

1. If you are removing a hard drive located above the bottom front primary hard drive, the 3.5 inch drive bay rack does not have to be removed.

Disconnect the power connector and the SCSI connector from the rear of the installed hard drive.



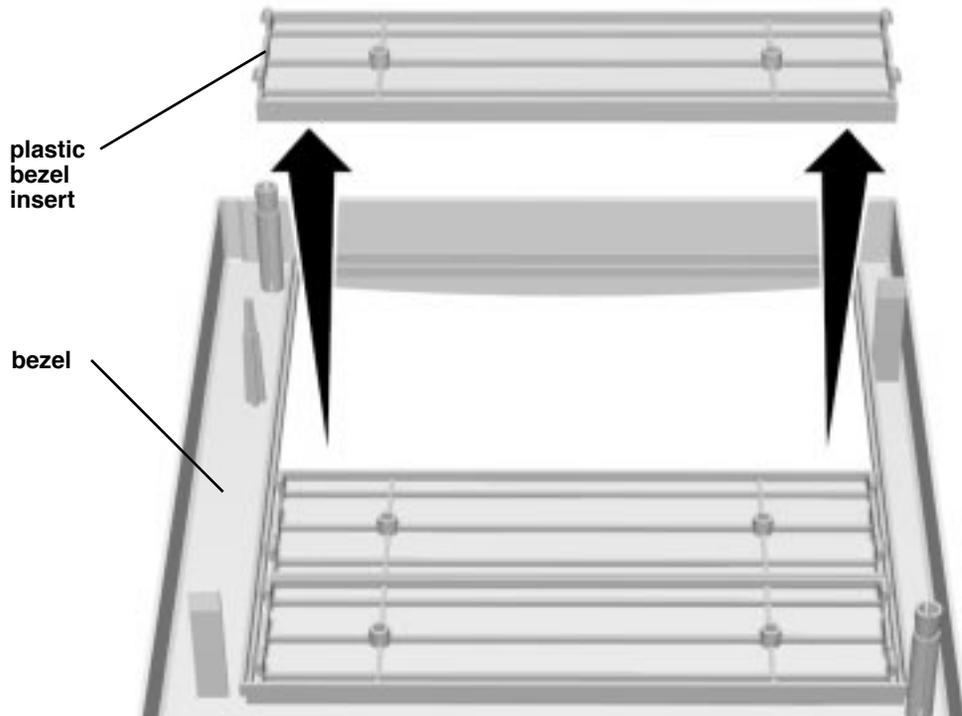
Remove the two front and rear mounting screws from the side of the hard drive. Be sure to save the screws.



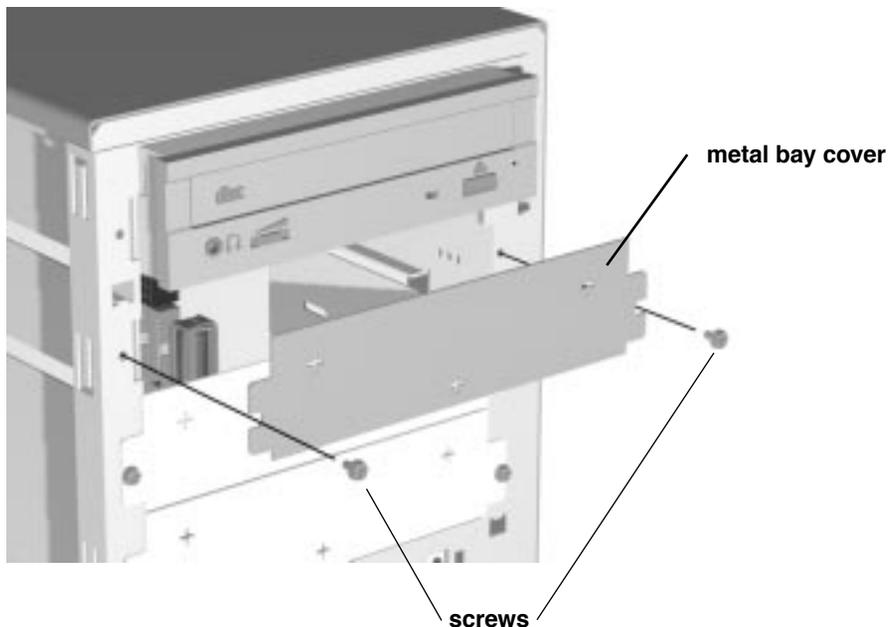
Gently slide the hard drive forward until it clears the chassis.

2. If you are installing a removable-media drive, remove the plastic bezel insert covering the bay you are planning to use. To remove the insert, press it out from the inside.

The plastic insert is very flexible and should pop out quite easily.



3. If you are installing a removable-media drive, unscrew the two screws holding the metal bay cover, if there is one, in front of the drive bay and set them aside.



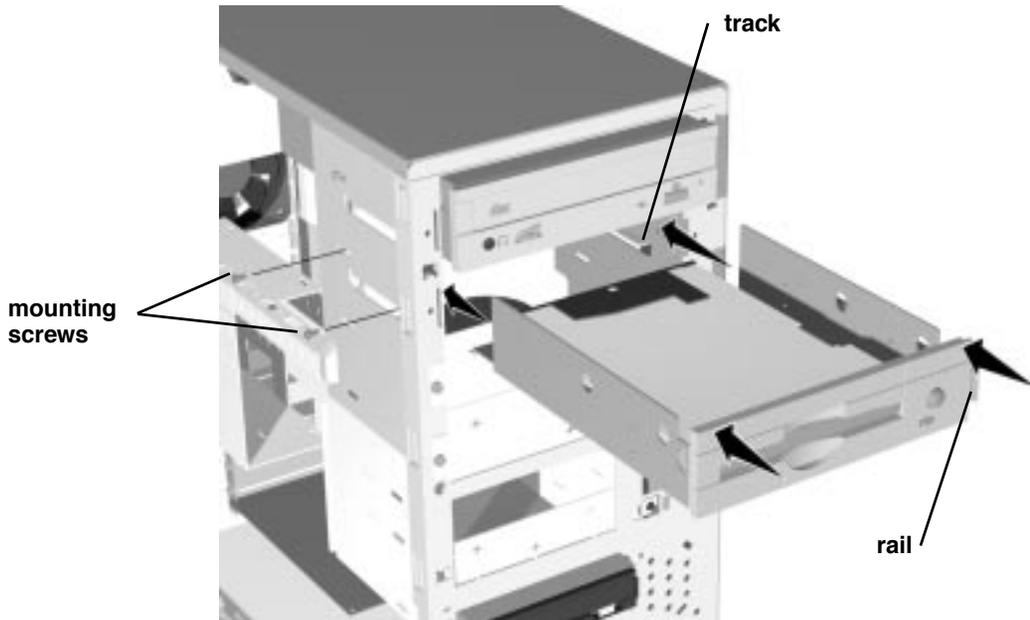
Once you have prepared the drive (see “Prepare the drive,” starting on page 100), you are ready to install the drive.

Note: Connectors are keyed, which means that there is only one correct way to mate them. If a cable is very hard to connect, examine it carefully to make sure you have it oriented so that it fits the connector it goes onto. Once cables are connected, make sure they are snug.

4. Slide the drive into the bay, being careful not to crimp or fold any cables.

Install the drive so that it faces up; if it isn't clear which way the drive should face (e.g. hard drives), assume that the SCSI connector (see illustration on next page) should be in the back and the SCSI connector key should face up.

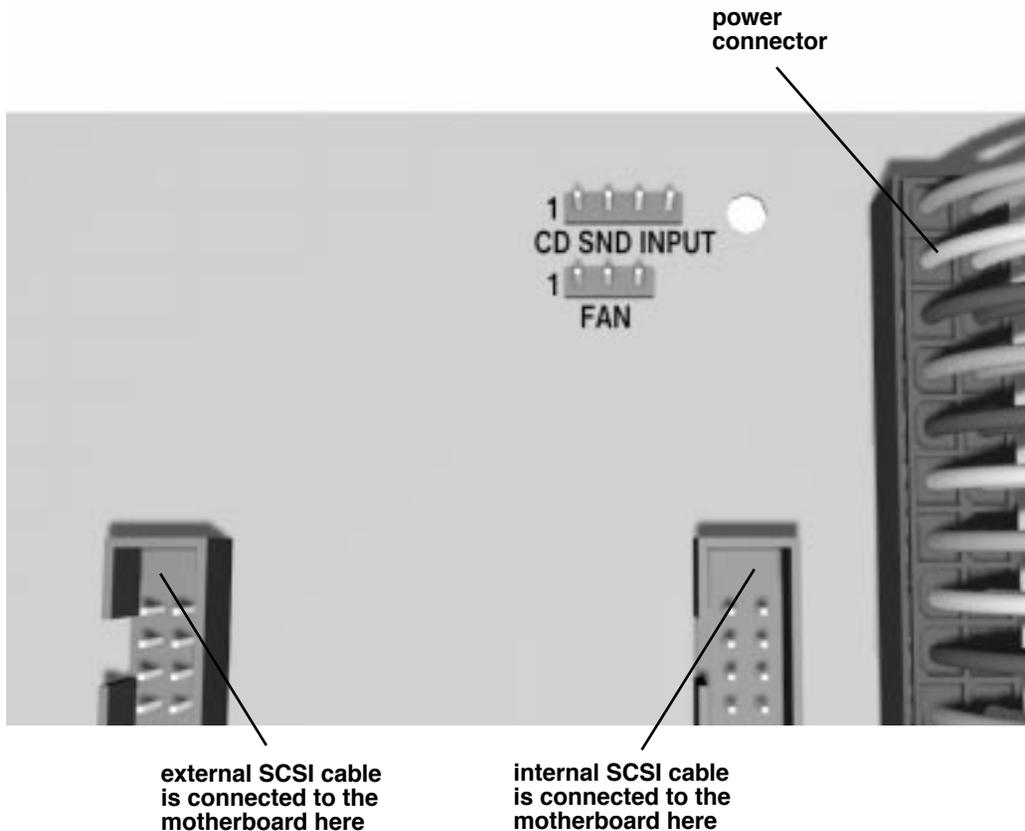
The 5.25 inch drive bays above the bottom 5.25 drive bay use mounting screws on the left side and a rail on the drive which slides from the front into a track in the drive bay on the right side of the bay.



5. Line the screw holes on the side of the drive up with the slots in the drive housing, and insert the mounting two screws, front and rear, on each side of the drive. Tighten screws firmly, but don't overtighten (see the illustration above).

6. Connect one of the unused connectors on the SCSI cable to the wide connector on the drive (see illustrations following).

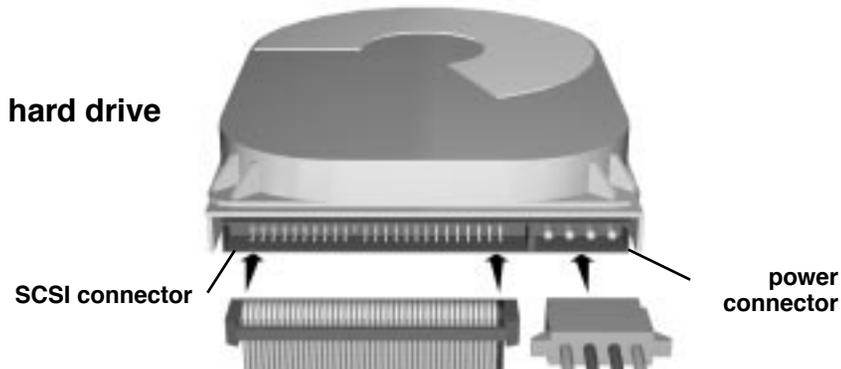
Find the internal SCSI cable inside the computer (it is the wide flat ribbon cable connected to the motherboard connector to the immediate left of the power cable).

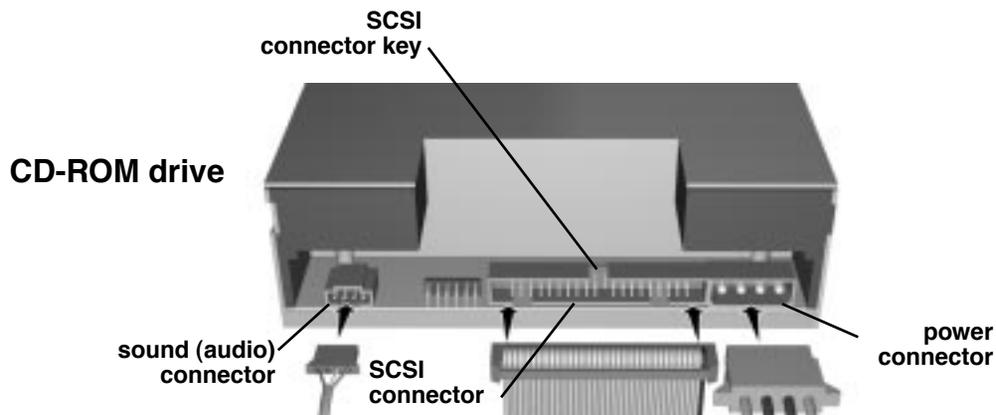


The internal SCSI cable should have one or more unused connectors on it. You may have to detach and re-attach the SCSI connectors on one or more other drives to get connectors where you need them. Remember, this is SCSI, so the ends have to be terminated. See “Ensuring proper termination” on page 17 for details.

Note: Because this system has a total of 9 drive bays, and a SCSI chain can handle a maximum of 7 devices, including the pre-installed hard drive and the CD-ROM drive, there is a separate cable, connected to the external SCSI chain, to be used if the internal SCSI chain is filled to capacity. It is set up to be used for devices in the 3.5 inch drive bays. The internal SCSI bus operates at 10 MB/sec; the external SCSI bus operates at 5MB/sec.

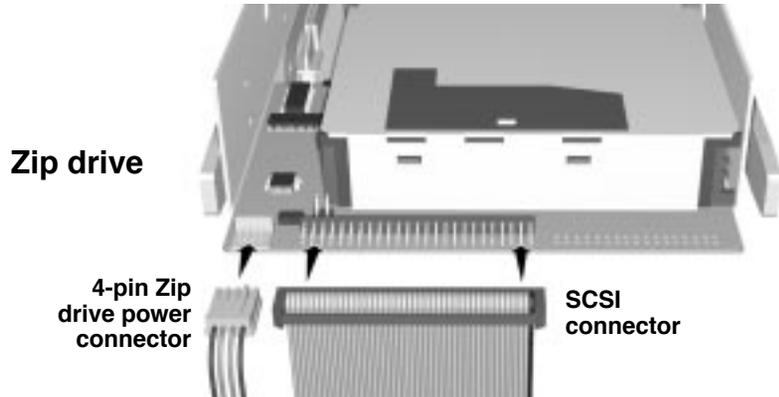
There is a *key* in the middle of the top of the SCSI connector and a *notch* in the cable connector which matches the key, to ensure that the cable is not plugged in upside down. If the cable resists being plugged in, check to make sure the key and slot are mating correctly.





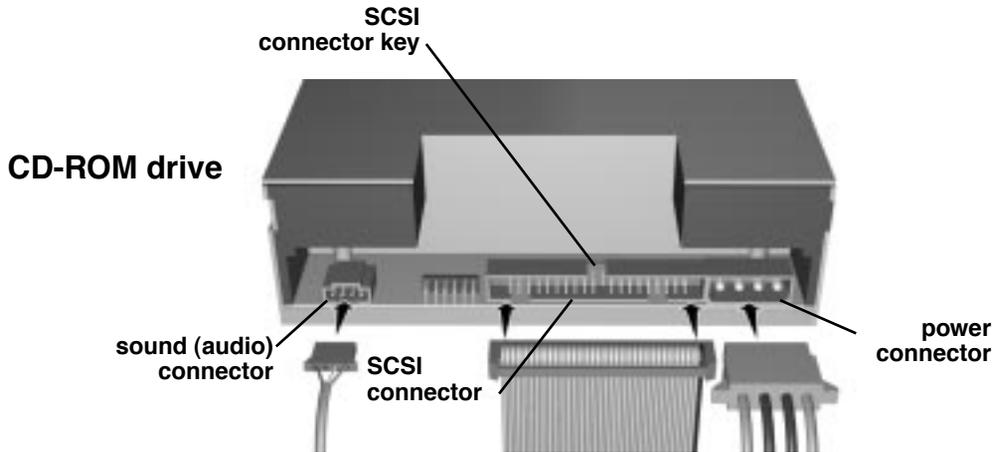
7. Find an unused four-pin power cable in the set of cables coming from the power supply (the power supply is in the right rear of the computer, on the bottom) and connect that cable to the rear of the drive, being careful to match the beveled corners of the plug to those of the socket (see the two preceding illustrations).

8. If you are installing a Zip drive, use the small four-wire four-pin power connector and plug it into the keyed four-pin connector near the left end of the rear of the Zip drive.



9. If you are installing a CD-ROM drive,

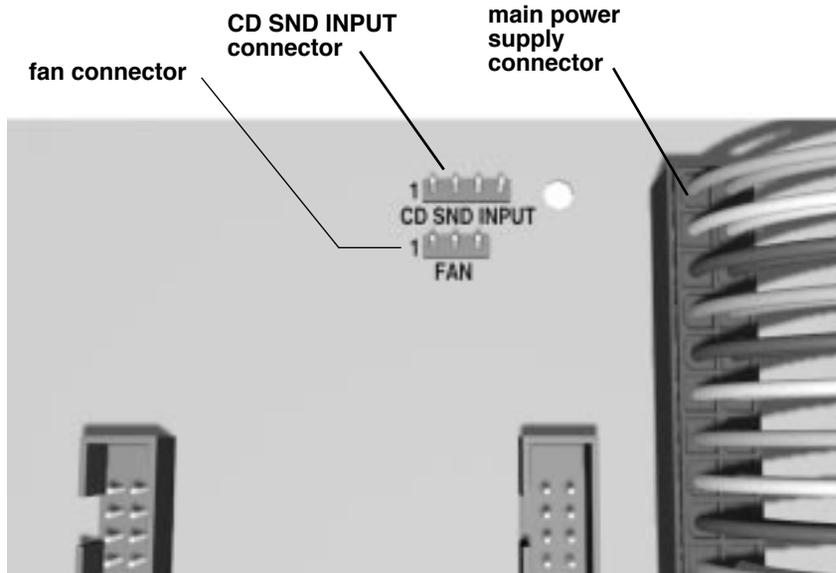
Connect the small white 3-pin end of the CD-ROM cable firmly to the keyed 3-pin audio connector on the CD-ROM drive.



Be careful not to get the small four-wire power supply cable, which is intended for a Zip drive; the four-wire power cable is connected to the power supply. The audio cable goes to the motherboard.

The 3-pin audio connector is keyed; so if you have trouble getting it on, try turning it over. The larger, 4-pin connector should be connected to the four-pin connector on the motherboard, labeled **CD SND INPUT**.

The **CD SND INPUT** connector is near the power supply edge of the motherboard, above the fan connector and next to the main power supply connector.



The four-pin audio connector should be connected so that the lip on the connector faces away from the drive bay edge of the motherboard. You may have to temporarily remove some of the other cables from their connectors to be able to reach in and seat the CD-ROM connector.

Make sure all four pins are enclosed in the connector.

Make sure the connectors are replaced and snug.

Check the instructions that came with the drive for jumper or switch settings and check to make sure that they are properly set before going to the next step.

- 10. Replace and re-connect any drives removed to obtain access to the drive bay.**
- 11. If you are finished, proceed to “Putting the computer back together” on page 137.**

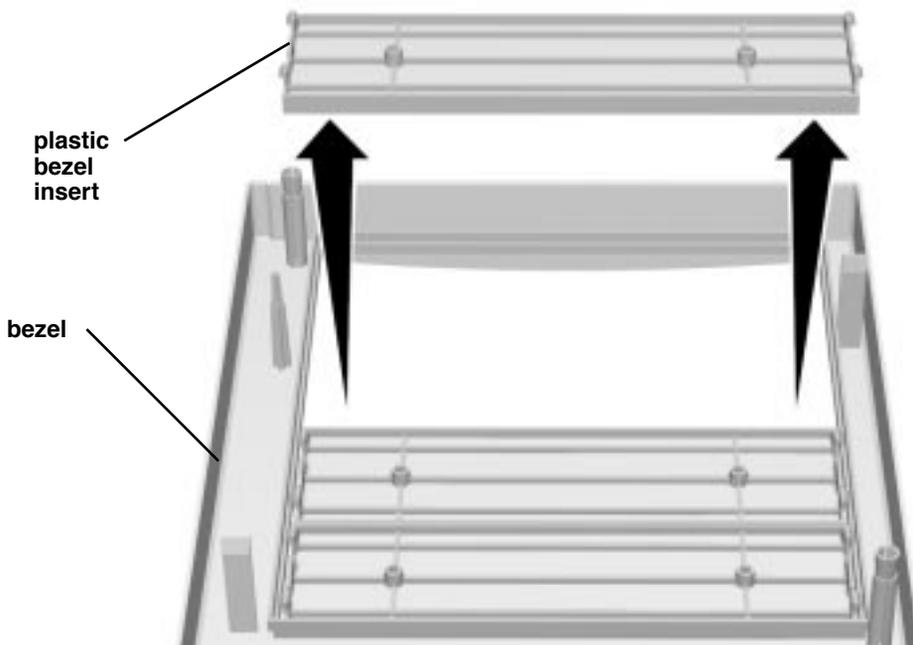
Replacing and installing drives in the front 3.5 inch rack positions

Once you have prepared the drive (see “Prepare the drive,” starting on page 100), you are ready to install the drive.

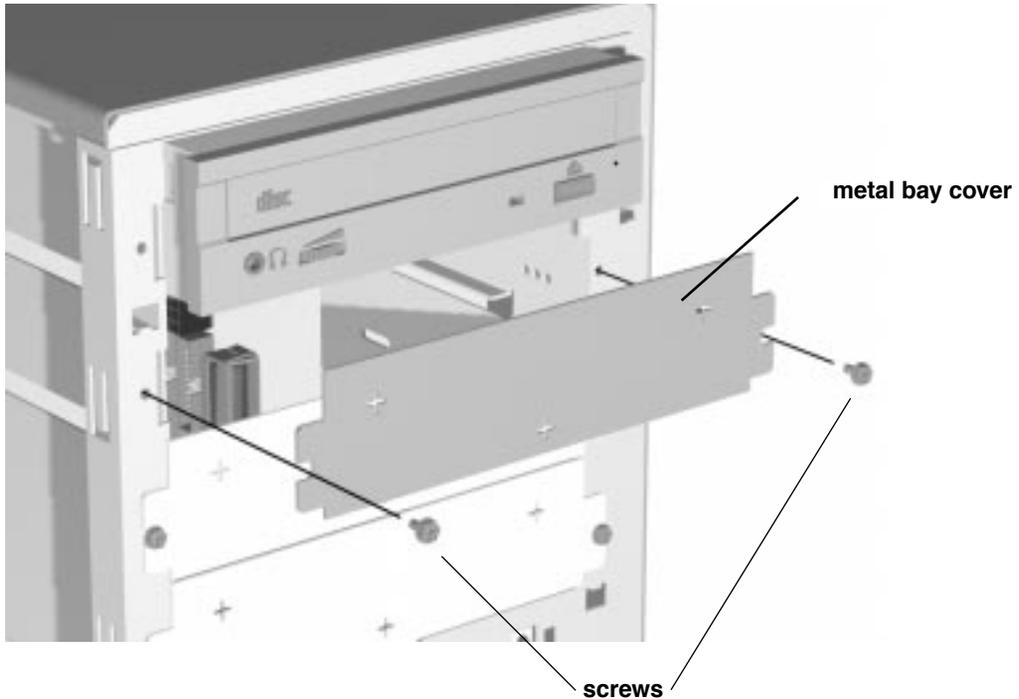
Connectors are keyed, which means that there is only one correct way to mate them. If a cable is very hard to connect, examine it carefully to make sure you have it oriented so that it fits the connector it goes onto. Once cables are connected, make sure they are snug.

- 1. If you are installing a removable-media drive, remove the plastic bezel insert covering the bay you are planning to use. To remove the insert, press it out from the inside.**

The plastic insert is very flexible and should pop out quite easily.



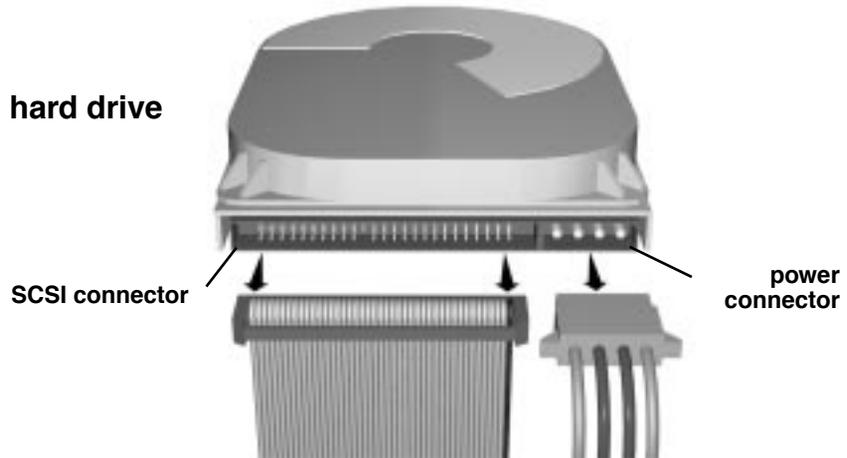
2. If you are installing a removable-media drive, unscrew the two screws holding the metal bay cover, if there is one, in front of the drive bay and set them aside.



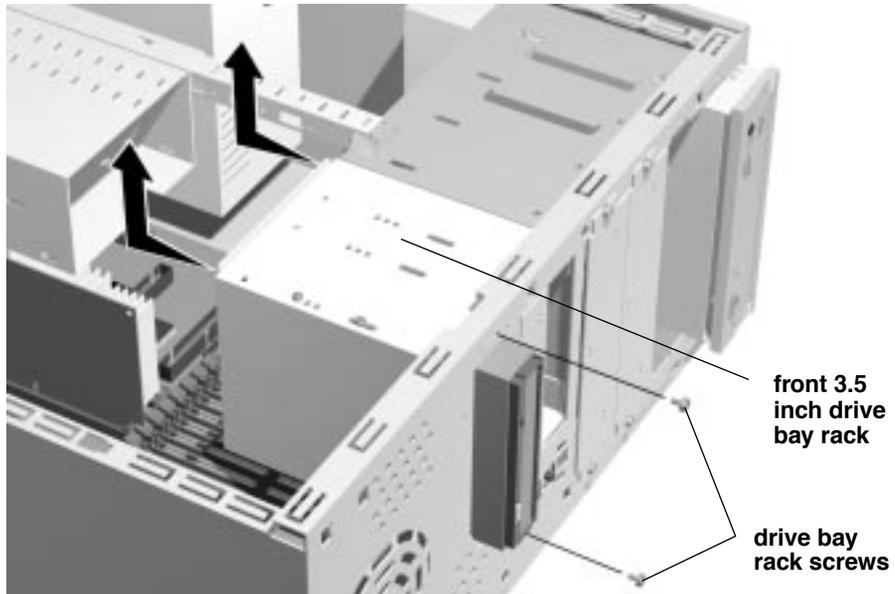
Note: The 3.5 inch slots may have metal plates without screws, which are attached by thin strips of metal. To remove *that* type of plate, simply bend it back and forth several times until it comes loose, and remove it.

3. Disconnect the cables from the drives in the 3.5 inch drive bay rack, which is below the 5.25 inch drive bays.

For hard drives, disconnect the power connector and the SCSI connector from the rear of the bottom hard drive. For the floppy drive, there is only one cable to disconnect.

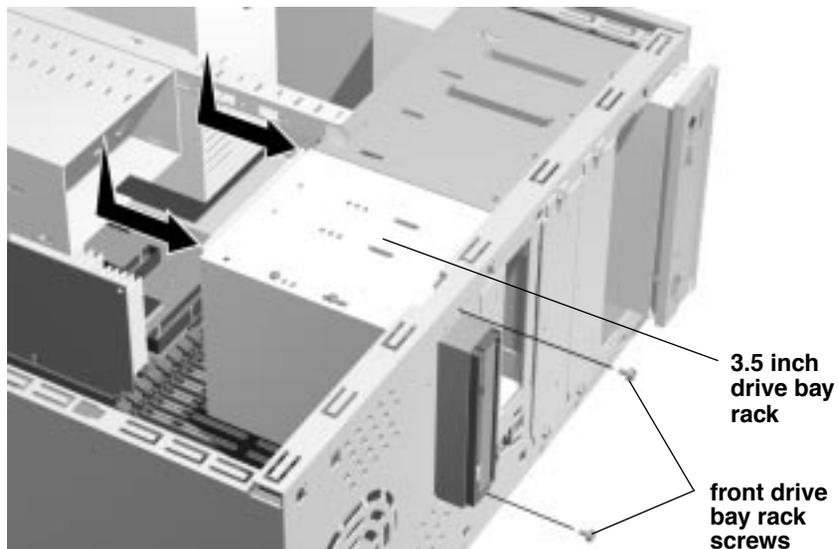


4. Remove the two Phillips-head front drive bay rack screws, slide the front drive bay rack back and remove it from the chassis.



5. If you are replacing a drive, remove the mounting screws of the drive, and remove the drive. If you are installing a drive, insert the drive into the 3.5 inch rack, and install its four mounting screws, two on each side.

6. Replace the 3.5 inch rack by sliding it to the front, and secure it to the front of the chassis with the two front drive bay rack screws.



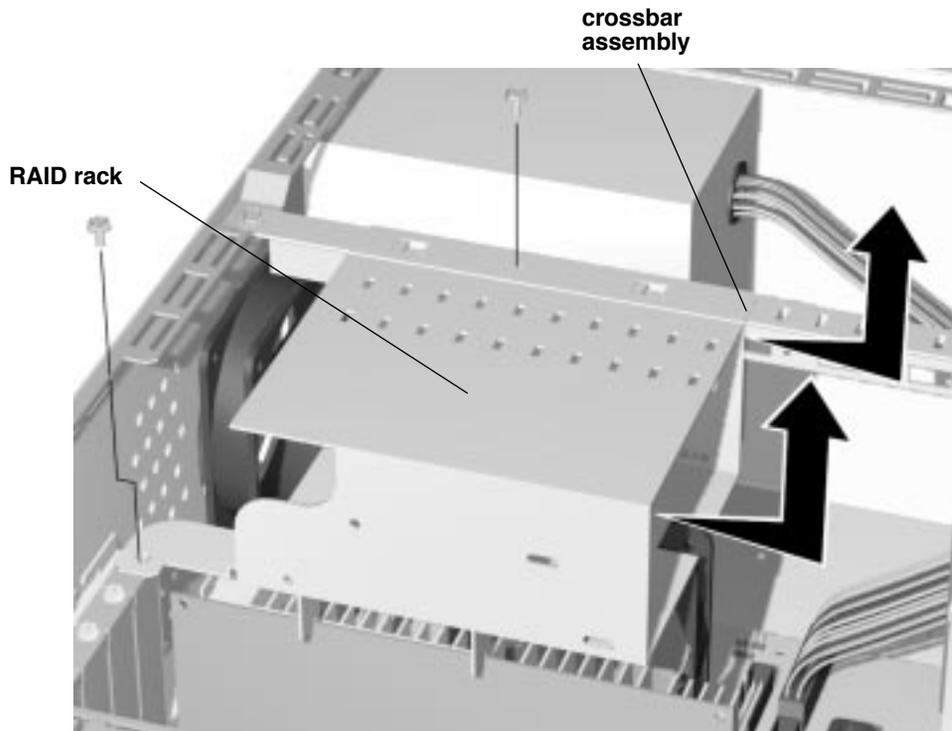
7. If you are finished, proceed to “Putting the computer back together” on page 137.

Replacing and installing drives in the RAID rack

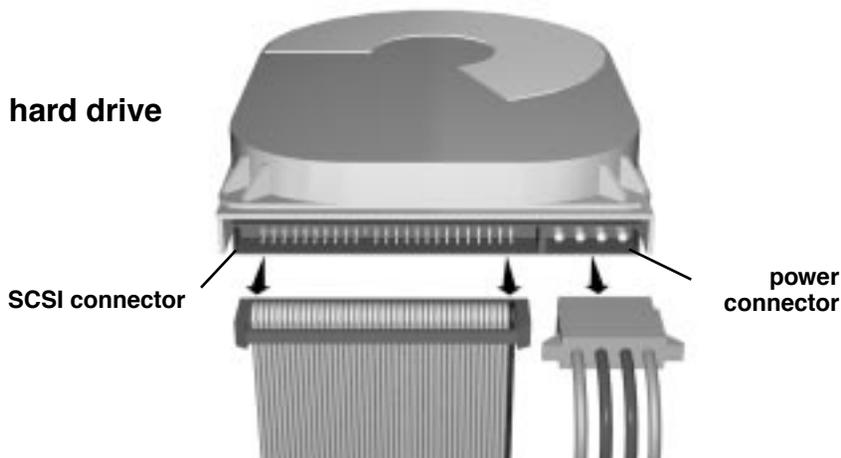
Once you have prepared the drive (see “Prepare the drive,” starting on page 100), you are ready to install the drive.

Connectors are keyed, which means that there is only one correct way to mate them. If a cable is very hard to connect, examine it carefully to make sure you have it oriented so that it fits the connector it goes onto. Once cables are connected, make sure they are snug.

1. The RAID rack is located on the crossbar assembly that you earlier removed.



2. If you are replacing a hard drive, disconnect the power connector and the SCSI connector from the rear of the hard drive.

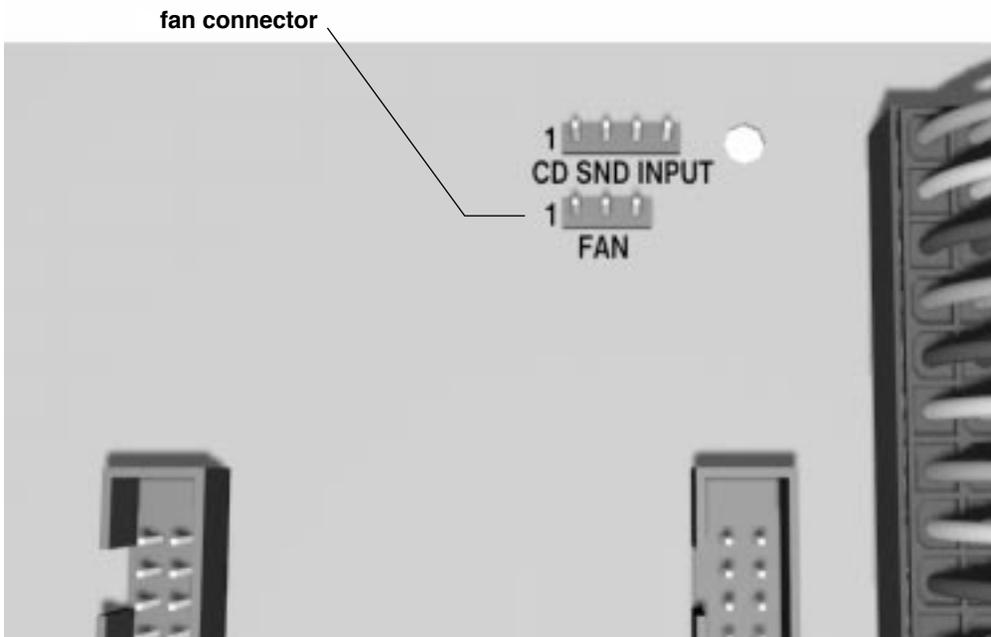


3. If you are replacing a drive, remove the mounting screws of the drive, and remove the drive. If you are installing a drive, insert the drive into the RAID rack, and install four mounting screws, two on each side.
4. If you are finished, proceed to “Putting the computer back together” on page 137.

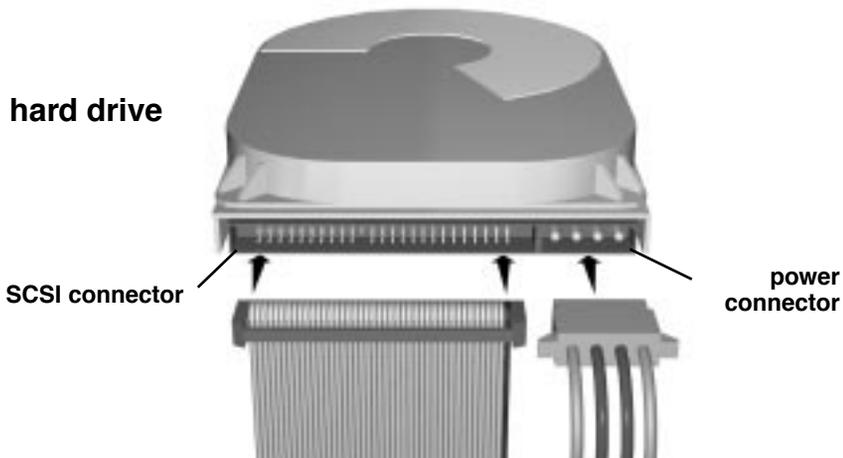
Putting the computer back together

Follow the instructions in this section to put the computer back together and to verify that the installed drive is operating properly.

1. Re-connect the crossbar assembly fan connector.



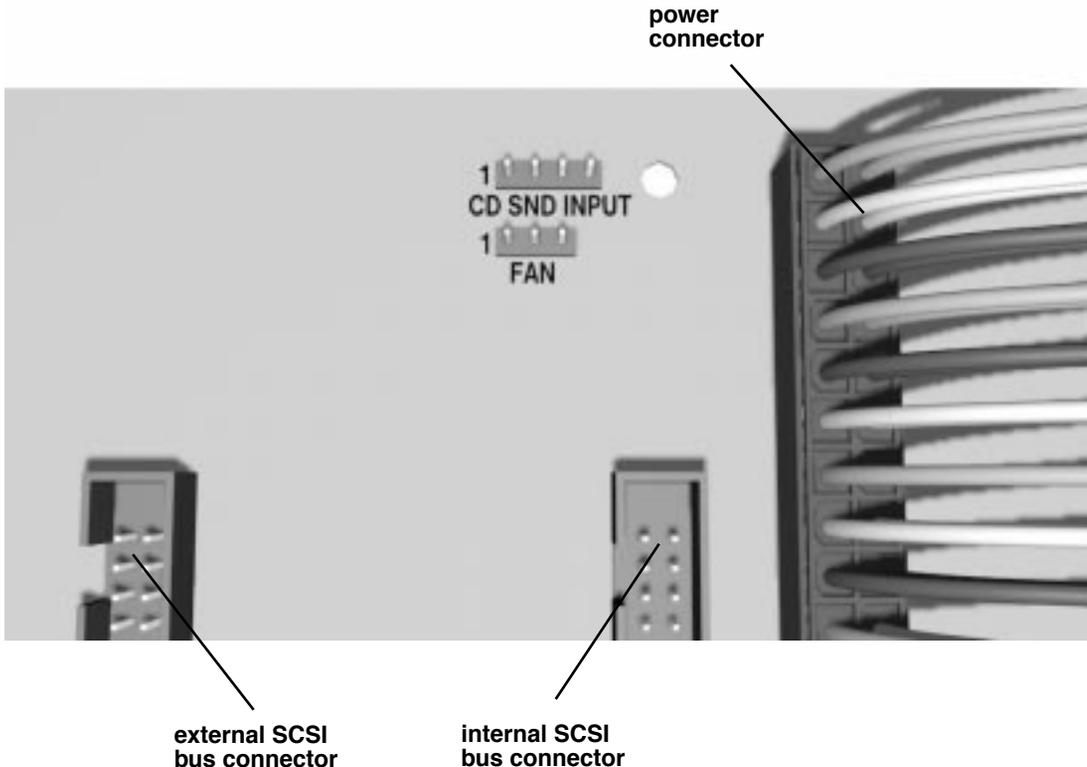
2. If drives are installed in the RAID rack, connect the RAID drive power and SCSI cable connectors.



Find the internal SCSI cable inside the computer (it is the wide flat ribbon cable connected to the hard drive). The internal SCSI cable should have one or more unused connectors on it. You may have to detach and re-attach the SCSI connectors on one or more other drives to get connectors where you need them. Remember, this is SCSI, so the ends have to be terminated. See “Ensuring proper termination” on page 17 for details.

Note: Because this system has a total of 9 drive bays, and a SCSI chain can handle a maximum of 7 devices, including the pre-installed hard drive and the CD-ROM drive, there is a separate cable, connected to the external SCSI chain, to be used if the internal SCSI chain is filled to capacity. It is set up to be used for devices in the 3.5 inch drive bays. The internal SCSI bus operates at 10 MB/sec; the external SCSI bus operates at 5MB/sec.

If you are installing a drive in the RAID rack and there are no other SCSI connectors available, connect these drives to the external bus cable.

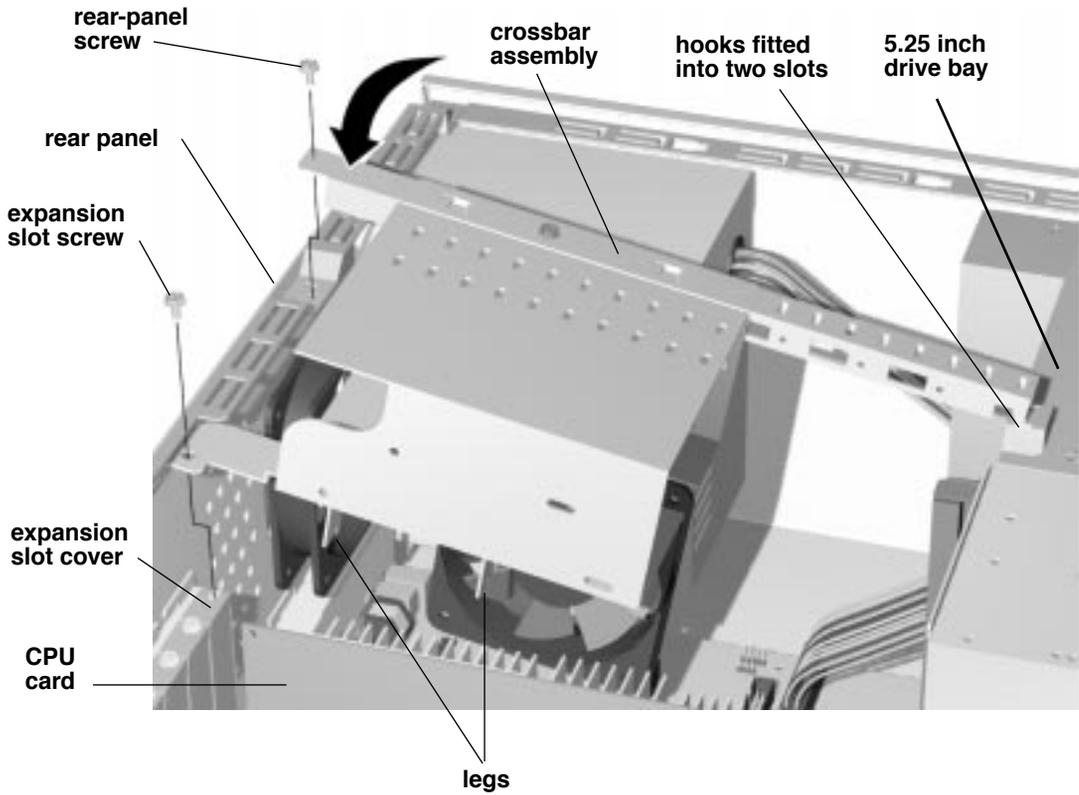


- 3. Place the expansion slot cover over the PCI expansion slot, but do not reinsert the screw.**
- 4. Read this step before proceeding.**

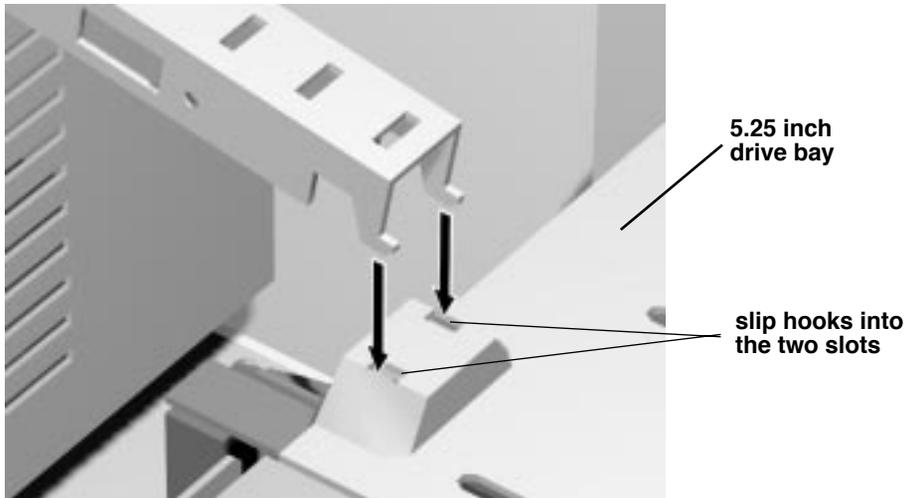
This step is intended to provide an overview of the crossbar assembly installation procedure. Use the following illustration for reference only. Detailed installation instructions follow.

In general, the crossbar assembly must be secured to the chassis by two hooks on the front end of the beam, which fits into two slots on the 5.25 inch drive bay rack.

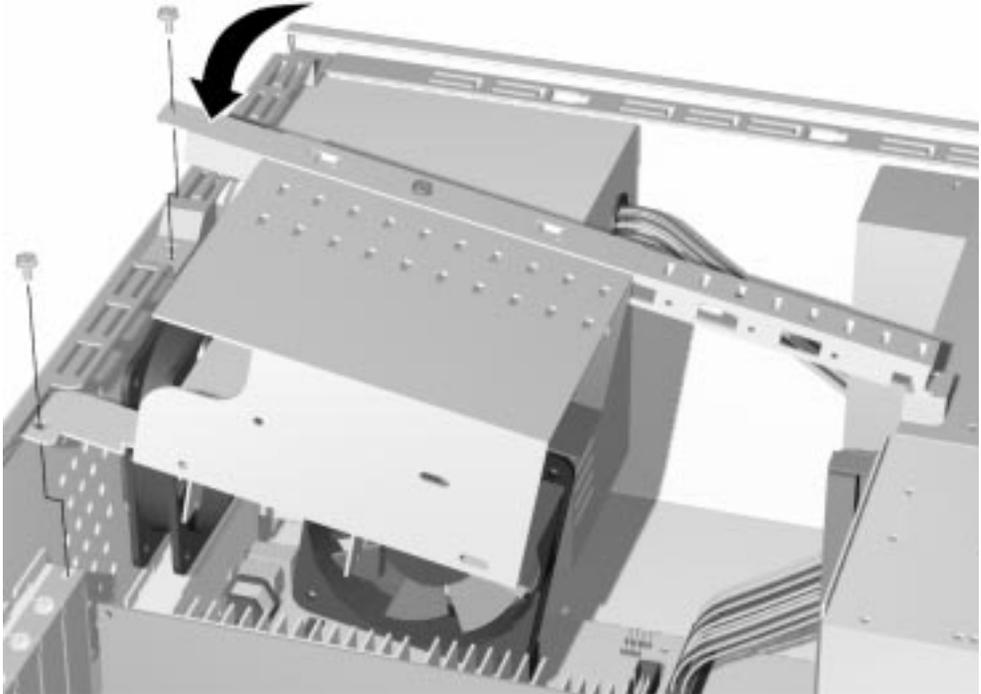
A screw attaches the rear of the beam to the rear chassis panel, and a second screw attaches the RAID rack cage to the PCI expansion slot closest to the CPU card. The RAID rack rests on two legs on top of the CPU card.



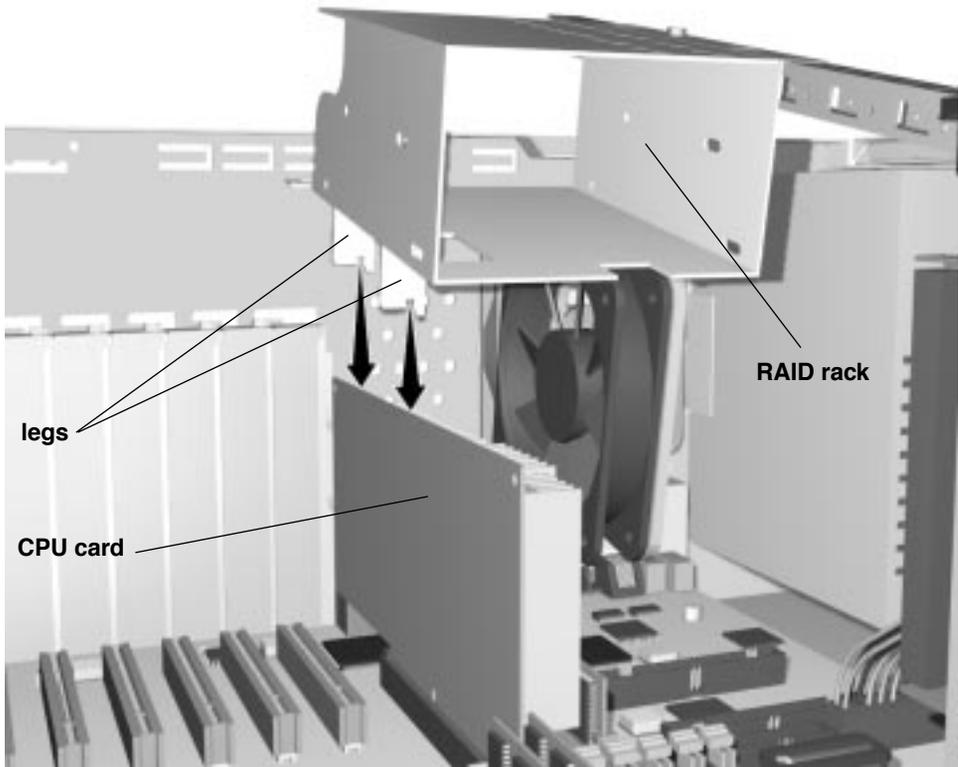
5. To re-install the crossbar assembly, first slip the two hooks on the front end of the crossbar beam into the two slots on the 5.25 inch drive bay rack.



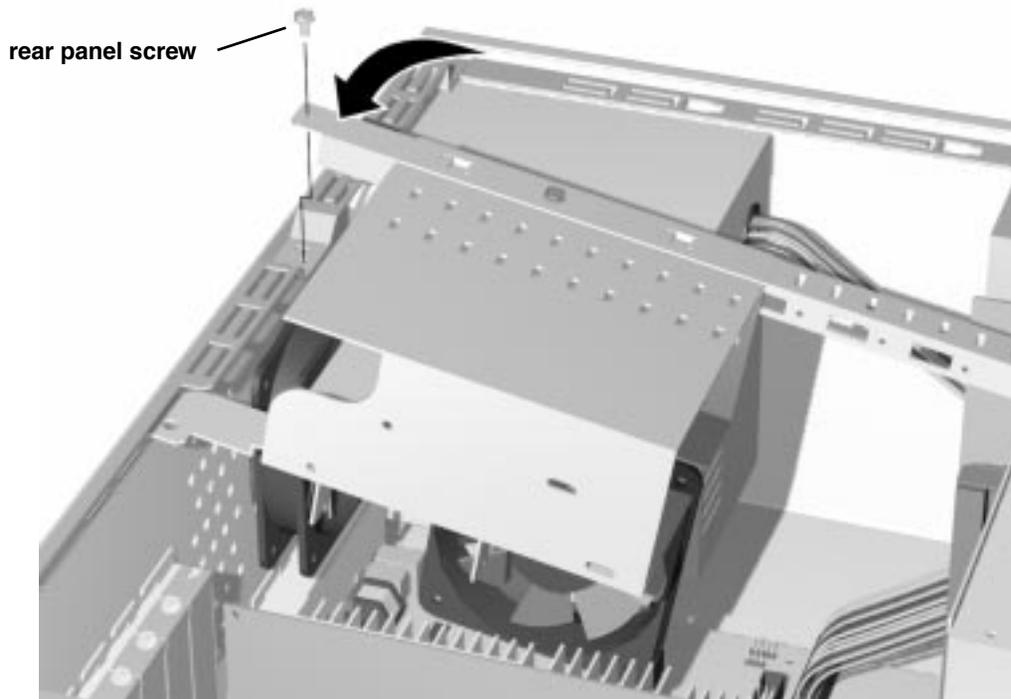
6. Lower the crossbar until the other end is almost to the rear panel.



7. Make sure the slots on the two legs on the bottom of the RAID rack are aligned with the CPU card.

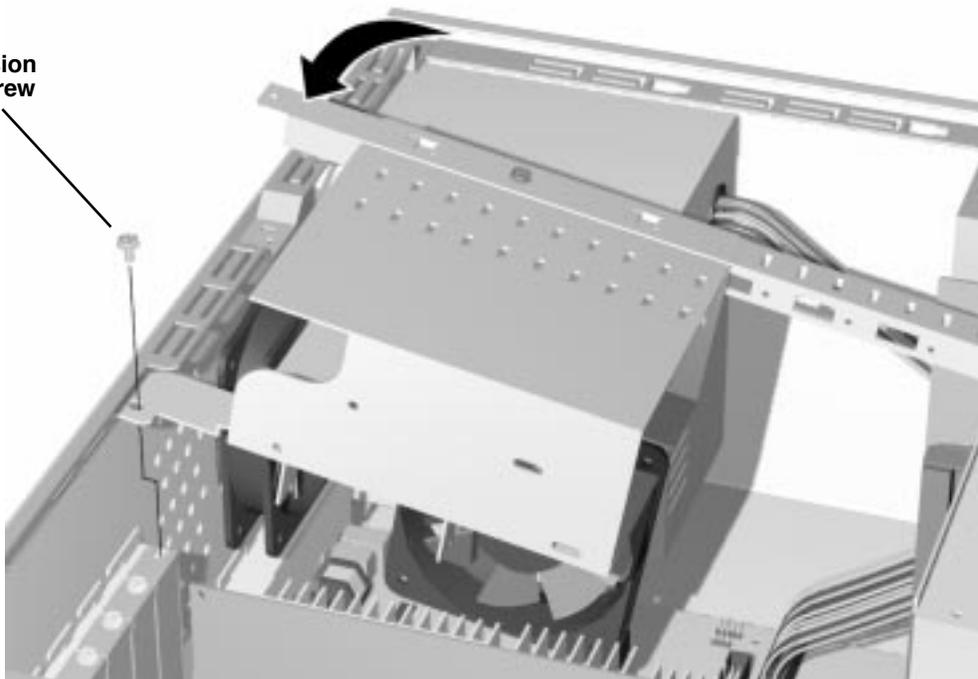


8. After making sure of proper alignment, lower the end of the crossbar so that it is flush with the rear panel, and re-insert the rear-panel screw.



9. Align the holes in the crossbar assembly and expansion slot cover, and then re-install the expansion slot screw.

expansion
slot screw



10. Replace the side panel, re-connect system components, and restart the computer.

CAUTION! Be careful not to get any of the cables caught in the cover or stuck in the fan housing when you put the cover back on the computer.

Installing software drivers

1. Install software drivers

Some SCSI devices require special software called device drivers to operate with your computer. If a device driver is required, it is normally supplied with the device; if you are unsure whether one is required, contact the manufacturer of the device. Follow the driver installation instructions supplied by the manufacturer. If a device driver is not supplied, you can generally assume that the device does not need one. The drives pre-installed in your system have pre-installed drivers.

If the drive does not work

1. **Make sure that any required drivers are properly installed. See the drive's documentation for more information.**
2. **Turn the system off, unplug the system components, and remove the cover.**
3. **Make sure that the drive's SCSI connector is plugged in and seated firmly.**

If the connection seems loose or crooked, check to make sure that no pins are bent and that the connection is keyed properly. Bent pins may be carefully straightened with a very small screwdriver.

4. **Make sure that the drive's power cable is plugged in and seated firmly.**
5. **If it is a CD-ROM drive, make sure the audio cable is properly connected and seated firmly at both ends.**
6. **Make sure that each device in the internal SCSI chain has its own unique SCSI ID: the primary hard drive (in the lower bay) should be set to ID 0, a secondary hard drive is normally set to 1, and the CD-ROM is normally set to 3. (See "Set the SCSI ID" on page 100.)**
7. **Make sure there are no internally-terminated devices in the middle of the SCSI chain. The only internally-terminated device on the internal SCSI chain should be the pre-installed primary internal hard drive.**

8. Replace the cover on the computer, replace and tighten the three thumbscrews, re-connect the external cables, and restart the computer.

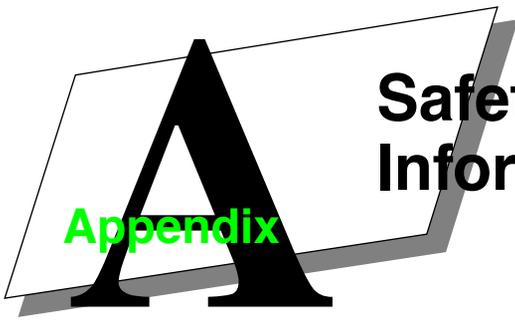
CAUTION! Be careful not to get any of the cables caught in the cover or stuck in the fan housing when you put the cover back on the computer.

If these steps do not correct the problem, contact the drive manufacturer for assistance, follow the troubleshooting procedures in Chapter 4, “Troubleshooting,” on page 29 visit our Web Site at

<http://www.powercc.com>

for troubleshooting and installation tips.

If you are unable to resolve the problem, contact Power Computing Technical Support at 1-800-708-6227 for assistance.



Safety and Health Information

Use this appendix to learn about safety and health issues related to computer use.

Safety instructions

Follow these guidelines to protect yourself from electrical shock:

- Plug the computer into a grounded, three-hole outlet. Do not use a three-hole adapter in a two-hole outlet.
- Do not use your computer if the power cord is frayed or damaged.
- Keep the computer away from moisture and liquid. Do not use it if you spill liquids on it.
- Turn off the computer before removing its cover.
- Never operate the computer without its cover.
- Follow the safety instructions in this manual. A *warning* alerts you of a potential health or safety hazard. A *caution* notice alerts you of potential harm to your computer or its components.

Health-related information about computer use

The way you set up and use your computer can affect not only your productivity but also your comfort and well-being. No set of guidelines can cover every situation, but if you follow a few common-sense suggestions, you can prevent the eye fatigue and musculoskeletal discomfort sometimes experienced by computer users.

Preventing eye strain

Whenever you focus your eyes on a nearby object for a long time—whether you are reading, sewing, or working on a computer—your eyes can get tired. Follow these suggestions to prevent eye strain:

- Take frequent breaks. Periodically look away from the screen and focus your eyes on something farther than 20 feet away.
- To prevent glare on the screen, avoid working with a window or light source behind you. Turn off lights or close drapes if necessary.
- Place your monitor, chair, and work table so that the top of the monitor is slightly below the top of your head and the screen is 18-28 inches away from you. This may require placing something under the monitor.

Preventing discomfort and fatigue

Like any activity that involves sitting for long periods of time, using a computer can make you tired and stiff. In addition, using a keyboard and mouse improperly can sometimes be associated with RSIs (repetitive stress injuries), particularly in the wrists. Follow these suggestions to prevent discomfort:

- Take frequent breaks. Stand up, stretch, and walk around. These breaks are not wasted time. They help you work more effectively in the long run.
- Adjust your chair so that your lower back and thighs are supported and your feet are flat on the ground (or on a footrest).
- Adjust your chair and work table so that you can type and use the mouse with your elbows at a 90° angle, your forearms level, and your hands in a straight line with your forearms. A work table equipped with an adjustable keyboard tray may make this easier.
- Do not place your wrists on the hard edge of your table. Use a wrist pad.
- Sit up straight in your chair. Slouching puts unnecessary strain on your back.
- Do not strike the keys any harder than necessary.

B Technical Information

Appendix

This appendix contains technical information and specifications for the PowerTower Pro 604/200, 604/225, and 604/225 MP systems.

Specifications

Processor

- PowerPC 604e, with 64 Kb L1 cache, at 200, or 225 MHz; the 225 MP has two PowerPC 604e processors.

Memory

- Minimum 16 MB RAM for the Core system; 32 MB RAM for other systems, expandable to a maximum of 1024 MB
- 4 MB read-only memory (ROM)
- 4 Kbytes of non-volatile parameter memory
- 1 MB of synchronous burst static RAM used as a Level 2 cache for the PowerPC processor

Disk drives

- 1.4 MB high-density MFM/GCR floppy disk drive supporting Mac OS, DOS and ProDOS diskettes
- Internal SCSI hard disk drive, 2 GB AV to 4 GB
- Internal 8x CD-ROM drive; 1200 KB sustained transfer rate; CD XA/Photo-CD, multi-session compatible.

Video

IMS Twin Turbo Video Card

- High performance IMS TwinTurbo-128M8 128-bit graphics accelerator installed
- Horizontal refresh rate up to 75 Hz
- On-the-fly resolution switching
- 4 or 8 MB VRAM on IMS Twin Turbo card
- Supports 640 x 480 to 1920 x 1080 resolution

64-Bit High-Performance Video Card

- High performance 64-bit PCI video card
- Refresh rate up to 120 MHz
- On-the-fly resolution switching
- 2 MB VRAM

Audio system

- Stereo sound generator capable of driving stereo mini-plug headphones or audio equipment
- CD-quality 16-bit stereo, 44.1 kHz sample rate, in and out
- Sample rates of 44.1 kHz, 22.05, and 11.025 kHz
- Input line level: 2 volts peak-to-peak nominal into 6.5 k Ω
- Input through output signal-to-noise ratio: >86 decibels (dB) with no audible discrete tones
- Bandwidth: 10 Hz–19 kHz (+/- 2 dB) at 44.1 kHz sample rate
- Total harmonic distortion plus noise: Less than 0.06%, measured 30 Hz–60 kHz with a 2 V p-p sine wave input

Interfaces

- Internal fast SCSI (10 MB/sec) bus and external SCSI (5 MB/sec) bus
- Dual SCSI buses support up to seven devices each.

- One Apple Desktop Bus (ADB) port for up to three input devices daisy-chained through a low-speed, synchronous serial bus
- Six PCI bus expansion card slots (one used for video card)
- Two RS-232/RS-422 serial GeoPort-compatible ports, 230.4 Kbits per second maximum (up to 2.048 Mbits per second clocked externally)
- Built-in Ethernet AAUI and 10BaseT connectors
- Sound output port for stereo CD audio and computer-generated sound
- Powered sound input port for stereo sound input

AC line input

- Line voltage: 100–240 volts AC, RMS single phase (not auto-ranging)
- Frequency: 50–60 Hz
- Power 460 Watts

DC power

- 300 watts maximum

Current type	Total
+3.3 V	14 A
+5 V	30 A
-5 V	0.6 A
+12 V	12 A
-12 V	0.5 A

Clock and calendar

- CMOS circuitry with long-life 3.6-volt lithium battery (1/2 AA cell)

Keyboard and mouse

- Supports all ADB-compatible keyboards and mice

Operating environment

- Operating temperature: 10°C to 40°C (50°F to 104°F)
- Storage temperature: -40°C to 50°C (-40°F to 122°F)
- Relative humidity: 5% to 95% (noncondensing)
- Altitude: 0 to 3048 m (0 to 10,000 ft)

Dimensions

- Size: 7.7" W X 16.9" H X 17.3" D (196 mm X 429 mm X 439 mm)
- Weight: 27 lb (12.3 kg).

RAM configurations

The PowerTower Pro has eight slots for memory modules (or DIMMs). The computer will work with a number of different memory configurations, from a minimum of 16 MB to a maximum of 1024 MB. Follow these guidelines when configuring your system's RAM:

- DIMM slots can accept 8, 16, 32, 64, and 128 MB DIMMs.
- All DIMMs must be 168-pin, 64-bit fast-paged mode, 70-nanosecond RAM access time or faster. Slower DIMMs will not work reliably. SIMMs from older Macintosh computers are not compatible.
- DIMMs should be installed in pairs of equal value and in corresponding slots to take advantage of interleaved memory.

VRAM information

Video memory (VRAM) for the video ports is provided in VRAM modules installed on the graphics card. The 128-bit video system comes with 4 or 8 MB of VRAM; the 64-bit video system comes with 2 MB of VRAM. See the table following for information about how many colors at what resolution can be displayed on a monitor of a particular size with different amounts of VRAM.

Monitor resolution/color table

The following table displays the numbers of colors available to monitors of various sizes connected to the computer's monitor ports. The 2 MB figures apply to the 64-bit video

Table B-1. Built-in monitor port color levels

Monitor	Resolution	Colors *		
		2 MB VRAM	4 MB VRAM	8 MB VRAM
12" Color	512 X 384	Millions	Millions	Millions
13 or 14" VGA	640 X 480	Millions	Millions	Millions
15" Mono Portrait	640 X 870	Thousands	Millions	Millions*
16 or 17" Color	800 X 600	Millions	Millions	Millions
	832 X 624	Millions	Millions	Millions
19 or 20" Color	1024 X 768	Thousands	Millions	Millions
21" Color	1152 X 870	Thousands	Millions	Millions
	1280 X 960	256	Thousands	Millions
	1280 X 1024	256	Thousands	Millions
	1360 X 1024	N/A	N/A	Millions
	1600 X 1200	N/A	N/A	Millions
	1920 X 1080	N/A	N/A	Millions

card; the 4 and 8 MB figures apply to the 128-bit video card.

*256 Grays maximum for all monitors

Power requirements

Apple Desktop Bus

- Maximum power draw for all devices: 500 mA
- Mouse power: up to 10 mA
- Keyboard power: 25–80 mA (depending on keyboard model)

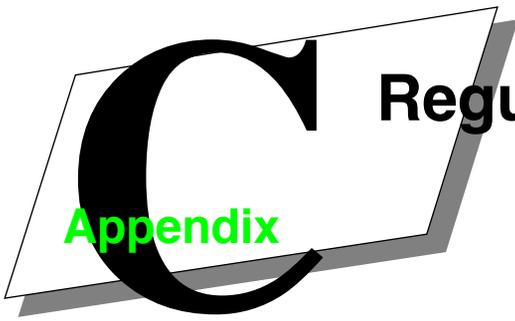
Audio and telecommunications input devices

Device	Voltage	Current	Power
Microphone	+5 V	20 mA	100 mW
GeoPort Telecom Adapter	+5 V	500 mA	2.5 W

Expansion cards and devices

When you add PCI cards or internal storage devices, make sure the combined power consumption of all devices meets the following guidelines:

Device	Voltage	Current	Power
	+5 V	3 A	15 W
PCI card (per slot)	+12 V	0.5 A	6.0 W
	-12 V	0.1 A	1.2 W
PCI cards total	+5 V	10 A	50 W
	+12 V	2.5 A	30 W
(6 slot maximum)	-12 V	0.5 A	6 W
	+5 V	4.5 A	22.5 W
Internal storage device (such as a CD-ROM or hard disk drive)	+12 V	1.7 A	20 W



Regulatory Information

This appendix contains information required by regulatory agencies.

FCC statement

This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in Part 15 of FCC rules. See instructions if interference to radio or television reception is suspected.

Radio and television interference

The equipment described in this manual generates, uses, and can radiate radio-frequency energy. If it is not installed and used properly—that is, in accordance with the manufacturer’s instructions—it may cause interference with radio and television reception.

This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

You can determine whether your computer system is causing interference by turning it off. If the interference stops, it was probably caused by the computer or one of the peripheral devices.

If your computer system does cause interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the computer to one side or the other of the television or radio.
- Move the computer farther away from the television or radio.

- Plug the computer into an outlet that is on a different circuit from the television or radio. (That is, make certain the computer and the television or radio are on circuits controlled by different circuit breakers or fuses.)

If necessary, consult an authorized service provider or consult an experienced radio/television technician for additional suggestions. You may find the following booklet helpful: *Interference Handbook* (stock number 004-000-00493-1). This booklet, prepared by the Federal Communications Commission, is available from the U.S. Government Printing Office, Washington, DC 20402.

Important: Changes or modifications to your computer not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This product was tested for FCC compliance under conditions that included the use of shielded cables and connectors between system components. It is important that you use shielded cables and connectors between system components to reduce the possibility of causing interference to radios, television sets, and other electronic devices.

DOC statement

DOC Class B Compliance This digital apparatus does not exceed Class B limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Department of Communications.

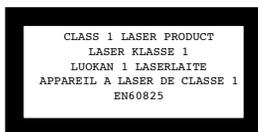
Observation des normes—Classe B Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Class B prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le ministre des Communications.

CD-ROM drive

WARNING! Making adjustments or performing procedures other than those specified in your equipment's manual may result in hazardous exposure.

WARNING! Do not attempt to disassemble the cabinet containing the laser. The laser beam used in this product is harmful to the eyes. The use of optical instruments, such as magnifying lenses, with this product increases the potential hazard to your eyes. For your safety, have this equipment serviced only by an authorized service provider.

If you have an internal CD-ROM drive in your computer, your computer is a Class 1 laser product. The Class 1 label, located on the computer, indicates that the drive meets minimum safety requirements. A service warning label is on the CD-ROM drive inside the computer.



Lithium battery warning

The computer contains a lithium battery to power the clock and calendar circuitry.

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

ATTENTION: Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

For use in European countries

Use an HAR approved power cord with proper plug configuration.

Bitte nur mit zugelassener HAR-Stromkabel benutzen.

Index

Numerics

115/230 volt switch, illustrated xvi, 2, 15
3.5" to 5.25" adapter 100, 102
3.5" to 5.25" adapter tray 103
680x0-based Mac 177

A

A/UX 172
A/UX partition 186
AC line input, specifications 155
Acceleration, see cache
ActiveAudio 224, 258, 279
adapter tray, 3.5" to 5.25" 103
adapter, 3.5" x 5.25" 100
ADB ports
 illustrated xvi, 15
 input devices connection 19
 mouse and keyboard connections 7
 symbol for xvi, 15
Additional SCSI buses, accessing 200
Address
 SCSI ID 213
AIFF files 262, 285
Allocation Block Size 187, 190
Alternating Read test 194
Apple CD Audio Player 255
Apple desktop bus, power requirements 159
Apple HFS 248
AppleCD Audio Player 24
Attributes
 partition 189
audio equipment 21
 audio device connection 21
 external speaker connection 22
 microphone connection 23

power requirements 159
sound ports 21
specifications 154

B

Backup 213
Bad blocks 194
Basics tutorial, running 27
battery warning 163
bay cover, metal 122, 131
bezel insert 114, 121, 130
bezel tabs 74, 106
Bit 213
Blind Data Transfer 213
blind transfers 178, 199, 207
Block 213
Block size 196
Blocks
 bad 194
Blown session 282
bomb dialog box 38
Bootable partition 190
brightness control, monitor 10
Buffer 213
Bus 213
Byte 213

C

cables, for connecting SCSI devices 18
Cache 213, 242
 definition 223
 dynamic RAM cache 243
 notes about settings 292
 overview 242
 remember static images 244

- static disk cache 244
- static RAM cache 243
- total cache capacity 245
- Capacity
 - of drive 196
- caution notices
 - (see also: warning alerts)
 - defined 149
 - on increasing memory 65, 157
- CD Extra 224, 258, 279
- CD formats
 - ActiveAudio 224
 - CD Extra 224, 279
 - CD Karaoke 224
 - CD+G 224
 - High Sierra 224
 - ISO 9660 224
 - Kodak PhotoCD 224
 - Macintosh HFS 224
 - mixed mode 278
 - multisession 249
 - multivolume 249
 - ProDOS 224
- CD recorders 280, 284
- CD+G 224, 257, 287 to 290
- CD-ROM 277
 - description 277
- CD-ROM drive
 - (see also: hard disk drive) 24
 - playing audio CDs on 24
 - power requirements 159
 - warnings 163
- CD-ROM ToolKit
 - about 223
 - application file 234
 - compatible CD formats 224
 - configuring 279
 - Extension 234, 235
 - incompatible systems 225
- CDs (audio), playing 24
- CDT Remote 237
 - about 224, 255
 - ActiveAudio 258
 - Apple CD Audio Player 255
 - CD Extra 258
 - CDT Remote file 234
 - Enhanced CD 258
 - how to play audio 259
 - multimedia audio CDs 258
 - play an AIFF file 262
 - player menu 258
 - remote control 256, 257
 - sound Control Panel 255, 259
 - sound output 255
 - transfer digital audio 260
 - troubleshooting 260
- Central processing unit 213
- Chooser program 19
- Class
 - of drive 196
- clock and calendar, specifications 155
- color tables, for monitor ports 158
- compatibility problems, software 39
- Computer Information 197
- connecting peripheral devices **15**
- connector key 122, 130, 135
- Control Panels 229, 240
- Controller 213
- cover removal
 - instructions 55, 67, 103
 - warning alert 55, 67, 96
- cover, metal bay 122, 131
- CPU 213
- cursor (see: mouse pointer)
- Custom install 233, 235, 236
 - Apple's Foreign File Access 237
 - application 237
 - CD-ROM ToolKit folder 237
 - CDT Remote 237
 - easy install 236
 - Extension 237
 - information button 236
 - install options 236
 - Read Me file 237
 - supported devices file 237
 - system items 237
- Custom partition 186
- customer satisfaction guarantee xxiii

Customer Support
contacting iv, xix

D

Data Error 214

Daystar Turbo 040 accelerator board 178, 199, 207

DC power, specifications 155

Defragment 214

Deleting a Partition 192

desktop problems

missing hard disk icon 37

Device Driver 214

Device driver 223, 229, 255

common device drivers 229

definition 229

loading 253

removing 229

third party driver 254

device drivers, installing 19, 147

Device-independent 214

Devices list 239

view menu 240

Digital audio extraction 284 to 285

dimensional specifications 156

DIMM module (dual in-line memory module)

inserting 81

removing 80

DIMM slots 72

Disk

mounting 193

unmounting 193

disk drives

installing internal **106**

specifications 153

Disk First Aid 37

display device (see: monitor)

Display non-CDs 239

DOC statement (DOC Class B) 162

double-clicking, explained 27

Drive

capacity 196

class 196

disk 214

hard disk 214

tape 216

testing 194

type 196

Drive Capacity 188

Drive Information 195

drive rails 103, 123

Drive setup ?? to 253, 253 to ??

cache 242

cancel 241

default 241

devices list 239

display non-CDs 239

drive setup screen 239

fast 239, 254

miscellaneous notes 292

mounting 248

MouseHelp 241

OK 241

on 239

prescan 246

read ahead 250

scan 239

setup 239

setup features screen 240

special 252

suggested settings 291 to 306

Drive's capacity 180

Driver 214

name 196

updating 181

version 196

driver

Hard Disk ToolKit•Personal Edition 178

Hard Disk ToolKit•Personal Edition's high-performance 171

non-HDT 181

drives

ST-506 171

drives, installing internal **106**

Dual format CDs 248

dual in-line memory modules (DIMMs) 72

Dynamic RAM cache 243

E

- Easy install 233, 237
- Ejecting CDs manually 286
- electrical outlets
 - for plugging in computer 1
 - warning alert 3
- electrical shock safety guidelines 149
- energy-saving mode (sleep mode) 31
- Enhanced CD 258, 278
 - ActiveAudio 224, 279
 - CD Extra 224, 279
- environment (operating) specifications 156
- Error
 - data 214
- error dialog box 34
- error messages (see: troubleshooting)
- Ethernet
 - illustrated xvi, 15
 - network, connecting to 20
- Expand partition 191
- expanding your computer
 - cover removal 55, 67, 95
 - cover replacement 59, 71, 106
- expansion cards
 - guidelines for installing 60
 - installing **59, 61**
 - installing internal **59**
 - warning alert 65
- expansion cards, installing **59**
- expansion cards, installing internal **59**
- Extensions 229, 235, 238
 - disabling 231
- Extensions Manager 39
- external speakers, connecting 22
- eye strain, preventing 150

F

- fat application 177
- FCC statement 161
- Finder (Application menu) 28
- Firmware 283
- floppy disk
 - X icon 36
- floppy disks

- problems with 37
- specifications 153
- folder, opening 28
- Foreign File Access 235, 237
 - Audio CD 235
 - High Sierra 235
 - ISO 9660 235
- Formatting 182, 214
- Fragmentation 214
- Free partition space 196
- Free Space, on drive for partition 188
- Frequently asked questions 264 to 271
- Frisbee 282
- front cover insert 114, 121, 130
- front panel, removing 74, 106
- FWB recommends
 - Drive setup settings 291
 - easy install 227, 233
 - load driver and restart 254
 - restart after installation 235
 - using Technical Support 253

G

- GeoPort Telecom Adapter
 - connecting 20
 - power requirements 159
- Get Info window 39
- Gigabyte 214
- glare, preventing 150
- Guide menu 28

H

- hard disk drive
 - (see also: CD-ROM drive)
 - internal 16, 100
 - power requirements 159
 - specifications 153
- hard disk icon
 - opening 28
 - problems 37
- Hard Disk ToolKit•Personal Edition
 - installing 175
- Hard Disk ToolKit•Personal Edition features 171
- HDT (Hard Disk Toolkit) Primer 101

- HDT Primer PE 173
 - main window 180
 - Menu Commands 198
 - overview 177
 - partitioning with 188
 - starting 180
 - using 179
 - health-related information **149**
 - Help
 - accessing online help 223
 - MouseHelp 241
 - help
 - on-line 172
 - help, on-line 28
 - Hierarchical File System 224, 248
 - High Sierra 224, 235, 237
 - high-performance monitor port
 - color table 158
 - Macintosh-standard described 5
- I**
- icons
 - floppy disk X icon 36
 - hard disk icon 28
 - Mac OS Tutorial Part 1 28
 - sad face icon 36
 - ID
 - SCSI 214
 - Information
 - about computer 197
 - about drive 195
 - Initialization 214
 - Initialize 199
 - Initializing 185
 - input devices, connecting 19
 - insert, front panel 114, 121, 130
 - Inside Mac IV and V 215
 - Installation
 - Apple's Foreign File Access 235
 - application file 234
 - CDT Remote file 234
 - contents of installation disk 230
 - custom install 233, 235, 236
 - easy install 233
 - Extension 234
 - personalization 233
 - quick start 227
 - Read Me file 234
 - remove 233, 238
 - select folder 233
 - SimpleText 234
 - supported devices file 234
 - switch disk 233
 - troubleshooting 236
 - before you install 231
 - Installer 230, 255
 - alias files 240, 255
 - installing
 - expansion cards **59**
 - internal drives **106**
 - RAM **72**
 - Installing Hard Disk ToolKit•Personal Edition 175
 - Intelligent 215
 - Interface 215
 - interfaces, specifications 154
 - internal drives, installing **106**
 - internal storage devices
 - installing **106**
 - power requirements 159
 - Interrupt button 34
 - ISO 9660 224, 235, 237, 248
- K**
- key, connector 122, 130, 135
 - keyboard
 - connecting to computer 7
 - power requirements 159
 - problems 38
 - specifications 156
 - Kilobit 215
 - Kilobyte 215
 - Kodak PhotoCD 224, 281
- L**
- license agreement xxv
 - lithium battery warning 163
 - LocalTalk network
 - connecting to 20

- printer connections 19
- Logical 215
- Logical Unit 215

M

- Mac OS CD-ROM 37
- Mac OS operating system 27
 - Mac OS Tutorial folder 28
 - Mac OS Tutorial Part I icon 28
 - Macintosh Guide 28
 - on-line help 28
- Macintosh Guide
 - Guide menu 28
 - icon for 5
- Macintosh HFS 224
- Macintosh System 7.5 manual 27
- Main window
 - HDT Primer PE 180
- Maximum Macintosh 186
- Maximum Size
 - of partition 190
- Megabit 215
- Megabyte 215
- Memory
 - random access 216
 - read only 216
- memory
 - configurations 153
 - increasing **72**
 - specifications 153
- memory, installing **72**
- metal bay cover 122, 131
- microphones
 - connecting 23
 - power requirements 159
- Mirroring 196
- Mixed mode CD 278, 280
- modem port
 - connecting printer to 19
 - illustrated xvi, 15
 - symbol for xvi, 15
- modems
 - connecting 20
- Modifying a Partition 191

- monitor
 - placement of 1
 - ports 5
 - setting up 4
 - turning on 9
- monitor ports
 - color tables 158
- Monitors and Sound control panel 25
- Monitors control panel 5
- motherboard
 - DIMM slots 72
- Mount 215
- Mounting 248, 279
 - ActiveAudio 279
 - Apple HFS 248
 - CD Extra 279
 - disk 193
 - dual format CDs 248
 - ISO 9660 248
 - partition 193
 - ProDOS 249
 - search every track 249
- mouse
 - connecting to computer 7
 - problems 37
 - specifications 156
 - using 27
- mouse pointer, described 27
- MouseHelp 241
- Multimedia 278, 292
- Multisession CD 249, 280
- Multivolume CD 249

N

- networks, connecting to 20
- Nibble 215
- NuBus cards
 - installing 59

O

- older HDT modules 175
- on-line help 28, 172
- operating environment, specifications 156
- Orange Book 281

P

- Partition 216
 - A/UX 186
 - attributes 189
 - automount attribute 191
 - bootable attribute 190
 - creating new 189
 - custom 186
 - deleting 192
 - expand 191
 - Maximum Macintosh 186
 - maximum size 190
 - modifying 191
 - mounting 193
 - name 189
 - shrink 191
 - size 189, 190
 - style 196
 - type 189
 - unmounting 193
 - Partition Directory window 188
 - Partition Map 215
 - Partitioning Method dialog box 184, 186
 - Partitions
 - number of 189
 - number on disk 196
 - Password
 - partition 190, 191
 - PCI cards
 - installing **61**
 - warning alert 65
 - Peripheral 216
 - peripheral devices
 - audio equipment 21
 - CD-ROM drives 24
 - connecting to **15**
 - external speakers 22
 - input devices 19
 - microphones 23
 - modems 20
 - network connections 20
 - printers 19
 - SCSI devices 16
 - Personalization 233
 - PlainTalk microphone 23
 - plastic insert 114, 121, 130
 - Player menu 258
 - ports (see: ADB ports; monitor ports; sound ports)
 - power cable 117, 126
 - Power Computing team
 - word from v
 - power consumption
 - expansion cards 95
 - of expansion cards 61
 - specifications 159
 - power cord
 - plugging in 2
 - socket, illustrated xvi, 2, 15
 - Power On key/button 9, 34
 - power switch
 - restarting computer 34, 38
 - turning on computer 9
 - PowerPC-based Mac 177
 - Preferences 238
 - Prescan 246
 - continue prescanning 247
 - desktop information 246
 - file and folder information 246
 - system 7 alias files 247
 - system 7 icon files 247
 - printer port
 - illustrated xvi, 15
 - symbol for xvi, 15
 - printers, connecting 19
 - problems and solutions (see: troubleshooting)
 - problems and solutions (see: troubleshooting)
 - processor specifications 153
 - ProDOS 224, 249
 - programs
 - launching 28
 - Proprietary 216
- ## Q
- QuickTime 247, 261, 285
- ## R
- radio and television interference

- regulatory information **161**
- rails for internal drive 103
- rails, for internal drive 123
- RAM 216, 242, 243, 247, 250
 - installing **72**
 - installing internal **72**
- RAM (random-access memory)
 - configurations 157
 - increasing **72**
 - insufficient memory problems 39
 - specifications 153
- RAM, installing internal **72**
- Random Access Memory 216
- Random Read test 194
- Read ahead 224, 250
 - disabled 250
 - large 251
 - RAM 250
 - small 250
- Read Me file 223, 231, 234, 237
- Read Only 192
- Read-Only Memory 216
- regulatory information **161**
 - CD-ROM drive 163
 - DOC statement 162
 - FCC statement 161
 - lithium battery warning 163
 - radio/television interference 161
- Remember static images 244, 292
- Remove 233, 238
 - cancel 238
 - disable 238
 - Extensions 238
 - Preferences 238
 - remove all files 238
- removing computer cover 55, 67, 95
- repetitive stress injuries (RSIs), preventing 150
- Reset button 34
- Restart command (Special menu) 34
- restarting the computer, troubleshooting 34
- ROM 216

S

- sad face icon 36, 37

- Sad Mac 202
- safety and health guidelines **149**
- Sales, contacting iv
- satisfaction guarantee xxiii
- saving files 12, 30
- Scan 239
- SCSI 216
- SCSI bus 16, 96
 - scanning 101
- SCSI cables
 - for external SCSI devices 18
 - for internal SCSI devices 116, 124
- SCSI chain 16, 17
- SCSI device drivers 147
- SCSI devices 16
 - connecting external 18
 - connecting internal 19
 - installing device drivers 19, 147
 - problems 37
 - SCSI ID assignment 16, 17, 100
 - terminating 17
- SCSI ID 253
- SCSI ID number 196
 - assigning 16, 100
 - determining 101
 - pre-set IDs 100
- SCSI Manager 216
- SCSI Manager 4.3 172, 180, 224
- SCSI port
 - described 18
 - illustrated xvi, 15
 - symbol for xvi, 15
- SCSI-2 172
- Sectors 216
- Security Erase 192
- Select folder 233
- Sequential Read test 194
- Serial number 201
- Session, defined 278
- setting up your computer 1
- Shrink partition 191
- Shut Down (Special menu) 12, 30
- shutting down your computer 12, 30
- SIMMS (Single Inline Memory Modules)

- configuring 157
- installing 72, 157
- SimpleText 231, 234
- Size
 - of partition 190
- sleep mode 31
- software
 - compatibility problems 39
 - memory problems 39
- software device drivers, installing 19
- Sound control panel 25
- sound in port
 - illustrated xvi, 15
 - symbol for xvi, 15
- sound out port
 - illustrated xvi, 15
 - symbol for xvi, 15
- sound ports
 - connecting audio devices to 21
- speakers (external), connecting to 22
- Special 252
 - badly mastered CDs 253
 - do not eject 253
 - hide custom icons 252
 - polled non-blind 253
- specifications **153**
- ST-506 drives 171
- Standards 278
 - Orange Book 281
- starting up
 - problems 10, 34, 37
 - turning the computer on 9
- Static disk cache 242, 244
- static electricity, discharging 58, 70, 105
- Static RAM cache 242, 243
- stereo mini-plug connectors 21, 22
- Striping 196
- Style
 - of partition 196
- Suggested settings
 - ActiveAudio CDs 305
 - CD Extra CDs 303
 - children's stories 294
 - Desktop recorded CDs 302

- educational CDs 294
- encyclopedias 296
- games 293
- photo CDs 300
- shareware CDs 299
- support numbers iii, xix
- Supported devices 224, 225
- Supported devices file 234, 237
- Supported devices, notes on 271 to 275
- Switch disk 233
- system
 - front view xv
 - rear view xvi
- System Heap space message 201
- System requirements 225
- system software
 - problems 36

T

- Tape Drive 216
- technical information
 - power requirements 159
 - RAM configurations 157
 - system specifications **153**
 - VRAM configurations 157
- Technical Support
 - contacting iv, xx
- telecom adapter 20
- telecommunications devices
 - power requirements for 159
- telecommunications port (see: modem port)
- television/radio interference
 - regulatory information 161
- terminating SCSI devices 17
- Testing a Drive 194
- Thermal recalibration 282
- Token Ring network, connecting to 21
- Track 1 problem 278
- Track, defined 278
- Tracks 216
- Transfer digital audio 260
- Troubleshooting 263
- troubleshooting 33
 - drive not working 147

- restarting the computer 34
- Troubleshooting installation 263 to 264
- tutorial (Basics)
 - overview 27
 - running 27
- Type
 - of drive 196

U

- Unmounting
 - disk 193
 - partition 193
- upgrading your computer **55, 67, 95**
 - internal drives **106**
 - memory **72**
- Using HDT Primer PE 179

V

- VGA monitor port
 - described 5
 - illustrated 15
- video cable, connecting 5
- video specifications 154
- virtual memory 39
- virus protection software 175
- Virus protection, disabling 231
- Volume 216
- Volume Name 190
- Volume name 180
- Volumes 187
- VRAM (video memory)
 - configurations 157

W

- warning alerts
 - (see also: caution notices)
 - defined 149
 - on adjusting CD-ROM drives 163
 - on computer cover removal 55, 65, 67, 73, 96
 - on installing expansion cards 65
 - on lithium batteries 163
 - on using electrical outlets 3
- warranty xvii
- Web address, Power Computing team iii, xix

Word 216

X

X icon 36