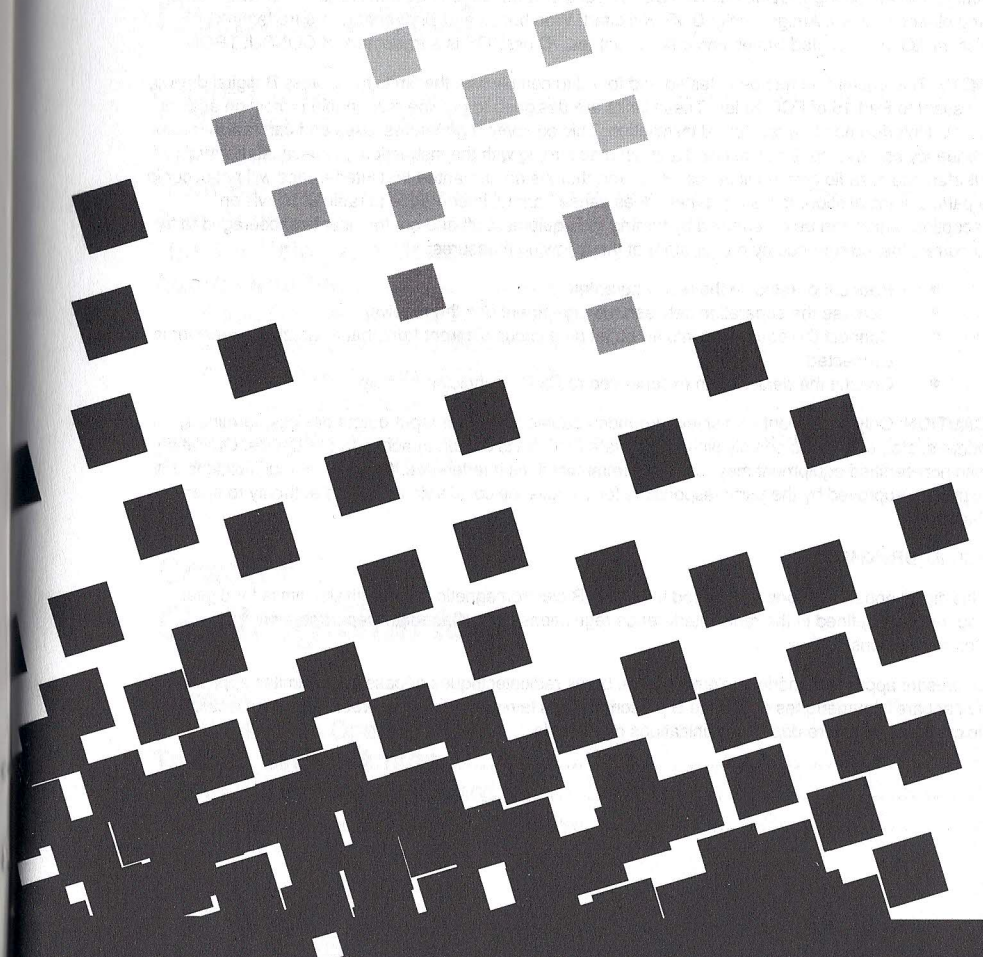


AMIGA<sup>®</sup>



AMIGA<sup>®</sup> A4000T

# AMIGA<sup>®</sup>



AMIGA<sup>®</sup> A 4000T

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**CAUTION:** Only equipment with shield-grounded cables (computer input-output devices, terminals, printers, etc.) certified to comply with appropriate FCC limits can be attached to this device. Operation with non-certified equipment may result in communications interference. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the device.

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P/N: 371188-02

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# Welcome

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Welcome to the AMIGA Technologies® commitment to optimum performance at an affordable price!

Your AMIGA Technologies Amiga® is based on a state-of-the-art Motorola 680x0 series microprocessor. In addition to preinstalled random access memory (Fast RAM), your system includes an integrated hard disk drive for extensive data storage, and five Zorro III expansion slots (compatible with Zorro II boards).

The hardware strengths of the AMIGA Technologies Amiga family of personal computers make the Amiga the computer platform of choice for video, multimedia, 3-D modeling, and other graphics-intensive applications. The Amiga 4000 line features sophisticated standard graphics capabilities and a modular, easily-expandable base unit for maximum flexibility.

## Features

The Amiga 4000 tower (A4000T) offers the most advanced set of features in the Amiga line. These features include:

- Motorola 680x0 series microprocessor running at 25 - 50 MHz, on a removable processor module
- Advanced Graphic Architecture™ (AGA) custom chipset offering graphics with 256 colors from a palette of 16.8 million in all color modes
- 2 MB 32-bit Chip memory
- Up to 16 MB 32-bit onboard Fast memory using SIMMs
- Five Zorro III AUTOCONFIG™ expansion slots

- Four PC/AT slots; three accommodate a Bridgeboard
- Two extended video slots
- Local-bus CPU slot for enhanced processors/additional RAM expansion
- SCSI-2 peripherals interface (controller)
- AT IDE hard drive interface (16-bit)
- Mounting provisions for internal 3.5-inch and 5.25-inch devices
- Four-voice stereo sound output
- Internal speaker
- Front panel keylock for security

## Using this Guide

This guide is designed to help you set up your Amiga system quickly and safely. It contains information for making the necessary external connections, adding internal and external expansion options, and other hardware-related tasks. Use this manual when you add expansion hardware or need technical information.

Consult the other Amiga documentation included with your system for software information.

**Chapter 1. Quick Connect:** This chapter provides instructions for connecting peripherals to the system and the system to a power source.

**Chapter 2. Getting Started:** This chapter explains how to turn on your system and describes the start up screen, keyboard layout, and keys.

**Chapter 3. Before Expanding Your System:** This chapter provides general advice for adding expansion devices and shows you the interior system layout.

**Chapter 4. Installing Motherboard Options:** This chapter explains how to install system options on the motherboard.

**Chapter 5. Installing Expansion Boards:** This chapter describes how to install expansion boards in motherboard expansion slots.

**Chapter 6. Installing Optional Storage Devices:** This chapter provides information for installing additional floppy drives, hard drives, and other devices.

**Appendix A. Technical Specifications:** This appendix provides technical details about your system.

**Appendix B. Monitor Types and Compatibility:** This appendix describes the horizontal and vertical scan rates for monitors used with the Amiga and gives information to assist you in choosing a monitor for your system.

**Appendix C. Component Locations and Jumper Settings:** This appendix describes how to set a jumper and gives information about jumper settings on the motherboard, disks module board, and the processor module board.

**Appendix D. Using Floppy Disks:** This appendix explains how to handle your floppy disks.

**Appendix E. Troubleshooting:** This chapter describes how to avoid common problems, how to identify and solve basic hardware problems, and how to interpret startup diagnostics results.

**Appendix F. Input/Output Connector Pin Assignments:** This appendix lists the pin assignments for each port and expansion slot.

## Document Conventions

In this and other Amiga documentation from AMIGA Technologies, the following conventions are used:

- Amiga, A4000T** The Amiga 4000T main unit is usually referred to as the A4000T (tower) or the Amiga.
- Key1 + Key2** Key combinations with a plus (+) sign between the keys indicate pressing the keys simultaneously. For example, Right Amiga+O means to hold down the right Amiga key and, while holding it down, press O.
- Amiga keys** These two keys on the Amiga keyboard are used for special functions. The left Amiga key is to the left of the space bar and is marked with a large solid A. The right Amiga key is to the right of the space bar and is marked with an outlined A. Unlike Shift and Alt key pairs, the two Amiga keys usually have different functions.
- Enter** Directions to enter something mean to type in the indicated information and then press Return.
- arrow keys** The arrow keys are the four keys in an inverted-T formation to the right of the main keyboard, with arrows on them pointing up, down, left, and right. Do not confuse these keys with others on the keyboard marked with arrows.

## Related Documentation

- *Workbench™ User's Guide*
- *AmigaDOS™ User's Guide*
- *ARexx User's Guide*
- *Amiga Hard Drive User's Guide*

If you come upon terms in this book that you do not understand, look in the Glossary of the *Workbench User's Guide*, which defines many computer and Amiga-specific terms.

## Chapter 1 Quick Connect

---

As you unpack your system, check the items in the system box. Contact your dealer immediately if anything is damaged.

This chapter guides you through setting up your system. Read the instructions carefully. Before you set up your system, use the information in this chapter to understand:

- Proper work area conditions
- Components of your Amiga
- Audio options
- Video options
- Powering on your system

## Before You Begin

- Choose a location for your system away from heat, dust, smoke, vibration, and electrical interference.
- Place the main unit on the floor at least 15 cm (6 inches) away from a wall. The ventilation slots on the back of the main unit must not be blocked.
- Have on hand a multi-outlet power strip with surge protection. (These units are available from most computer stores.) AMIGA Technologies strongly recommends that you use this type of outlet to protect your system from electrical problems.



- Make sure your equipment matches the electrical requirements for the country in which you are using the computer. For example, you cannot use a 110/115 volt model in countries having a 220/240 volt system unless the voltage selection switch is set correctly.
- Read the descriptions in this chapter to acquaint yourself with the purpose and function of each feature and connector.

## As You Set Up Your System

- If possible, plug your system into a separate circuit to avoid any electrical interference. Voltage surges and drops caused by devices such as air conditioners, fans, and vacuum cleaners can cause damage to your computer data and/or to the computer itself.
- Look at your system and match the features and connectors with the illustrations in this chapter. Use the illustrations to help you identify the lights, switches, connectors, and disk drive.
- Use the instructions to connect the monitor, keyboard, and any optional peripherals to the system unit. All connectors are shaped so they fit only one way. Do not try to force a cable into a connector.
- Never connect or disconnect any equipment when the system power is on.
- If you have a problem, always check the instructions and the illustrations before proceeding. Remember, you can cause damage by not following instructions.

## Main Unit

The main unit case contains the basic components that run your computer. The system motherboard, disk drives, power supply, and optional expansion boards are located in the main unit. The other parts of your computer system connect to the main unit by cables.

## Front Panel

Figure 1-1, the front panel, identifies system features, such as the key lock and floppy disk drive.

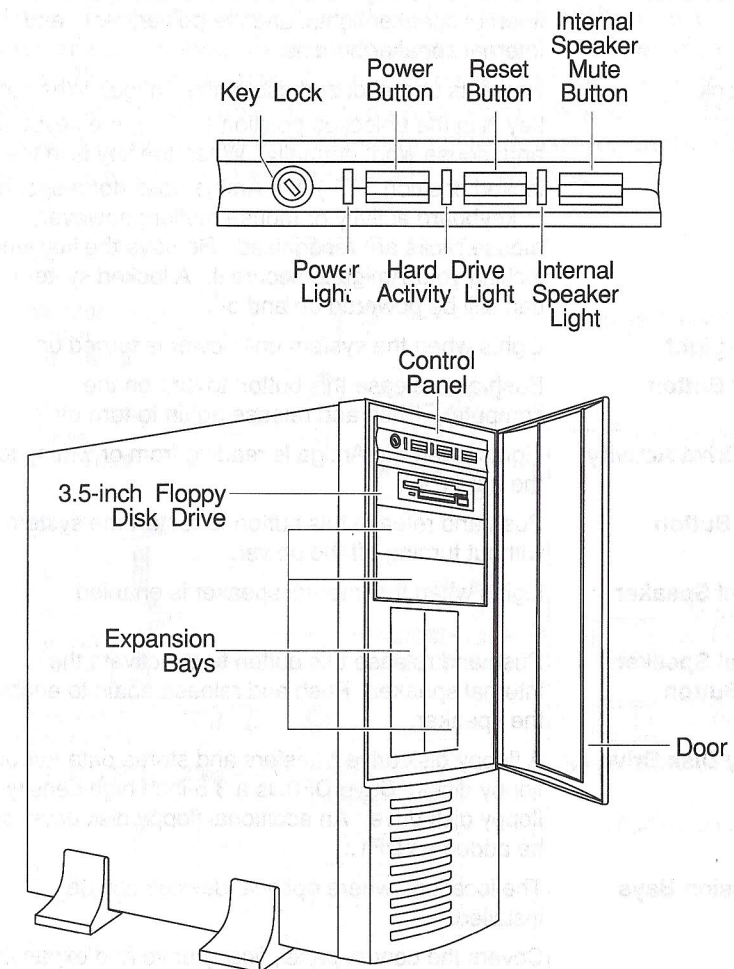




Figure 1-1. A4000T Front Panel

The following table explains the front panel's features:

Feature	Description
<b>Control Panel</b>	Contains the key lock; the power, hard disk and internal speaker lights; and the power, reset and internal speaker buttons.
<b>Key Lock</b>	Prevents unauthorized use of the Amiga. When the key is in the unlocked position (  ), the keyboard and mouse work normally. When the key is in the locked position (  ), the Amiga does not respond to keyboard activity or mouse motion; however, mouse clicks are recognized. Remove the key when locking your Amiga to secure it. A locked system can still be powered on and off.
<b>Power Light</b>	Lights when the system unit power is turned on.
<b>Power Button</b>	Push and release this button to turn on the computer. Push and release again to turn off.
<b>Hard Drive Activity Light</b>	Lights when the Amiga is reading from or writing to the hard disk.
<b>Reset Button</b>	Push and release this button to restart the system without turning off the power.
<b>Internal Speaker Light</b>	Lights when the internal speaker is enabled.
<b>Internal Speaker Mute Button</b>	Push and release this button to deactivate the internal speaker. Push and release again to enable the speaker.
<b>Floppy Disk Drive</b>	A floppy disk drive transfers and stores data to/from floppy disks. Drive DF0: is a 3.5-inch high density floppy disk drive. An additional floppy disk drive can be added as DF1:.
<b>Expansion Bays</b>	The locations where optional devices can be installed.
<b>Door</b>	Covers the control panel, floppy drive and expansion bays. Gently push on the door to release it.

## Rear Panel

The rear panel, illustrated in Figure 1-2, shows you where the external parts of your system (for example, the monitor and keyboard) plug into the main unit.

Of the eight slot brackets located at the bottom of the rear panel, the lower six are available as expansion slots for add-on expansion boards. The top two (slots 7 and 8) are reserved for standard motherboard connectors mounted on two small boards: the Disks Module and the Audio-Video Module. The remaining motherboard connectors are located above the slot bracket area.

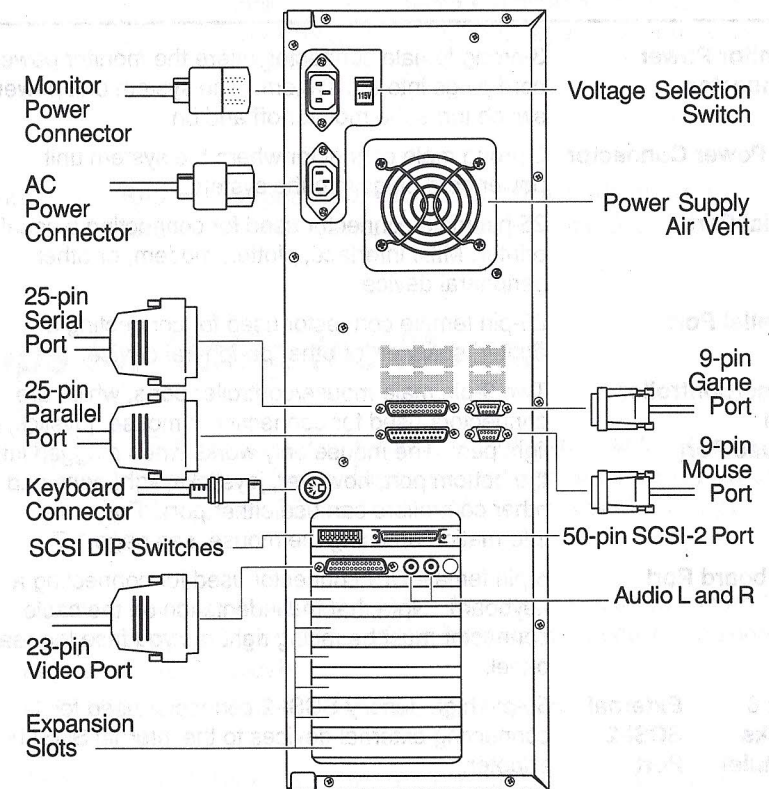


Figure 1-2. A4000T Rear Panel

The following table lists each port on the main unit rear panel. Plug in the power input after all the other connectors are attached. The other connectors can be attached in any order.

**Caution** Do not plug in and turn on the Amiga until you have securely connected all equipment and set the voltage switch to match your local power supply (230V or 115V).

Port	Description
<b>Monitor Power Connector</b>	3-prong female connector where the monitor power cord plugs into the system. The system unit power switch turns the monitor off and on.
<b>AC Power Connector</b>	3-prong male connector where the system unit power cord plugs into the system.
<b>Serial Port</b>	25-pin male connector used for connecting a serial printer, MIDI interface, plotter, modem, or other peripheral device.
<b>Parallel Port</b>	25-pin female connector used for connecting a printer, scanner, or other peripheral device.
<b>Game/Controller Port</b>	Two 9-pin male mouse/controller ports, which are connectors used for connecting a mouse, joystick, or light pen. The mouse only works when plugged into the bottom port, however, joysticks, light pens and other controllers can use either port. For more information on using the mouse, see page 1-7.
<b>Keyboard Port</b>	5-pin female DIN connector used for connecting a keyboard. Note that the indentation on the cable connector must be facing right (as you face the rear panel).
<b>Slot 8 (Disks Module)</b>	<b>External SCSI-2 Port</b> 50-pin high density SCSI-2 connector used for connecting external devices to the internal SCSI host adapter.

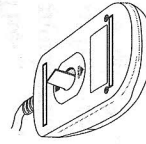
**SCSI DIP Switches**  
The DIP switches control the SCSI address of the board as well as features such as SCSI Fast Bus, short/long spinup, synchronous mode and external termination. The default setting for all switches is OFF. For detailed information on the DIP switches and on adding SCSI devices, see Chapter 6.

**Slot 7 (Audio/Video Module)**  
**Audio L and R**  
Two RCA jacks labeled AUDIO L and R used for connecting the Amiga's left and right sound channels to a monitor or audio equipment. See page 1-8 for detailed information.

**Video Port**  
23-pin male analog RGB display connector connects an analog video output to a 15 kHz Amiga RGB standard video monitor. A 23- to-15-pin adapter is included to connect the Amiga to a multiscan or VGA/SVGA monitor. See page 1-10 for detailed information.

**Note** Refer to Appendix F for technical details on and illustrations of the internal and external connectors.

## Tips for Using the Mouse



Before using the mouse, remove the packing material. Turn the mouse upside down and pull out the piece of foam that holds the mouse ball in place.

- Leave a clear area approximately 30 centimeters (12 inches) square to the left and right of the keyboard so you have room to move the mouse freely.
- Hold the mouse with a finger on each mouse button. Use a light touch.
- The motion of the pointer on the screen corresponds to the motion of the mouse. However, if you lift the mouse, the pointer does not move.

- Use a mouse pad for better control of mouse movement and to keep it from getting dirty.

**Note** Do not leave the mouse pointer over a gadget or icon when locking the keylock. The mouse motion is disabled when the system is locked; however, the mouse buttons still respond to clicks.

## Audio Options

The A4000T includes several audio options:

- An internal speaker with front panel button and light.
- Two RCA jacks (female connectors) labeled AUDIO L and R connect the Amiga's left and right sound channels to a monitor with speakers or audio equipment.
- An internal connector that alerts the Amiga to mix Amiga sound with the sound from a CD-ROM drive or a digital signal processing (DSP) board.

You do not need to take any action to hear sound from the Amiga, but you can turn it off by pressing the Internal Speaker Mute Button on the control panel on the front of the A4000T. The other options work independently from the internal speaker. The following paragraphs describe connecting your Amiga to monitors with sound or to other audio equipment.

### Audio Connection to a Stereo Monitor

A monitor with internal speakers allows you to hear the Amiga's sound output without other external equipment. An Amiga stereo monitor comes with a stereo cable, color-coded for the left and right channels. Insert the connectors at one end of the cable into the Amiga's left and right audio output jacks. Then insert the cable's other connectors into the corresponding audio input jacks on the monitor.

### Audio Connection to a Monaural Monitor

A monitor with monaural sound capability can still accept both Amiga audio channels. Plug a single audio cable into one of the jacks. Insert the other end of the cable into the monitor's audio input jack. Both audio channels are mixed and routed to the monitor speaker.

### Audio Connection to Other Equipment

You can also connect the Amiga's audio output to self-powered speakers, a stereo system, or other audio equipment. Use input connectors labeled Auxiliary, Aux, Audio In, CD, Tape, or VCR Audio on the equipment. You need a stereo audio cable with RCA connectors at one end and the appropriate type of connector for your equipment at the other end. Audio cables and adapters are available from most electronics and stereo stores.

Insert the RCA connectors into the Amiga's audio output jacks and the other connectors into the equipment's audio input jacks. Consult the equipment's user manual for further instructions on using its external inputs.

### Audio Expansion

If you install a CD ROM drive or a DSP expansion board, you can connect the drive or board to the header on the audio/video module, illustrated in Figure 1-3, so that its audio output can be mixed with the Amiga's audio channels.

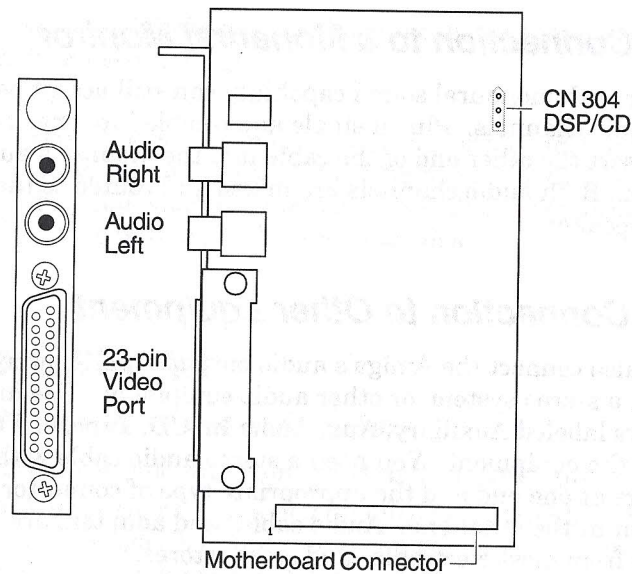
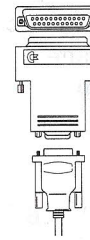


Figure 1-3. Audio/Video Module

After you install the CD ROM drive or DSP expansion board according to the manufacturer's directions, connect the drive or board to CN304 on the audio/video module with a 3-wire cable, generally supplied with the device.

## Video Options

Several types of monitors can be used with the A4000T. An analog RGB monitor with a 23-pin female connector, such as the AMIGA Technologies 1084 or 1084S, connects directly to the A4000T VIDEO port, located in slot 7 (audio/video module). This monitor must be capable of a 15 kHz horizontal scan rate to accept the Amiga's standard video output. See Appendix B for information about monitor types and choosing a monitor.



By using the 23-pin to 15-pin adapter, most multiscan or VGA/SVGA type monitors (such as the AMIGA Technologies 1940 or 1942) can be connected. Such monitors allow use of the Amiga's higher-resolution display modes (over 15 kHz horizontal scan rate). A multiscan monitor is required if you wish to use display modes that have different horizontal scan rates.

To use additional hardware, you may need other types of display devices and/or adapters. For example:

- A very high-resolution, accelerated graphics board can require a special high-bandwidth monitor with separate red, green, and blue BNC input connectors.
- A genlock, RF modulator, or other video related device allows you to use an ordinary television or a composite video monitor for certain display modes. Such devices can have an F (coaxial) connector, antenna leads, RCA jacks, and/or BNC connectors.

See the documentation for your graphics expansion hardware and your monitor for specific information about making the proper connections. Your dealer can help you choose the right combination of graphics hardware, monitor, and monitor cable or adapter for your use.

## Powering On the Amiga

**Caution** Do not plug in and turn on the Amiga until you have securely connected all equipment.

When all other connections are made, you can connect your system to power and turn it on.

1. Plug in all peripheral equipment as described in the previous sections.
2. Connect peripherals to power.

3. Attach the Amiga power cable to the Amiga. Be sure the voltage selection switch on your Amiga matches the electrical voltage supply in your country. If in doubt about electrical hookup requirements, consult your dealer.
4. Plug in the Amiga.
5. Turn on the other equipment.
6. Insert the key in the keylock and be sure the keylock is in the unlocked position.
7. Turn on the Amiga.

## Chapter 2

# Getting Started

---

This chapter covers booting your Amiga system and using it for the first time. Use the information in this chapter to:

- Boot the Amiga
- Turn off the Amiga
- Use the Amiga keyboard

## Booting

Your Amiga automatically boots when you power it on. You can reboot or reset the system by pressing the Reset button or by pressing the Ctrl+Left Amiga+Right Amiga keys simultaneously.

## Workbench Opening Screen

After the Amiga is booted, the Amiga Workbench screen is displayed (Figure 2-1). If you do not see a screen similar to this, the Amiga did not boot successfully and you should refer to Appendix E.

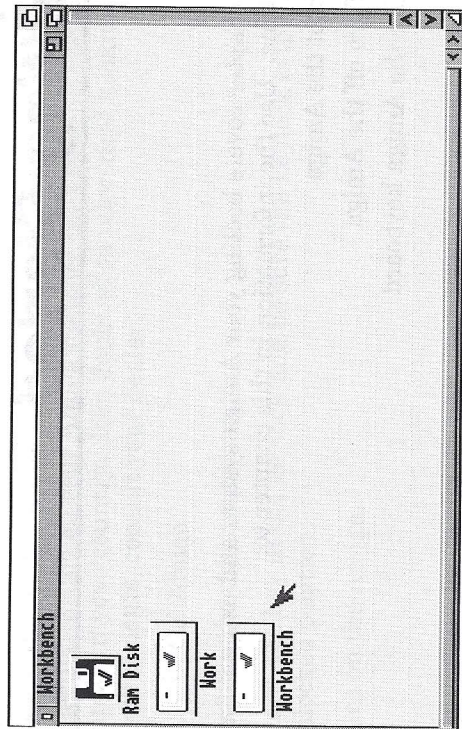


Figure 2-1. Workbench Screen

Use the Workbench screen for setting up the Workbench environment and for configuring the system to best use your specific hardware.

See the *Workbench User's Guide* for complete information on:

- Booting and rebooting
- Installing and reinstalling the system software
- Setting your system up for your keyboard, language, and country
- Making backup copies of your system disks
- Using the Preferences editors

The rest of this guide assumes that you are familiar with basic Amiga operations and terminology.

## Turning Off the Amiga

When you finish a computing session and want to turn off the Amiga:

1. Save to disk any work that you want to keep. Turning off or rebooting the Amiga erases everything in memory.

### Note

Do not turn off or reboot the Amiga while any disk activity is in progress. Wait at least five seconds after all disk drive activity lights have gone out before removing floppy disks or turning off the Amiga.

Also, if you are using software that automatically saves to disk periodically or that allows remote access to the Amiga's disks through a network, exit the software or disable the network connection before powering off or rebooting.

2. Remove any disks from the floppy drives.
3. Press the power button on the control panel of the Amiga. The power light to the left of the button goes out.
4. Turn off the monitor and any peripherals.

### Note

If you want to turn the Amiga on again immediately, wait at least 10 seconds after turning the machine off before turning it on again.

## Using the Amiga Keyboard

The Amiga keyboard is similar to industry-standard computer keyboards. It has four sections:

- Main keyboard
- Function keys
- Del, Help, and arrow keys
- Numeric keypad

Figure 2-2 illustrates the keyboard layout.

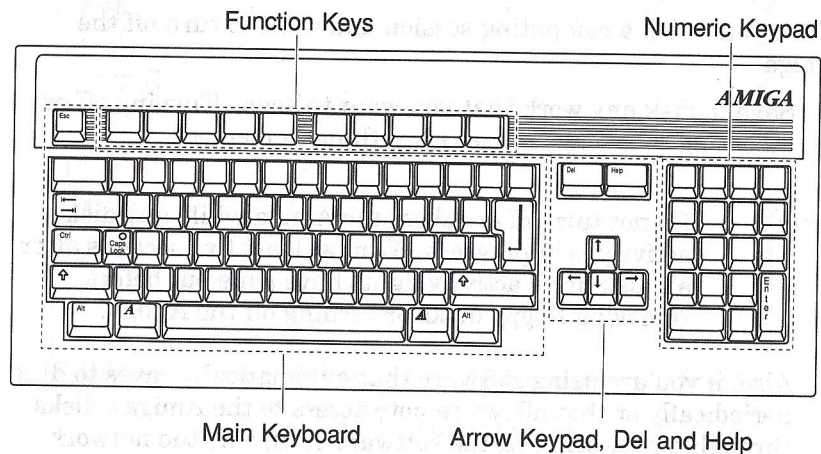







Figure 2-2. Amiga Keyboard

The main keyboard area has standard alphanumeric typewriter keys plus special keys with computer-specific uses. Some of these are qualifier keys, which have no effect by themselves, but are used with other keys for special functions.



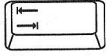
Qualifier keys include the following:

- Ctrl**  The Ctrl (Control) key, located on the left side of the middle row of letters, is a program-defined key that is often used with other keys to perform special functions.
- Shift**  Two Shift keys, marked with an up arrow (↑) are located on either side of the bottom row of letters. These keys can be used the same way as the shift keys on a standard typewriter. Press either Shift key simultaneously with any alphabetic key or with any key having two characters on the keypad to produce the uppercase or top character. The Shift keys are also often used with other keys to perform special functions.

- Alt**  The two Alt (Alternate) keys, located at the extreme left and right sides of the bottom row of the keyboard, are used with other keys to produce alternate characters.
- Left Amiga**  The left Amiga key, located on the bottom row of the keyboard just to the left of the space bar, is used with other keys to perform special functions, particularly keyboard shortcuts for gadget selection.
- Right Amiga**  The right Amiga key, located on the bottom row of the keyboard just to the right of the space bar, is used with other keys to perform special functions, particularly keyboard shortcuts for menu selection.

**Caution** The key combination **Ctrl+Left Amiga+Right Amiga** reboots the Amiga. See the *Workbench User's Guide* for details.

Other special keys include the following:

- Esc**  The Esc (Escape) key, located at the top left of the keyboard, is a program-defined key, often used as a shortcut to leave or enter a program or a certain program mode.
- Function Keys**  The function keys, located at the top of the keyboard and labeled F1 to F10, are programmable keys. Applications can define these keys to activate special functions or allow you to define them. You can also define these keys using FKey in the Commodities drawer.
- Tab**  The Tab key, located on the left side of the top row of letters, can be program-defined to move the cursor to a set position. Tab is used extensively in word processing and desktop publishing programs. In addition, many Workbench programs that have several text gadgets let you use Tab and Shift+Tab to move from gadget to gadget.



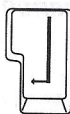
**Caps Lock**

The Caps Lock key, located next to the Ctrl key, forces all alphabetic keys (A through Z) to produce uppercase (capital) letters. Other keys, however, are not affected by the Caps Lock key. To type the upper characters on the non-alphabetic keys, you must still hold down one of the Shift keys and press the key for the desired character.

When Caps Lock is active, a light on the key is illuminated. To inactivate Caps Lock, press the key again so that its light goes out.

**Backspace**

The Backspace key is the key farthest right in the top row of the main keyboard. Pressing Backspace deletes any characters to the left of the cursor and causes the cursor, and any characters to the right of it, to move to the left.

**Return**

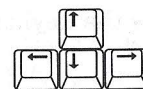
The Return key, located on the right side of the main keyboard area in the middle two rows, transmits information or a command to the computer. This key is sometimes referred to by the symbol ↵ or as the Enter key.

**Del**

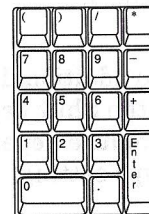
The Del (Delete) key, located just to the right of the top row of the main keyboard, deletes the character at the cursor position. Any characters to the right of the cursor move to the left.

**Help**

The Help key, located to the right of the Del key, is a program-defined key that applications can use to provide additional information or user assistance while a program is running.

**Arrow Keypad**

The four arrow keys are grouped in a small keypad at the lower right side of the keyboard, between the main keyboard and the numeric keypad. These keys control the movement of the cursor (up, down, left, and right) on the screen. The direction in which each key moves the cursor is indicated by the direction of the arrow on the key. These keys can also have special functions with different qualifier keys, depending on the application.

**Numeric Keypad**

The numeric keypad is located to the far right of the keyboard. The keys are arranged in a calculator layout to facilitate numeric data entry. The numeric and arithmetic symbol keys on the keypad are equivalent to the numeric and arithmetic symbol keys on the main keyboard.

In many cases, you can use the Enter key on the numeric keypad just as you use the Return key on the main keyboard to transmit data and commands to the computer. The keypad can be redefined for special functions by some applications (as can the whole keyboard).

The legends on the front of many of the numeric keypad keys, such as PgDn and Home, are normally not applicable to Amiga programs. The indicated functions are available only when running MS-DOS on a PC emulator, or within certain PC-based applications.

**When using the keyboard:**

- The layout or mapping of characters to the keys is determined by the Input Preferences editor's Keyboard Type setting. This typically varies by country.
- Keys can be redefined by an application to have special functions. If you notice unexpected responses to some keystrokes (especially when switching between windows and screens running different applications) this can be the reason.

For specifics on how an application affects the keyboard, see the application's manual.

- Depending on the application, certain key combinations can have special meaning. For example, the keys may need to be pressed simultaneously or one after the other.
- Many keys on the keyboard repeat for as long as they are held down.
- You cannot interchange the numeral 0 and the uppercase letter O, or the numeral 1 and the lowercase letter l.

**Note** International keyboards have two additional keys on the main keyboard, located near the Shift key positions. The characters they produce depend on the current Preferences Keyboard Type setting.

### ***Keyboard Equivalents to the Mouse***

You can use the keyboard as well as the mouse to move the pointer around the screen and select icons, gadgets, and windows.

In programs that mainly use the keyboard to enter information, this can be faster and more convenient. The keyboard equivalents are also useful if your mouse is malfunctioning, or when you need to make extremely precise pointer movements.

The following key combinations are available from any application, to let you perform mouse movement and button clicks with the keyboard.

<b>Move left</b>	Either Amiga key+left arrow
<b>Move right</b>	Either Amiga key+right arrow
<b>Move up</b>	Either Amiga key+up arrow
<b>Move down</b>	Either Amiga key+down arrow
<b>Left mouse button</b>	Left Alt+left Amiga
<b>Right mouse button</b>	Right Alt+right Amiga

**Note** In the arrow key combinations in this table, pressing Shift at the same time as the other two keys makes the pointer move faster.

## **Chapter 3**

# ***Expanding Your System***

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You can expand your system by installing motherboard options, expansion boards, and optional storage devices. Before you expand your system, use the information provided in this chapter to:

- Understand the internal expansion options for the Amiga
- Understand the safety requirements that must be followed to protect yourself and your equipment
- Remove the system unit cover, front panel, and front panel slot blanks
- Locate the main system components
- Set jumpers

## ***Internal Expansion Options***

The Amiga can accommodate several types of internal expansion options:

- Memory expansion
- Processor modules
- Zorro bus (Zorro III/Zorro II) expansion boards
- Bridgeboard PC emulator boards
- Video expansion boards
- 3.5-inch drives
- 5.25-inch drives

## Memory Expansion

The amount of random access memory (RAM) in the A4000T is expandable to 18 megabytes (18 MB) on the motherboard using single inline memory module (SIMM) sockets. All motherboard RAM is 32-bit memory directly addressable by the operating system.

The Amiga's memory consists of Chip RAM and Fast RAM. Chip RAM is memory shared by the microprocessor and the Amiga's custom chips. Fast RAM is memory used exclusively by the processor. Your Amiga contains 2 MB of Chip RAM installed on the motherboard. Up to 16 MB of Fast RAM can be installed in the A4000T's SIMM sockets.

Fast RAM can be added quickly and inexpensively by installing standard SIMM units in the four motherboard sockets. Additional memory can be added using the Zorro bus slots, if desired. Replacement processor modules also can accommodate RAM.

## Processor Expansion

The A4000T central processing unit (CPU) is mounted on a removable processor module that plugs into the 200-pin CPU expansion slot. This is a local bus slot provided specifically to support expansion options that must be tightly coupled to Amiga motherboard memory.

The standard processor module contains a 25 - 50 MHz Motorola 680x0 series microprocessor. To upgrade to a faster processor, additional high-speed memory, or other performance enhancements, the original A4000T processor module is removed and replaced.

## Zorro Bus Expansion

There are five 100-pin general purpose expansion slots in the A4000T. These use the Zorro III Amiga expansion bus, which yields high performance with a wide variety of internal expansion devices, including high resolution framebuffer, video and audio digitizers, RAM, and multiport I/O boards.

The Zorro III slots are 100% compatible with the many Zorro II expansion boards already available for the Amiga. Use of Zorro II expansion boards does not lower the performance of Zorro III boards that can also be installed.

## Bridgeboard Expansion

A Bridgeboard is a full-length Zorro II board available from AMIGA Technologies that allows Amiga systems to run PC software. It occupies both the 100-pin Zorro bus connector and the 98-pin PC/AT connector that is in line with it. With a Bridgeboard installed, the other three slots with PC/AT connectors can accept most standard PC/XT and PC/AT drive controllers, VGA/SVGA video adapters, I/O boards, and other options for the Bridgeboard's use. Because the Amiga is multitasking, an Amiga equipped with a Bridgeboard can run MS-DOS and Windows programs at the same time as Amiga programs.

**Note** With a Bridgeboard installed, the Amiga expansion slots that are in line with unoccupied PC/AT slots can still be used by the Amiga expansion boards.

## Video Expansion

The Amiga video expansion slots accommodate internal installation of graphics and video options. Using these slots keeps all video circuitry in the metal housing of the Amiga's main unit, helping to minimize RF interference problems.

Each video slot is in line with one Zorro bus expansion slot. This allows a video expansion board to incorporate, or be easily connected to, a standard Zorro II/III expansion board. Access to both the video slot and the Zorro bus adds versatility, enabling high-speed data transfer between the Amiga's main memory and a graphics output device.

The video slot connectors have been extended compared with previous Amiga models to make graphics signals produced by the AGA custom chip set available. Most boards produced for the

earlier video slots are still electrically compatible with the newer slots. The rear bracket of video boards produced for earlier Amigas, however, may require some modification to fit the A4000T chassis.

The analog RGB output of the Amiga is compatible with worldwide television standards (both North American NTSC and European PAL). This makes the Amiga particularly well suited to video and multimedia options, such as a genlock, digitizer, composite encoder, or character generator.

If you install a AMIGA Technologies A2300 genlock in an A4000T, a video input source (video cassette recorder, video camera) must always be connected to the system with the power on before you turn on or reboot the A4000T. Since some genlock devices require a video signal to initialize the system timers, the video source may need to be running (playing a recording) before booting the A4000T.

### ***Drive Expansion***

The Amiga has ample space and mounting hardware for internal drive expansion, allowing both 3.5-inch and 5.25-inch devices.

The A4000T can accommodate up to seven devices internally. The five front bays (one already filled by the internal floppy drive) have external access; the one in the rear position is suitable for a full-height hard drive that does not require external access.

The A4000T contains a SCSI-2 host adapter, which controls additional internal and external storage equipment, such as CD-ROM drives, tape drives, and scanners. The A4000T also contains a built-in Intelligent Drive Electronics (IDE) hard disk controller, to which one or two devices can be connected internally via the ribbon cable included.

You can install a second floppy drive (DF1:) in a front bay.

### ***Before You Begin***

Select a clean, well lighted work space. Place your system unit on a stable surface large enough to accommodate the components of the system unit you remove and replace.

As you work with your system you must:

- Protect yourself from electrical shock by turning the Amiga off, unplugging, and disconnecting all cables before removing the cover.
- Protect your system from electrostatic discharge (ESD).

### ***ESD Precautions***

Integrated circuit (IC) chips are sensitive to static electricity. When handling electronic components containing IC chips, including expansion boards and RAM modules, always take precautions to reduce the chances of electrostatic discharge (ESD) harming the components.

Touching a nearby grounded metal surface before touching a component drains static electricity, reducing the likelihood of ESD damage.

To protect your system from ESD, observe these precautions.

- Do not remove any computer components that are wrapped in anti-static packing material until you are ready to install them.
- Discharge any static buildup as you work by periodically touching an unpainted metal surface. This is particularly important before you unpack a new computer component.
- Handle each component carefully. Avoid touching card edge connectors, electrical component connectors, and contact points.

### ***Installing Internal Options***



**Warning**

Installation of internal options should be performed by an authorized AMIGA Technologies dealer/service center or by a knowledgeable technician. AMIGA Technologies will not be liable for any damages or injuries caused by improper installation of expansion equipment.

This section and following chapters give general information on installing options in the Amiga. Installing an option inside the Amiga always includes:

1. Turning off the Amiga and disconnecting it from the AC power outlet.
2. Disconnecting the mouse and all other external peripherals.
3. Removing the Amiga's cover.
4. Following the expansion device manufacturer's specific installation instructions.
5. Reassembling the Amiga and replacing the cover.
6. Reconnecting peripherals and power, performing any software installation or configuration that is necessary, and testing the device for proper operation.

### Removing the Cover

To remove the Amiga's cover:

1. Turn off the power button and remove all connecting cables.
2. As you face the computer's back panel, lay the computer on its left side and remove the pedestal feet. The power connectors will be on your left.
3. Use a Phillips-head screwdriver to remove the seven screws at the rear of the main unit.
4. Grasp the cover on both sides as illustrated in Figure 3-1, and slide it toward you and up.

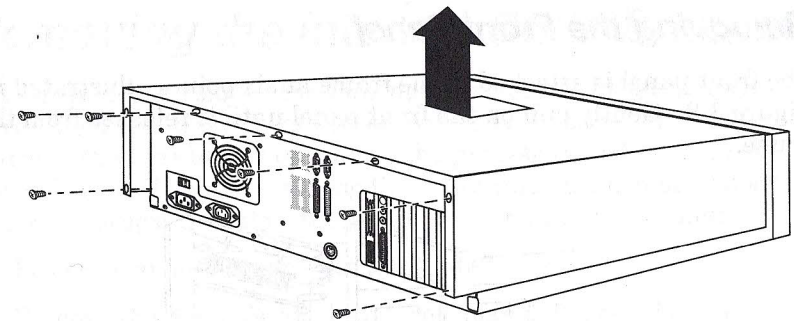


Figure 3-1. Removing the A4000T Main Unit Cover

Figure 3-2 illustrates the location of the major components in the A4000T.

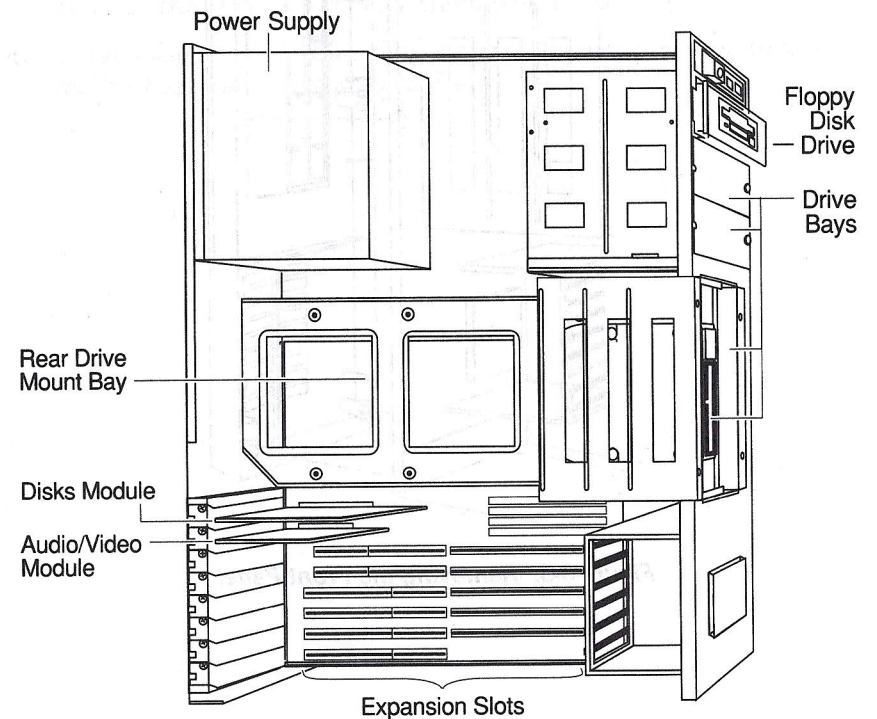


Figure 3-2. A4000T Internal Components

## Removing the Front Panel

The front panel is attached to the frame at six points, illustrated in Figure 3-3. Gently pull on the front panel until it releases from the frame.

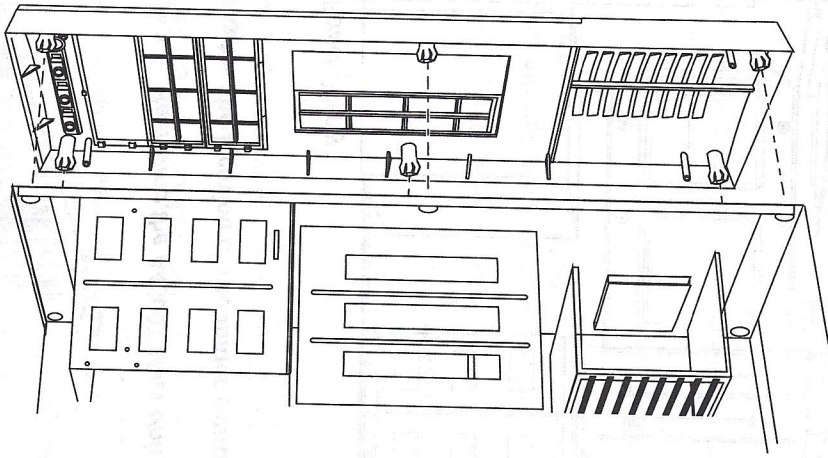
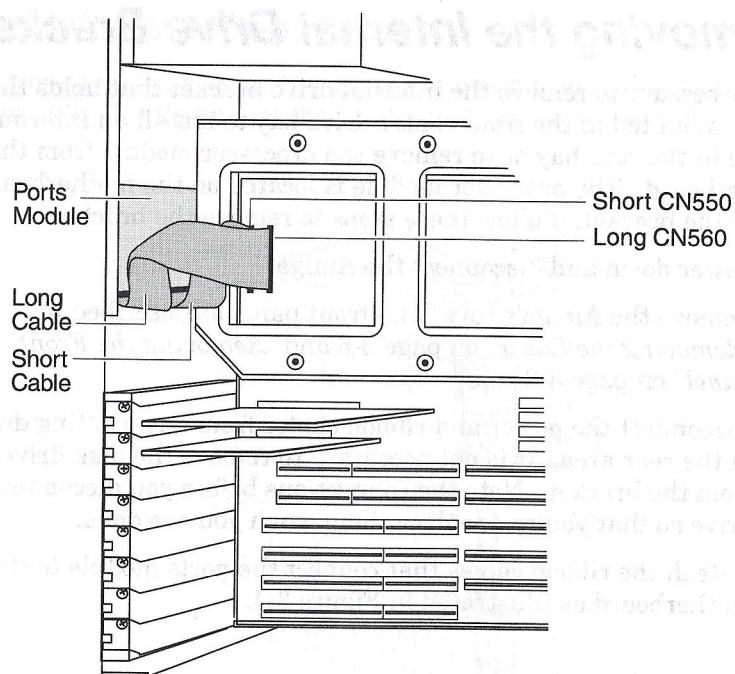


Figure 3-3. Removing the Front Panel

## Removing the Internal Drive Bracket

It is necessary to remove the internal drive bracket that holds the drives mounted in the front center drive bay to install an internal device in the rear bay or to remove the processor module from the motherboard. The processor module is located on the motherboard under the bracket. Follow these steps to remove the bracket:

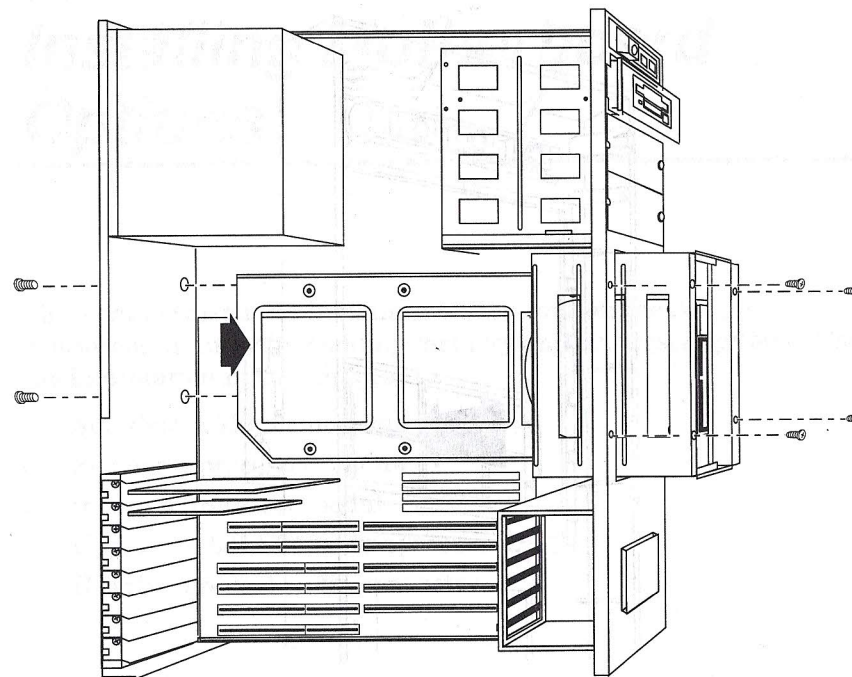
1. Power down and disconnect the Amiga.
2. Remove the Amiga's cover and front panel as described in "Removing the Cover" on page 3-6 and "Removing the Front Panel" on page 3-8.
3. Disconnect the power and ribbon cables from any existing drives in the rear area. It is not necessary to remove the disk drive(s) from the bracket. Note the connections before you disconnect a drive so that you can replace them when you are done.
4. Detach the ribbon cables that connect the ports module to the motherboard as illustrated in Figure 3-4.



**Figure 3-4. Disconnecting the Ports Module Cables**

**Note** When you reconnect the ports module cables, be sure to attach the cables to the correct connectors. The short cable links the lower connector on the ports module to the connector labeled Short CN550. The long cable links the top connector on the ports module to the connector labeled Long CN560.

5. Remove the screws holding the internal drive bracket to the system case as shown in Figure 3-5.



**Figure 3-5. Removing the Internal Drive Bay Bracket**

6. Slide the drive bracket out of the system case.

### Removing a Front Panel Slot Blank

Each externally accessible expansion bay is covered by a front panel slot blank. Slot blanks are held in place by small tabs. Remove the appropriate slot from the front panel by pressing on the inside center of the blank as illustrated in Figure 3-6.



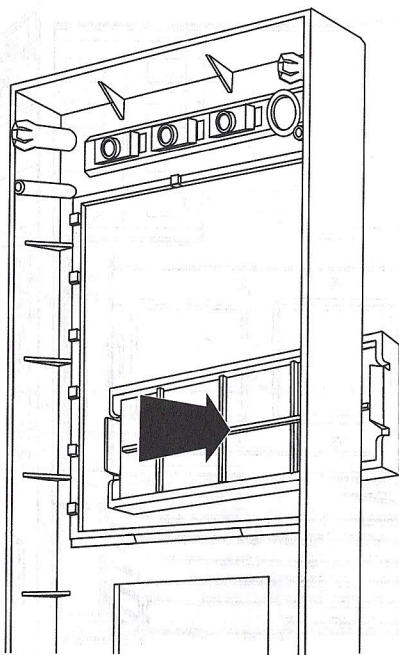


Figure 3-6. Removing a Slot Blank

### Setting Jumpers

Installing a new board or device can also require setting jumpers on the board or device or on the motherboard. Jumpers are small components on a circuit board that control a computer's or expansion unit's hardware configuration. It is sometimes necessary to set one or more jumpers to change the default configuration of the computer, or to add an internal expansion device. For detailed information on jumpers and instructions for setting them, see Appendix C.

## Chapter 4 Installing Motherboard Options

This chapter discusses installation of options on the Amiga motherboard, including adding memory and processor options. Use the information in this chapter to:

- Add Fast RAM memory modules
- Remove a processor module
- Install a processor module
- Upgrade a 68LC040 microprocessor
- Use the internal audio connector

Figure 4-1 illustrates the location of SIMM sockets and the CPU slot on the A4000T motherboard.

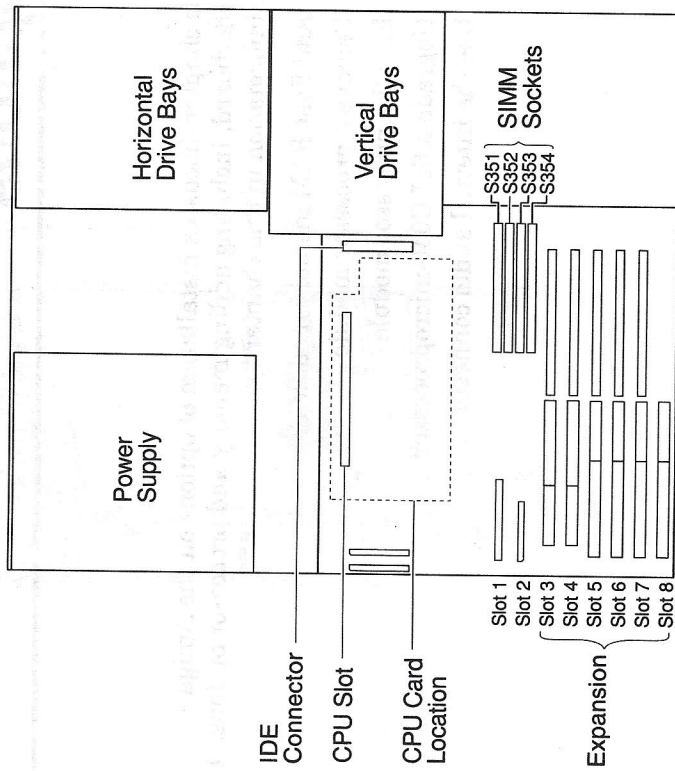


Figure 4-1. Motherboard Components

## Adding Memory

The four SIMM sockets provided on the motherboard are used to hold Fast memory.

See Appendix A for detailed information on the required parameters of acceptable SIMM modules.

**Note** Fast memory can also be added using the Zorro bus and CPU slot boards; however, using the motherboard sockets leaves expansion slots free for other options.

The following sections explain memory options and considerations, including:

- Fast versus Chip memory
- SIMM memory size
- Fast RAM bank locations
- Page mode versus static-column mode
- Installing SIMM units
- Testing memory installation

## Fast Memory

Fast memory (also called Fast RAM) is general purpose non-Chip memory that the microprocessor can access at full speed. The A4000T has four SIMM sockets for Fast RAM expansion, located between the Zorro III expansion slots and the CPU module.

### Fast RAM Banks and SIMM Size

The four Fast RAM sockets are labeled on the motherboard as S351, S352, S353, and S354. If your Amiga already has one or more sockets occupied, place additional SIMMs in the next higher numbered sockets.

The Fast RAM SIMMs can be one of four memory sizes: one megabyte (1 MB), two megabyte (2 MB) four megabyte (4 MB), or eight megabyte (8 MB). By filling the indicated sockets with the appropriate size SIMMs, the following Fast RAM configurations are possible:

Amount of Fast RAM	SIMM Size	Sockets Filled	SIMM Size Jumper
1 megabyte	1 MB	S351	256K
2 megabytes	1 MB	S351, S352	256K
2 megabytes	2 MB	S351	256K
3 megabytes	1 MB	S351, S352, S353	256K
3 megabytes	2 MB	S351	256K
	1 MB	S353	
4 megabytes	1 MB	S351, S352, S353, S354	256K
4 megabytes	2 MB	S351	256K
	1 MB	S353, S354	
4 megabytes	1 MB	S351, S352	256K
	2 MB	S353	
4 megabytes	2 MB	S351, S353	256K
4 megabytes	4 MB	S351	1M
8 megabytes	4 MB	S351, S352	1M
8 megabytes	8 MB	S351	1M
12 megabytes	4 MB	S351, S352, S353	1M
12 megabytes	8 MB	S351	1M
	4 MB	S353	
16 megabytes	4 MB	S351, S352, S353, S354	1M
16 megabytes	8 MB	S351	1M
	4 MB	S353, S354	
16 megabytes	4 MB	S351, S352	1M
	8 MB	S353	
16 megabytes	8 MB	S351, S353	1M

The physical packaging of Fast RAM SIMMs can be single-sided or double-sided. The main advantage of double-sided SIMMs is to install 16 MB while leaving socket S354 empty, allowing room for an oversized expansion board in the first video slot.

### SIMM Size Jumper

There is one jumper, SIMM Size, that is associated with Fast RAM. It must be set correctly according to the size of the installed SIMMs. Its two positions are labeled 1M for four or eight megabyte SIMMs, and 256K for one or two megabyte SIMMs. See Appendix C for the jumper's location on the motherboard.

### Installing Memory Modules

To install a SIMM in one of the RAM sockets:

1. Disconnect the Amiga and remove the cover, as described in Chapter 3.
2. If necessary, remove any expansion boards in the expansion slots.
3. Locate the proper SIMM socket.
4. Remove the existing SIMM if necessary.
5. Use the orientation notch on the SIMM module to line up the module at an angle in the retaining clip, as illustrated in Figure 4-2.

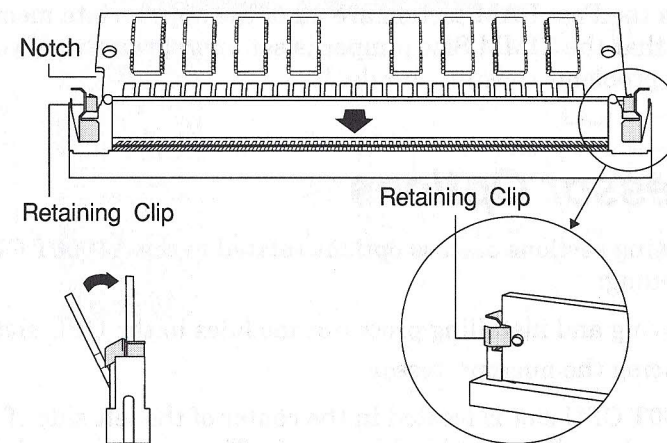


Figure 4-2. Inserting a SIMM into a Socket

6. Insert the SIMM, folding it forward into the socket. Then gently rock it from side to side to seat it in the socket. Pull the SIMM forward to secure it in the socket. You should hear a faint snap as the retaining clips latch the SIMM in its socket.
7. Change the setting of the SIMM Size jumper if necessary.
8. Replace any expansion boards you removed.
9. Replace the Amiga's cover.
10. Reconnect peripherals and turn on the system.

### Testing Memory Installation

After installing additional memory and replacing the Amiga's cover, check to be sure that the memory is functioning properly. Normally, any new RAM is automatically recognized by the operating system when the Amiga is turned on. The Workbench screen's title bar displays the amounts of available Chip (graphics) and Fast (other) memory.

If the Workbench title bar display does not reflect the memory that you installed or if the Amiga does not boot, there is a problem. Turn off the Amiga, disconnect and open it, and check that the SIMMs are the correct type, that all are seated in the proper banks, that the SIMMs in the Fast RAM section are all of the appropriate memory size, and that the SIMM Size jumper is set appropriately. If you still have problems consult your dealer.

## Processor Options

The following sections discuss options related to the A4000T CPU slot, including:

- Removing and installing processor modules in the CPU slot
- Replacing the microprocessor

The A4000T CPU slot is located in the center of the left side of the motherboard, as illustrated in Figure 4-1. The processor module occupies this slot, mounted horizontally parallel with the

motherboard. The processor module contains the Motorola 680x0 series microprocessor and associated circuitry.

### Removing a Processor Module

To modify or replace the processor module, you must remove it from the slot. This requires removing the Amiga's front panel and internal drive bay assembly to reach the CPU slot. See Chapter 3 in this manual for directions on how to do so.

The processor module is connected to the motherboard with the slot connector and four standoff supports, as illustrated in Figure 4-3. The circles show the location of the standoff supports. To remove a processor module, grasp the module at either end of the slot connector close to the standoff supports and lift. Lift the connector side of the module first, then lift at the remaining supports. Lifting elsewhere on the processor module can crack the module or its connector.

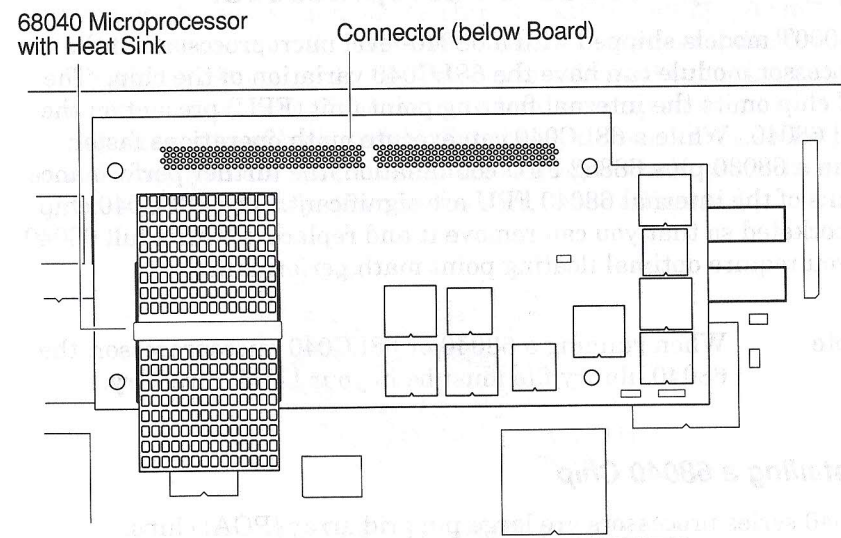


Figure 4-3. Removing Processor Module

## Installing a Processor Module

To replace a processor module or to install a new processor module:

1. Align the processor module so that its 200-pin connector is directly over the CPU slot connector on the motherboard. Be sure that the standoff supports are correctly placed.
2. When it is correctly aligned, press down on the processor module directly over the connector. Firmly seat the center of the connector and press down along the entire length of the connector. Do not press down elsewhere on the processor module. If it does not seat in the slot connector, it is not properly aligned.
3. If there are any other connections to be made for the processor module, make them as called for in the module's installation directions.

## Upgrading a 68LC040 Microprocessor

A4000T models shipped with a 68040-level microprocessor on the processor module can have the 68LC040 variation of the chip. The LC chip omits the internal floating point unit (FPU) present on the full 68040. While a 68LC040 can execute math operations faster than a 68030 plus 68882 FPU combination, the further performance gains of the internal 68040 FPU are significant. The 68LC040 chip is socketed so that you can remove it and replace it with a full 68040 if you require optimal floating point math performance.

**Note** When running a 68040 or 68LC040 microprocessor, the 68040.library file must be in your LIBS: directory.

## Installing a 68040 Chip

68040 series processors are large pin grid array (PGA) chips. Removing an existing 68LC040 chip requires a suitable chip puller and a flat blade screwdriver.

**Caution** Do not attempt to remove or install a microprocessor without the proper tools or you could damage both the processor module and the chip. If you do not have the proper tools or supplies, this upgrade should be performed by your AMIGA Technologies dealer/service center or a trained technician.

1. Remove the processor module from the CPU slot.
2. Remove the heat sink from the 68LC040 chip by inserting a flat blade screwdriver vertically on one side of the heat sink retaining clip and twisting the screwdriver to release the clip.
3. Using the chip puller, carefully remove the chip, taking care not to bend any pins.
4. When you have removed the chip, embed its pins in a piece of conductive foam to protect them.
5. To install the 68040 chip, you must determine the location of pin 1 on the socket and on the chip you are installing. A small 1 printed on the module near one corner of the socket indicates the pin 1 location. Pin 1 on the chip is indicated by an L-shaped mark on one corner of the chip. Orient the chip so that the pin 1 locations of both match. Set the chip down in the socket, and when you are sure all pins are resting in their socket holes, press the chip firmly down in the socket, as in Figure 4-4.

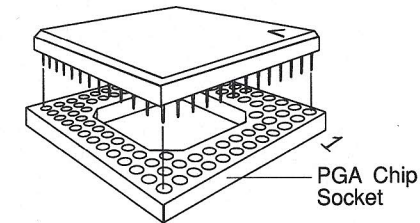


Figure 4-4. Inserting 68040 Chip

6. When the chip is seated in the socket, place the heat sink on top of the chip and snap the retaining clip over it onto the chip socket tabs.

7. Replace the processor module in the CPU slot.
8. Replace the cover on the Amiga, reconnect power and peripherals, and test the system.

## Chapter 5

# Installing Expansion Boards

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This chapter explains installation of Zorro III expansion boards (such as Bridgeboard, PC/XT and PC/AT, video, and I/O boards) in the slots on the A4000T motherboard. Use the information in this chapter to:

- Identify the slot connectors on the motherboard
- Install an expansion board
- Remove an expansion board

Zorro bus expansion boards install horizontally, fitting into 100-pin slot connectors on the motherboard (Figure 5-1). Most Amiga expansion boards can go in any slot, with these exceptions:

- A board that requires the video slot connectors must go in one of the two video slots (slot 5 or 6) below the audio/video module.
- A Bridgeboard must go in one of the three slots that have PC/AT slot connectors in line with Amiga slot connectors (slots 2, 3, or 4). PC expansion boards can reside in any of the three remaining PC/AT slots.

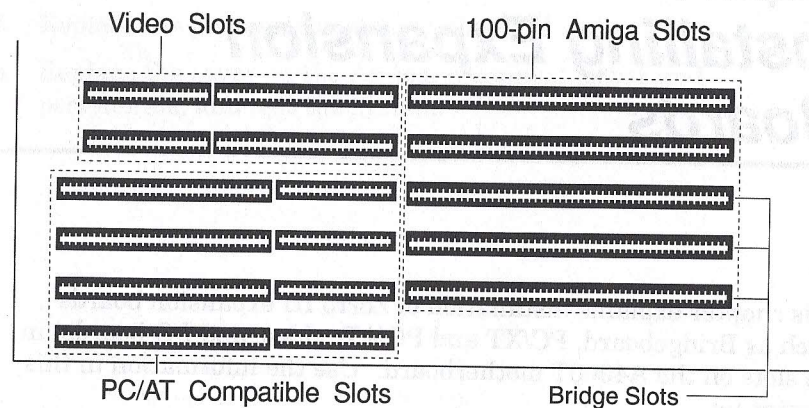


Figure 5-1. A4000T Expansion Slots

Expansion boards are supported by a grooved guide at the front of the unit, and held in by a screw that secures the rear mounting bracket of the board to the Amiga's chassis. A plate covers the rear access port of empty slots.

## Installing an Expansion Board

To install an expansion board:

1. Remove the Amiga's cover as described in Chapter 3.
2. Set any jumpers on the expansion board that must be adjusted according to the manufacturer's documentation.
3. Turn the Amiga so that the front of the system is on your right.
4. Remove the rear cover plate of the slot into which you are installing the board. Save the screw to secure the board. You should also keep the plate in case you need it in the future.
5. Slide the expansion board into the slot as illustrated in Figure 5-2. Make sure that the edge of the board is in the proper grooved guide and that the edge connectors are aligned correctly. Press firmly, but do not use excessive force, to seat the edge connectors fully into the slot.
6. Reinstall the cover plate screw to hold the board in place.

7. Connect any wires or ribbon cables that need to be attached to the board, as the board manufacturer's manual specifies.
8. Replace the Amiga's cover.
9. Reconnect peripherals and power and test the board.

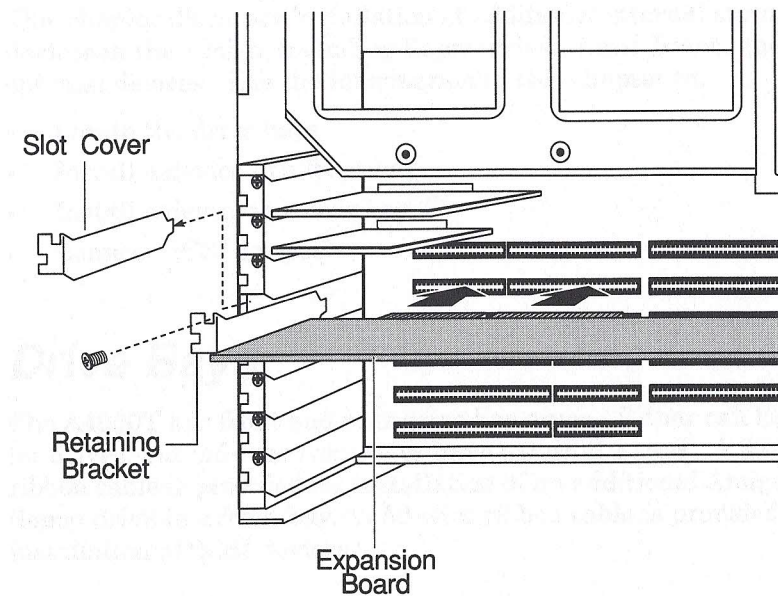


Figure 5-2. Removing the Cover Plate and Installing the Expansion Board

To remove an installed expansion board:

1. Remove the Amiga's cover.
2. Be sure the front of the system is on your right.
3. Disconnect any wires or ribbon cables that are connected to the expansion board.
4. Remove the screw securing the expansion board's rear bracket to the Amiga's chassis.

5. Grasp the expansion board firmly near either end, and pull toward you. Rock the board slightly from side to side, not up and down, to loosen it in the slot.
6. If not installing another expansion board in the vacant slot, replace the slot's cover plate and secure it with the screw.

## Chapter 6

# Installing Optional Storage Devices

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This chapter discusses installation of additional internal storage devices in the Amiga, including floppy drives, hard drives, and other optional devices. Use the information in this chapter to:

- Locate the drive bays
- Install a device in a front bay
- Install a device in a rear bay
- Connect SCSI devices

## Drive Bays

The A4000T has front and rear drive bay areas. Either can be used for drives, but only the front bays have external access. A 34-wire ribbon cable is provided for installation of an additional Amiga floppy drive in a front bay. A 50-wire ribbon cable is provided for installation of SCSI devices.

## Front Bays

In the front of the main unit are three horizontal and two vertical drive bays which can contain either 3.5-inch or 5.25-inch devices. All have external access, for devices such as floppy, tape, CD-ROM, and removable media drives that require it. A 3.5-inch device requires a 5.25-inch mounting bracket for installation. Two of these bays are already occupied by the Amiga's internal floppy drive and a SCSI hard disk drive.



The power supply wiring harness provides extra 4-pin power connectors for internal devices.

## Rear Bays

In the rear of the main unit below the power supply is the hard drive storage area, which can accept only devices that do not require external access. This area can take one full-height drive.

## Front Bay Installation

To install a drive in one of the front bays:

1. Turn off and disconnect the Amiga.
2. Remove the Amiga's cover as described in Chapter 3.
3. Remove the front panel and appropriate front panel slot blanks as described in Chapter 3.
4. If you are installing a SCSI device, see "Connecting SCSI Devices" on page 6-7 for SCSI address and termination information.

If you are installing an IDE hard drive, set its drive unit jumper for unit 1 so that it does not conflict with the existing drive, unit 0. Then set the unit 0 jumpers to indicate that there is a slave device present. Refer to the drive manufacturers' instructions for jumper configuration.

5. Disconnect the power and ribbon cables from the existing drives in the front area (see Figure 6-1). Note the orientation of the connectors before you remove them so that you can replace them properly when you are done.

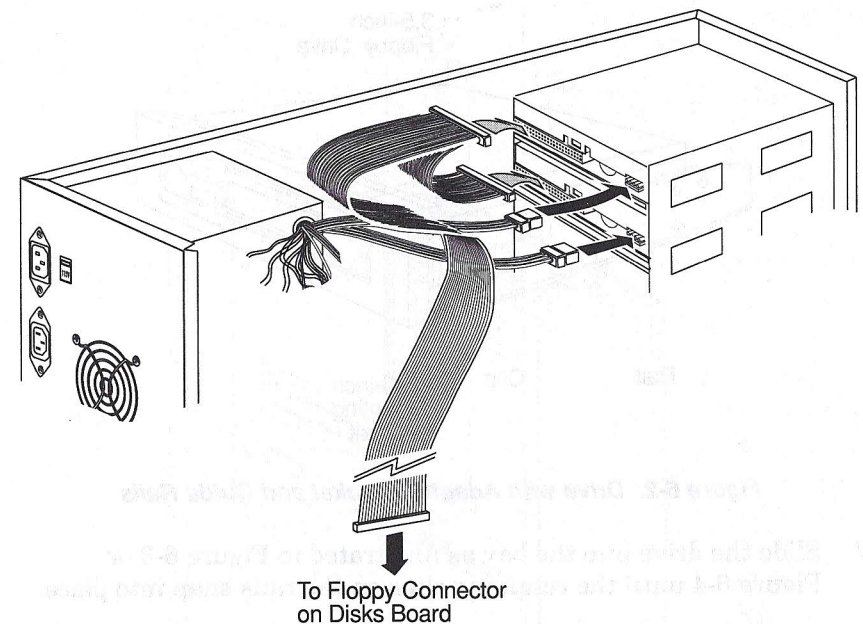
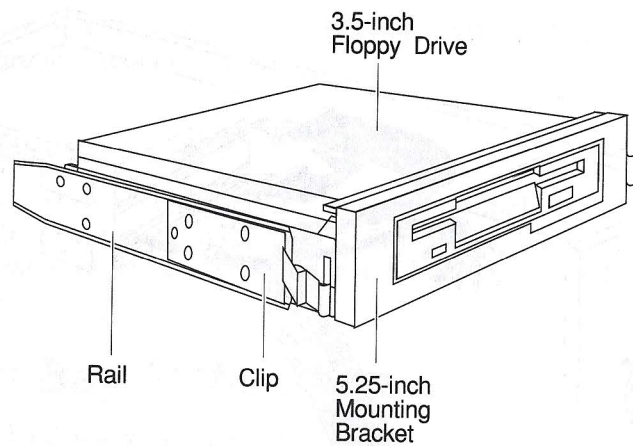


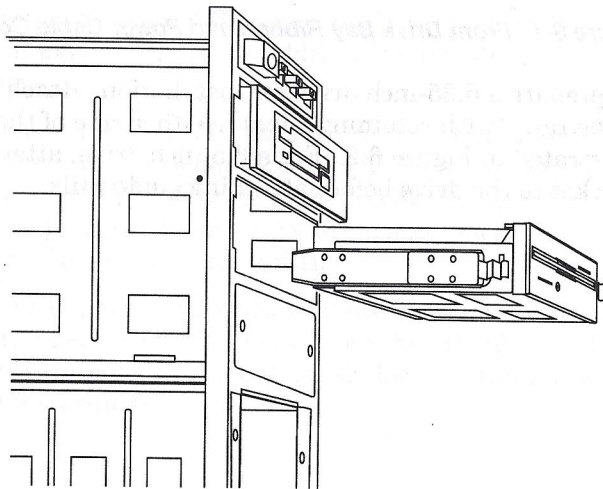
Figure 6-1. Front Drive Bay Ribbon and Power Cable Connections

6. To prepare a 5.25-inch drive for installation, attach the provided guide rails (with retaining clips) to either side of the drive, as illustrated in Figure 6-2. For a 3.5-inch drive, attach an adapter bracket to the drive before attaching guide rails.

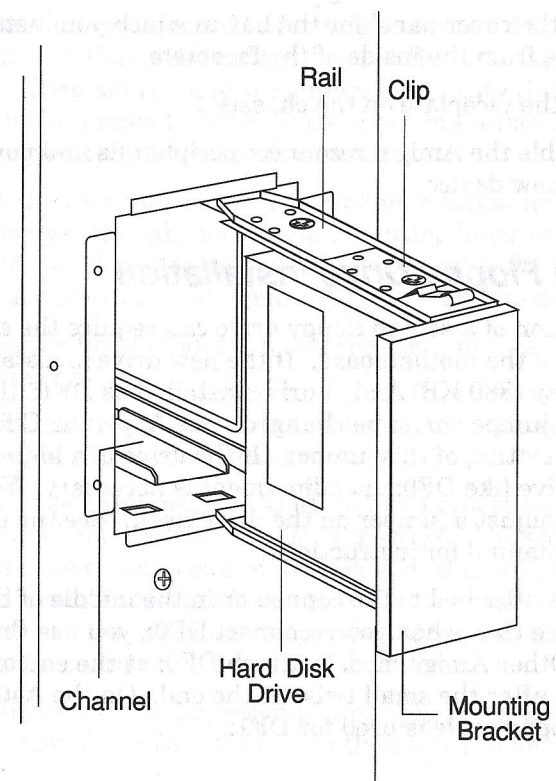


**Figure 6-2. Drive with Adapter Bracket and Guide Rails**

7. Slide the drive into the bay as illustrated in Figure 6-3 or Figure 6-4 until the retaining clips on the rails snap into place.



**Figure 6-3. Installing a Device in a Horizontal Bay**



**Figure 6-4. Installing a Device in a Vertical Bay**

8. Connect the drive's power and ribbon cables. Be sure the orientation of both cables is correct. The pin 1 side of a ribbon cable has a colored stripe along the edge or marked on the connector. The pin 1 end of a drive connector is usually indicated by a small 1 printed near it on the drive circuit board or with a square solder pad rather than a round one. The pin 1 end of the cable connector should be at the pin 1 end of the drive connector. The power connectors are shaped to prevent you from inserting them the wrong way.
9. Change any jumpers as necessary. See "Notes on Floppy Drive Installation" below.

10. Remove the cover panel for the bay in which you installed the new drive from the inside of the faceplate.
11. Replace the faceplate on the chassis.
12. Reassemble the Amiga, reconnect peripherals and power, then test the new device.

### Notes on Floppy Drive Installation

The installation of a second floppy drive can require the adjustment of a jumper on the motherboard. If the new drive is a standard double-density (880 KB) Amiga drive installed as DF1:, then the DF1: Enable jumper must be changed. See Appendix C for the location and setting of this jumper. If the drive is a high capacity (1.76 MB) drive like DF0:, no adjustment is necessary. You also may need to adjust a jumper on the drive itself. See the drive's installation manual for instructions.

Drive DF0: is attached to the connector in the middle of the ribbon cable. Be sure that when you reconnect DF0:, you use this connector. Other Amiga models attach DF0: at the end of the floppy ribbon cable, after the small twist at the end. On the A4000T, this end of the floppy cable is used for DF1:.

Note See "Notes on Hard Drive Installation" on page 6-7 for information on hard drives

### Rear Bay Installation

To install a drive in the rear bay:

1. Power down and disconnect the Amiga.
2. Remove the Amiga's cover, front panel and internal drive bracket as described in Chapter 3.
3. If you are installing a SCSI device, see "Connecting SCSI Devices" on page 6-7 for SCSI address and termination information.

If you are installing an IDE hard drive, set its drive unit jumper for unit 1 so that it does not conflict with the existing drive, unit 0. Then set the unit 0 jumpers to indicate that there is a slave device present. Refer to the drive manufacturers' instructions for jumper configuration.

4. Attach the new unit to the drive mount bracket and secure it with screws through the bottom mounting holes of the device. If any additional mounting hardware came with the new unit, install it according to the manufacturer's directions.
5. Replace the bracket and drive in the main unit, and secure it with its six screws.
6. Connect the drives' power and ribbon cables. Be sure the orientation of ribbon cables is correct.
7. Connect the ports module cables to the motherboard. Be sure to attach the cables to the correct connectors. The short cable links the lower connector on the ports module to the connector labeled Short on the motherboard. The long cable links the top connector on the ports module to the connector labeled Long on the motherboard.
8. Reassemble the Amiga, reconnect peripherals and power, run HDToolbox (for hard drives), and then test the new device.

### Notes on Hard Drive Installation

Most newly installed hard drives require additional setup before they are usable. Follow the drive manufacturer's instructions on drive setup carefully. Refer to the *Amiga Hard Drive User's Guide* for information on partitioning, formatting, and using hard drives and AMIGA Technologies hard drive software on the Amiga.

### Connecting SCSI Devices

The A4000T ships with a standard SCSI host adapter. You can connect up to seven external and internal SCSI devices—including hard drives, scanners, tape units and CD-ROMs—through

connectors on the disks module (in expansion slot 8) illustrated in Figure 6-5.

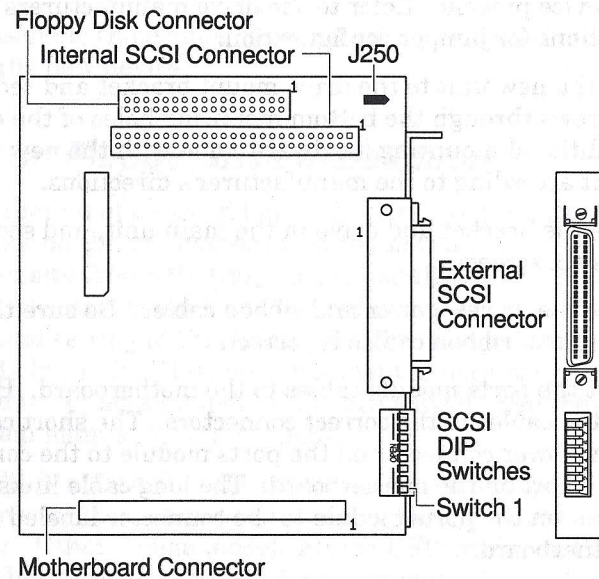


Figure 6-5. Disks Module

For internal SCSI devices, connect one device to the internal connector (CN210) on the disks module with the ribbon cable provided, then connect additional internal SCSI devices in a chain from the first device with the ribbon cable.

For external devices, connect one device to the external SCSI connector on the disks module, then connect additional external SCSI devices in a chain from the first device.

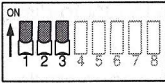
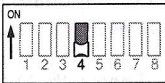
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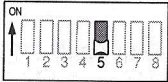
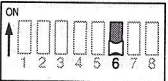
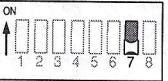
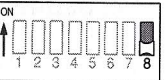
- Setting SCSI DIP switches
- SCSI addresses
- SCSI device termination

## Setting SCSI DIP Switches

A DIP switch is a component on a board that contains one or more switches with two settings: OFF (open) and ON (closed). The disks module contains a DIP switch with eight switches. The default setting for all eight switches is OFF.

The following table explains the purpose of each switch; note that switches 1, 2 and 3 are used in combination. A black and white rectangle indicates the switch function being described. A solid white rectangle indicates the switches you can ignore for that function.

Switch	Default Setting	Function
SCSI Address	1, 2, 3: OFF	Set the SCSI address for the host adapter. The default SCSI address is 7, with switches 1, 2, and 3 set to OFF. See "SCSI Addresses" on page 6-11 for more information.
		
SCSI Fast Bus	4: OFF	OFF indicates that the SCSI Fast Bus feature is enabled. Set this switch to ON if none of your SCSI devices supports SCSI Fast Bus.
		If the device does not work properly with SCSI Fast Bus enabled, check SCSI termination or try a shorter cable between the board and the device. If this does not correct the problem, set switch 4 to ON.

Switch (cont'd)	Default Setting (cont'd)	Function (cont'd)
<b>Short/Long Spinup</b>	5: OFF 	<p>OFF indicates that your system uses the standard spinup (booting) time. Set this switch to ON to request a longer booting period.</p> <p>If one of your SCSI devices has a long power-on cycle, the Amiga may not recognize it during the standard booting period. If this does not correct the problem, set switch 5 to ON.</p>
<b>Synchronous Mode</b>	6: OFF 	<p>OFF indicates that the synchronous mode feature is enabled. Set this switch to ON to disable synchronous mode.</p> <p>Synchronous mode does not require acknowledgment for every byte transmitted, which can mean improved response time with most SCSI devices.</p>
<b>External SCSI Termination</b>	7: OFF 	<p>OFF indicates that you do not have any external devices. This activates the terminator on the motherboard since this is one end of the SCSI bus.</p> <p>Set this switch to ON when you install an external device, then set external termination as described on page 6-12. This disables the termination on the motherboard since it is now in the middle of the SCSI bus (not at the end).</p>
<b>Logical Unit (LUN) Enable</b>	8: OFF 	<p>OFF indicates that only LUN 0 is recognized. Set this switch to ON to enable the system to recognize all LUNs.</p>

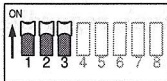
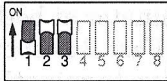
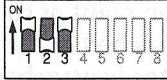
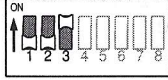
## SCSI Addresses

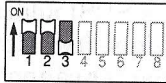
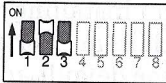
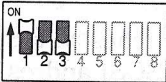
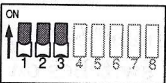
Each SCSI device controlled by the host adapter must have a unique identifier known as the SCSI address. The host adapter must also have a SCSI address. SCSI addresses range from 0 to 7 and must be unique (two devices cannot share an address; a device and the host adapter cannot share an address).

Before you begin installing SCSI devices, you must choose the SCSI address for each item. For example, select 7 as the address for the host adapter (the default address set at the factory), 0 and 1 for two internal devices, and 4 for an external device.

Jumpers or switches on a SCSI device determine the SCSI bus identification (SCSI address) for the device. Refer to the device documentation to set the SCSI address for each device.

As described under "Setting SCSI DIP Switches" on page 6-9, the first three DIP switches on the disks module determine the host adapter's SCSI address. You do not need to change these switches unless you want to change the address from the default setting (7). If you choose to change the SCSI address, set switches 1, 2 and 3 according to the following.

SCSI Address	Switch Settings	Switches 1-3
0	1: ON 2: ON 3: ON	
1	1: OFF 2: ON 3: ON	
2	1: ON 2: OFF 3: ON	
3	1: OFF 2: OFF 3: ON	

SCSI Address (cont'd)	Switch Settings (cont'd)	Switches 1-3 (cont'd)
4	1: ON 2: ON 3: OFF	
5	1: OFF 2: ON 3: OFF	
6	1: ON 2: OFF 3: OFF	
7 (default)	1: OFF 2: OFF 3: OFF	

## SCSI Device Termination

A chain of SCSI devices must have two termination points, one at either end of the chain of devices. A terminator indicates the end of the chain (bus) and protects the SCSI devices from potential failure. The terminator at each end of the chain must be of the same type (active or passive), regardless of whether the device is internal or external.

For the best results with SCSI Fast Bus enabled (switch 4 set to OFF), the terminator at both ends should be active, rather than passive. SCSI Fast Bus should not be enabled (set switch 4 to ON) if you use passive termination.

One termination point of the A4000T SCSI bus is the free end of the ribbon cable attached to the SCSI hard drive (if installed). An active terminator is attached to the free end of the ribbon cable. If you extend or replace this cable, move the terminator to the new end of the cable.

Before you install an internal device, remove or deactivate the termination on the device itself. Refer to the manufacturer's documentation for terminator information.

The other end of the SCSI bus is the last external device. It must also be properly terminated. Since the A4000T is shipped with no external SCSI devices, the external connector is terminated by the motherboard (see "External SCSI Termination", switch 7, on page 6-10).

If you have no external SCSI devices, switch 7 should be set to OFF. This enables the active termination on the motherboard, since this is the other end of the chain.

If you install external devices:

1. Set switch 7 to ON.
2. Remove or deactivate the termination from each external device (except for the last one). Refer to the manufacturer's documentation for termination information.
3. Terminate the last external SCSI device in the chain. For best results, use active termination. If the device has termination built in, you can enable it, or you can attach an external terminator.

## Appendix A

# Technical Specifications

---

<b>Clock Speed</b>	25 - 50 MHz
<b>Processor Module</b>	Motorola 680x0 series microprocessor Upgrade available for DSP/Cache
<b>Custom Chips</b>	AGA multichip coprocessor system for video, graphics, sound, and DMA
<b>Fast Memory</b>	Expandable using SIMM sockets on motherboard to a total of 16 MB (additional RAM can be added using expansion slots and/or processor module) Module specifications: Package           72-pin SIMM single- or double-sided Speed             80 nanoseconds or faster Type              page mode Organization     256K × 32 (1 MB) 512K × 32 (2 MB) 1M × 32 (4 MB) 2M × 32 (8 MB)  Note: SIMM units with the above characteristics but 36 bits wide rather than 32 are commonly available. SIMMs of this type can also be used in the Fast RAM banks; however, the extra bits are ignored.
<b>Chip Memory</b>	2 MB on motherboard
<b>ROM</b>	512 KB

<b>External Interfaces</b>	Keyboard	(5-pin female DIN)
	Mouse/Joystick	(DB9 male, two)
	Serial	(DB25 male, RS-232, PC-compatible)
	Parallel	(DB25 female, Centronics/PC-compatible)
	SCSI-2	(DB50 female, high density)
	Video	(DB23 male, analog RGB)
	Stereo audio	(RCA, two)
<b>Internal Interfaces</b>	Processor local bus	(200-pin, KEL connector)
	Amiga Zorro II/Zorro III expansion bus	(five 100-pin edge connectors)
	PC/AT compatible slots	(four 98-pin edge connectors, three in line with Amiga slots; one PC/AT only)
	AT IDE	(40-pin connector)
	SCSI-2	(50-pin connector)
	Floppy	(34-pin connector)
	Internal audio input	(3-pin connector)
<b>Video Slots</b>	Two 24-bit extended slots (36- and 54-pin edge connectors, in line with Amiga slots)	
<b>Keyboard</b>	Detachable; 94 keys US/96 keys international	
<b>Disk Drives</b>	One 3.5-inch double capacity drive standard (880 KB formatted maximum)	
	Internal mounting locations for: <ul style="list-style-type: none"> <li>• One full-height internal hard drive</li> <li>• Four additional 5.25-inch external-access drives (half-height)</li> </ul>	

<b>Video Display</b>	Output type	RGB, analog and digital; interlaced or non-interlaced; up to 8 bitplanes
	Compliance	NTSC and PAL
	Color palette	16.8 million
	Horizontal scan rates	15.6 kHz - 31.4 kHz
	Vertical scan rates	50 Hz - 73 Hz
	*See the Mode Properties display in the ScreenMode Preferences editor for a given display mode's exact scan rates. Compare the scan rates of modes you wish to use with your monitor specifications to determine monitor compatibility.	
<b>Sound</b>	Four independent voices configured as two stereo channels	
	Internal speaker	
	Two stereo RCA jacks	
<b>Clock/calendar</b>	Built-in, with battery backup; replacement battery connector	
<b>Power Supply</b>	200 watts (minimum), with fan	
<b>Environmental Specification</b>	Operating: 0 - 45°C (32 - 113°F)	
	Storage/Shipping: 0 - 60°C (32 - 140°F)	



## **Appendix B**

# **Monitor Types and Compatibility**

---

Your Amiga is built around the Advanced Graphics Architecture (AGA) custom chipset, which supersedes the earlier ECS and original chipsets in graphics capability.

The new graphics features of the AGA chipset and Release 3 software provide many new display options. Because of the numerous options involved, it can sometimes be difficult to find the optimum graphics configuration for the software and monitor you are using. This appendix contains information on how to determine monitor compatibility with AGA systems.

The Amiga requires an analog RGB (color) monitor. There are three general types of analog RGB monitors that you can use with your Amiga. The difference between them is in the horizontal sync frequencies (also called the scan rates) they accept:

1. Video monitors, such as the AMIGA Technologies 1084 series, accept only the standard Amiga 15 kHz scan rate (NTSC and PAL display modes).
2. VGA-only monitors accept only the 31 kHz VGA scan rate (DBL, Multiscan, and Productivity modes).
3. Multiscan (multiple horizontal sync frequency or multi-sync) monitors, like the AMIGA Technologies 1950 and 1960, accept a range of scan rates.

## Horizontal Scan Rate

To properly reproduce all the Amiga display modes that you are likely to encounter, you should use an appropriate multiscan monitor.

- Certain important Amiga screens, such as alerts and the Early Startup Control screen, always appear in one of the 15 kHz modes, as do many games and certain other applications. A VGA-only monitor cannot properly display these screens.
- A 15 kHz-only monitor can display all system screens and virtually all Amiga applications, but cannot take advantage of Mode Promotion or use the higher resolutions and enhanced displays that the AGA chipset offers.

Check the specifications for a multiscan monitor carefully. Not all multiscan monitors accept 15 kHz input.

## Vertical Scan Rate

Display modes also have a vertical scan rate (also called the refresh rate) that must be supported by the monitor. Vertical scan rates for display modes available under Release 3 vary from 48 to 73 Hz.

The *Workbench User's Guide* details the resolutions of the modes offered by the different monitor drivers included with Release 3, listed by monitor. The following tables group the monitor types according to the three basic horizontal scan rates that they require.

### Video Monitors

Monitor Driver	Horizontal Scan Rate	Vertical Scan Rate
NTSC	15.72 kHz	60 Hz
PAL	15.60 kHz	50 Hz
Euro36	15.76 kHz	73 Hz

## VGA Monitors

The standard VGA horizontal scan rate is 31.5 kHz. Most, but not all, VGA-only monitors can also display the 27 kHz promoted modes produced by the DBLNTSC and DBLPAL monitor drivers.

Monitor Driver	Horizontal Scan Rate	Vertical Scan Rate
DBLNTSC	27.66 kHz	58 Hz
DBLPAL	27.50 kHz	48 Hz
Euro72	29.32 kHz	69 Hz
Multiscan	29.29 kHz	58 Hz

## Multiscan Monitors

Multiscan monitors vary in the scan rates they support, but can potentially display any of the above, plus the following:

Monitor Driver	Horizontal Scan Rate	Vertical Scan Rate
Super72	23.21 kHz	71 Hz

## Choosing a Monitor

To determine whether a given monitor works with your Amiga, you must compare the specifications of the monitor you are considering against the scan rates listed above. If the monitor accepts the scan rate of the monitor driver listed, the monitor should work with the display modes the monitor driver provides.

In practice, it is unusual to find a monitor that can display all of the Amiga's display modes. However, there is really no need to do so. Many modes have similar resolutions, and differ only in their scan rates. The large number of video modes with different scan rates allows you the flexibility to use any of various types of monitors that are available to you.

**Note** When changing between screens whose display modes do not have the same scan rates, such as DBLNTSC and Super72 modes, a multiscan monitor must re-sync to the new scan rate. While the monitor adjusts itself, the image can jump or the display might go blank briefly, depending on the monitor. This is normal and does not indicate a problem with the Amiga or the monitor.

## Appendix C

# Component Locations and Jumper Settings

---

### Setting a Jumper

A jumper consists of a row of two or more closely spaced metal pins projecting from the circuit board and a metal-lined plastic cap that can fit over two adjacent pins. The cap connects (shorts) the two pins. When two of the pins are connected by the cap, they are closed; pins not connected by the cap are open. The combination of open and closed pins is the jumper's setting, which determines a specific hardware function.

**Note** If all pins on a jumper must be left open, save the cap by covering only one pin of the jumper. This keeps the cap handy if you need to change the jumper's setting in the future.

Figure C-1 shows the side and top views of a three-pin jumper in which pins two and three are closed.

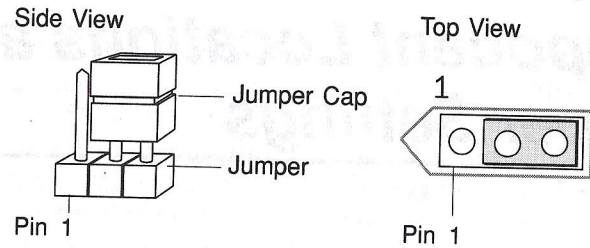


Figure C-1. Typical Jumper

On the A4000T there are jumpers on the motherboard, the disks module, and the processor module.

To properly set a jumper you usually need to determine which pin is pin 1. The pin 1 end of the jumper can be indicated on the circuit board by either:

- A numeral 1 printed near one end of the jumper
- A box with one pointed end printed around the jumper, with the pointed end being pin 1 (see Figure C-1, top view)

To change a jumper setting:

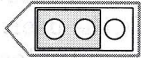
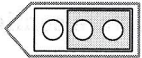
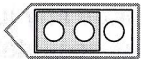
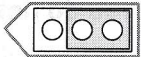
1. Disconnect the Amiga and remove the system cover, as described in Chapter 3.
2. Determine the name or number of the jumper to change.
3. Look up that jumper in the jumper table, noting its location on the circuit board and the required jumper cap position.
4. Locate the jumper on the motherboard (Figure C-2), disks module board (Figure C-3), or processor board (Figure C-4). Use the drawings in this chapter as you look at the actual board.
5. Reset a jumper by lifting the cap off the pins it currently occupies and pressing it down in the new position.

## A4000T Motherboard Jumpers

This table provides the settings for the motherboard jumpers. An asterisk (\*) in the jumper function column marks the two jumpers that may be changed by the user. A double asterisk (\*\*) in the jumper function column indicates that the jumper setting is dependent on the hardware configuration of the system.

**Caution** Do not change any jumper setting that is not indicated as acceptable to change or any whose functions you do not know.

Function	Jumper	Setting	Description
CLK90 Clock Source**	J100:1-2 closed		Internal (68030)
	J100:2-3 closed		External (68040)
CPU Clock Source**	J104:1-2 closed		Internal (68030)
	J104:2-3 closed		External (68040)
ROM Speed	J151:1-2 closed		200 ns
	J151:2-3 closed		160 ns
RAM Size*	J300:1-2 closed		RAM size 1 Mbit x 32 or 2 Mbit x 32
	J300:2-3 closed		RAM size 256 Kbit x 32 or 512 Kbit x 32

Function (cont'd)	Jumper (cont'd)	Setting (cont'd)	Description (cont'd)
Select NTSC/PAL	J212:1-2		Select NTSC
	J212:2-3		Select PAL
Select Sync on Green	J500:1-2		Sync on green disabled
	J500:2-3		Sync on green enabled

## Motherboard Jumper Locations

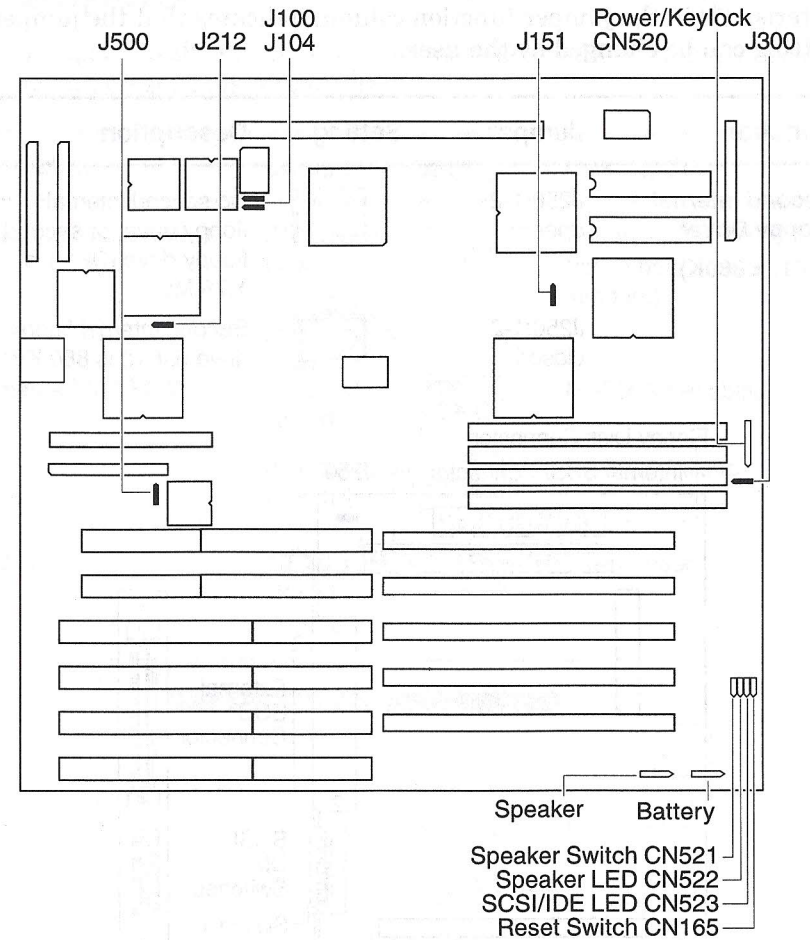

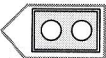


Figure C-2. Motherboard Jumper Locations

## Disks Module Jumpers

This table provides the settings for the disks module jumpers. An asterisk (\*) in the jumper function column indicates that the jumper setting can be changed by the user.

Function	Jumper	Setting	Description
Second Internal Floppy Drive* (DF1: = 880K)	J250:1-2 open		No second internal floppy drive, or second floppy drive (DF1:) is 1.76 MB.
	J250:1-2 closed		Second internal floppy drive (DF1:) is 880 KB:

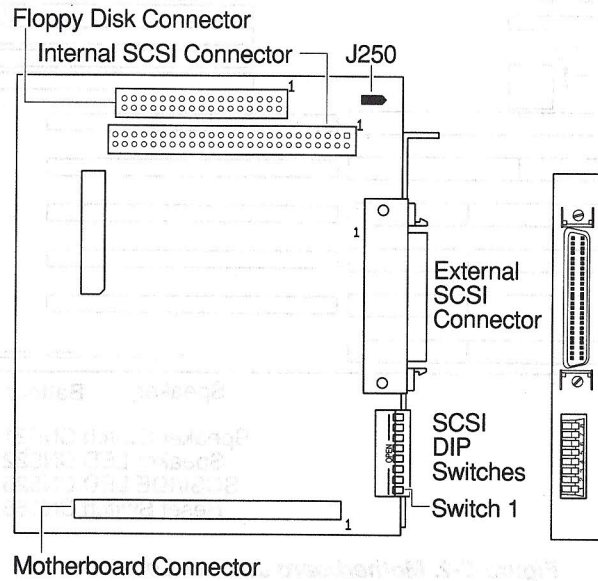
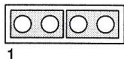
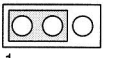



Figure C-3. Disks Module Board Jumper Locations

## 68040 and 68LC040 Processor Card Jumpers

No jumpers on the 68040 processor module should be changed from their factory settings by the user.

Function	Jumper	Setting	Description
Enable /CDIS /MDIS	J100:1-2 closed		Enable /CDIS /MDIS (close both sets of jumpers)
	J100:3-4 closed		
Enable MAPROM	J400:1-2 closed		MAPROM enabled
	J400:2-3 closed		
Test	TJ100:1-2 closed		Test jumper

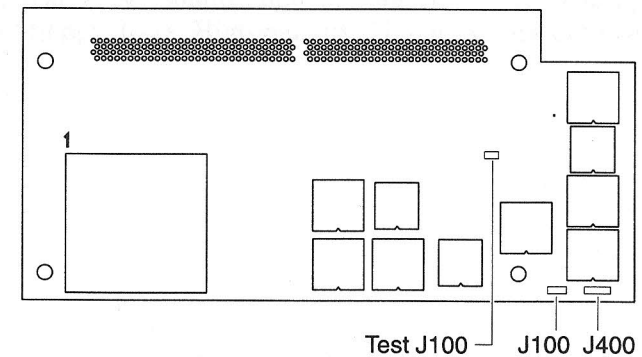


Figure C-4. 68040 Processor Card Jumper Locations

## Appendix D

# Using Floppy Disks

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Floppy disks are a type of portable magnetic recording media that are used to:

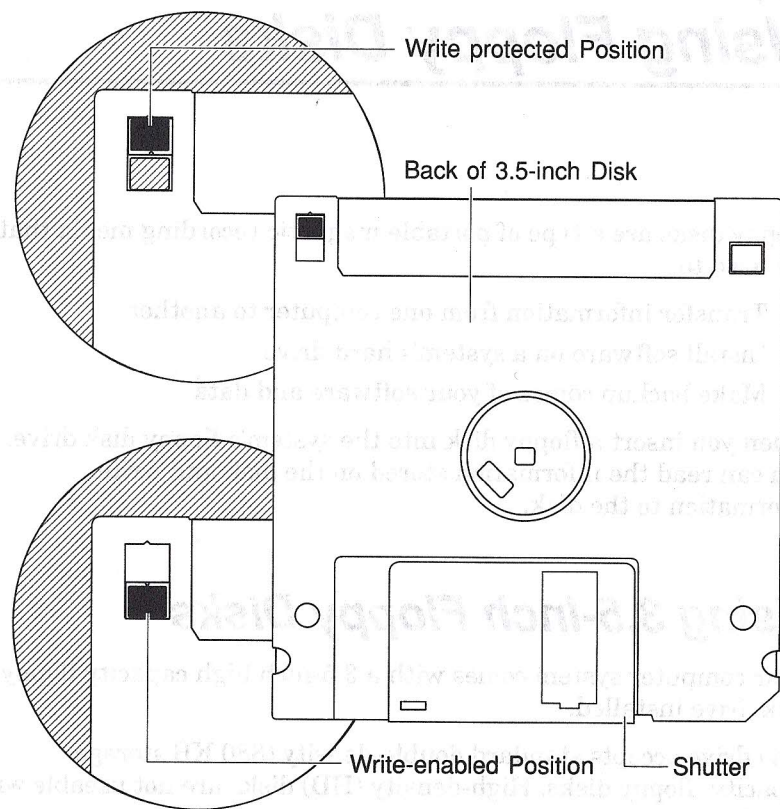
- Transfer information from one computer to another
- Install software on a system's hard drive
- Make backup copies of your software and data

When you insert a floppy disk into the system's floppy disk drive, you can read the information stored on the disk and write information to the disk.

## Using 3.5-Inch Floppy Disks

Your computer system comes with a 3.5-inch high capacity floppy disk drive installed.

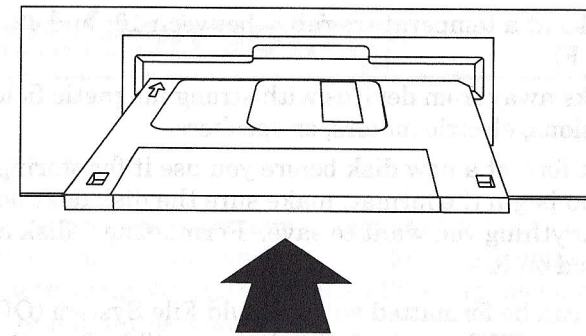
This drive accepts standard double-density (880 KB storage capacity) floppy disks. High-density (HD) disks are not useable with this drive.



**Figure D-1. 3.5-inch Floppy Disk**

To write-protect disk, slide the plastic write-protect tab to uncover the hole.

Figure D-2 illustrates inserting a disk into the disk drive. When you push the disk all the way into the drive, the disk clicks down into place. To release the disk, push the disk eject button on the lower right side of the disk opening.



**Figure D-2. Inserting a Disk**

## Guidelines for Using Disks

- Never remove a disk from a drive while the drive is in use. Always wait until after the drive light has gone out before removing a disk, rebooting, or turning the computer off, since there can be additional disk activity after it appears to be finished.
  - Disk errors can be caused by interrupting disk activity. These can often be repaired using a disk recovery utility. See your Amiga software documentation for more information.
- Keep application disks and your Amiga system disks write-protected if you regularly use floppy disks to transfer software and data between Amigas, particularly software that has been downloaded through a modem. This helps prevent damage to your disks by software viruses. Write-protecting important disks is also a way for inexperienced users to prevent accidental deletion of important files.
- Make copies (working disks) of important disks. Work with the copies and keep the originals in a safe place for use as backups if the copies become damaged. See your Amiga software documentation for information on copying disks.
- Do not touch or scratch any exposed portion of the disk's shiny surface or allow dust or moisture to collect on the disk.



- Store disks at a temperature range between 10° and 49° C (50° and 120° F).
- Keep disks away from devices with strong magnetic fields, such as televisions, electric motors, or speakers.
- You must format a new disk before you use it for storing data. Before you begin the format, make sure the disk does not contain anything you want to save. Formatting a disk erases all data stored on it.

Floppy disks can be formatted with the Old File System (OFS), the Fast File System (FFS), or the MS-DOS compatible CrossDOS™ file system. You can also format disks (OFS and FFS only) with a directory-caching option for faster response in opening disk windows and reading disk directories. This option uses more space on the disk.

Disks formatted with the directory-caching option cannot be read by Amigas with earlier versions of the system software. Do not format a disk with the directory-caching option if you need to use the disk to transfer files to an Amiga with Release 2 or earlier system software.

Do not attempt to use standard disk repair utilities on such disks. Disk utilities not developed to support the directory-caching feature do not properly recognize the new disk format and can damage the data on the disks.

## **Appendix E**

# **Troubleshooting**

If you have a problem with your Amiga or experience unexpected results, there may be an easy solution. Many problems result from errors in setting up the system or installing expansion devices. Use the information in this chapter to:

- Understand how to avoid common problems
- Understand the results of system startup diagnostic tests
- Identify and solve problems
- Identify problems that require service by a knowledgeable technician

**Caution**    **AMIGA Technologies will not be held liable for damages or injuries resulting from improper installation or repairs attempted by unauthorized personnel.**

Although you can solve many problems yourself, others result from hardware failure and require the assistance of your AMIGA Technologies dealer/service center or a knowledgeable technician. Never attempt to repair any problem involving internal damage to the Amiga yourself.

## Avoiding Problems

The three most important rules to remember to prevent damage to your computer, files, and disks are:

1. Never connect or disconnect anything while the power is on.

This applies to internal and external connectors, including the mouse and keyboard. It is very easy to cause damage that requires a service call by connecting or disconnecting something without first turning the system off.

2. Never interrupt disk activity.

This applies to both floppy and hard disks. When disk activity is in progress, the drive activity light on the front of the computer or on the drive itself is lit. Interrupting disk activity (by removing a disk from its drive, rebooting, or powering off) can cause disk errors. Always wait a few seconds after the drive activity lights have stopped, to be sure all disk activity has finished.

3. Read the documentation.

The majority of problems can be avoided by carefully reading and following the instructions for the hardware and software you use.

### System Initialization

The system initialization consists of a series of diagnostic tests that run automatically whenever you turn on the computer. This test series resides permanently in the Amiga ROM. It performs CPU and keyboard tests.

If the system finds an error before the screen display turns on, the screen remains blank and the system halts. After the screen display turns on, the screen changes color and the system halts if an error occurs. If your system indicates it failed a startup test, you should contact your dealer or authorized Amiga service center to correct the problem. The following screen colors represent the results of the system initialization tests:

Test Status	Color	Description
Passed Test	Light Gray	Initial hardware configuration tests passed
		Initial system software tests passed
		Final initialization test passed
Failed Test	Red	ROM error
	Green	Chip RAM error
	Blue	Custom Chips error
	Yellow	680x0 detected error before software trapped it

## Identifying and Solving Problems

There are several general types of problems that can occur when you use your system:

- Software problems
- Setup problems
- Disk problems
- Installation and maintenance problems

### Software Problems

This chapter focuses on hardware problems and their possible solutions. For information on software-related problems, consult your Amiga software documentation.

Typical software problems include:

- Preferences settings for your language, country, and national keyboard type (keymap) have not been made yet
- Preferences settings do not match your peripheral hardware, such as modem or printer
- New software was improperly installed
- Necessary directories or files are missing from the boot volume

- Necessary directory assignments have not been made
- The standard Startup-sequence file has been altered
- There is a disk error

Problems of this type usually produce requesters or error messages that give some indication of the source of the trouble. Note this information and consult your Amiga software documentation for guidance. The *Workbench User's Guide* and the *Amiga Hard Drive User's Guide* have information about software installation, proper settings, and the use of programs that can help with disk problems.

## Setup Problems

Problems starting up the system most often result from mistakes in system setup. Actual hardware failure is a less frequent cause.

Check the following if your Amiga does not respond when you turn it on:

- Is the Amiga plugged in to a power source of the correct voltage?
- Is the monitor plugged in to a power source of the correct voltage?
- Is the monitor connected to the Amiga?
- Are both the monitor and the Amiga turned on?
- If the Amiga is plugged in to a multiple-outlet power strip, is the power strip plugged in, turned on, and working properly?
- Are the monitor and the monitor cable known to work correctly?
- Is the monitor of a type capable of displaying the Amiga's video output?
- Is the monitor set to accept the Amiga's default video mode?
- Is the monitor securely connected to the main unit?

For information on these basic setup questions, refer to Chapter 1. Also see the ScreenMode Preferences sections in the *Workbench User's Guide* and your monitor manual.

## Disk Problems

If the Amiga comes on, but does not boot, check the following before suspecting a hardware problem:

- Do you have a bootable hard drive partition in the system?
- Is the partition you want to boot from enabled and does it have a boot priority above other bootable devices or partitions?
- Does your bootable partition have all the required directories and files available on it?

For additional information on bootable hard drive partitions, see the sections on disk use in the *Workbench User's Guide* and the *Amiga Hard Drive User's Guide*.

If you have trouble booting from your hard disk, try booting from floppy. If you can boot from floppy, then your hard disk setup, or something on your hard disk, is probably the source of the trouble. After booting from floppy you may still be able to access your hard disk to try to determine the source of the trouble.

Typical disk drive hardware problems include:

- A drive ribbon cable connector is inserted in its drive or motherboard connectors improperly (see Chapter 6)
- A drive is not connected to power, or the power supply is overloaded (see Chapter 6)
- A drive ID or unit number jumper is set incorrectly (see Chapter 6)
- A drive controller board is not fully seated in its slot
- The device chain is not terminated correctly (SCSI drive systems)
- A hard drive takes too long to spin up to working speed
- A drive or controller board has the wrong ROM version
- A drive ribbon cable is faulty
- A drive is faulty

Review the installation instructions provided in Chapters 5 and 6, as well as the setup instructions in the documentation that came with the drive.

## Installation and Maintenance Problems

Installation problems are most likely to occur after you have added a new drive or other hardware item to the system. If you have a problem after installing additional hardware, remove the new item and see if the problem disappears. If it does, you know the problem is in that item or its installation. Repeat the installation, following the hardware manufacturer's installation instructions carefully.

If you have several expansion devices, the problem could be an interaction between two or more items that by themselves work properly. Try running your system with different combinations of expansion devices to isolate the offending items. If the item requires its own software, consider different settings the software offers.

### Installation Problems

If the fault is not in the new hardware itself, there can be a problem with its installation. Be sure that:

- All SIMMs are fully seated in the proper sockets
- All the SIMMs in the Fast RAM banks are the appropriate size, either 1 MB/2 MB or 4 MB/8 MB
- The Fast RAM SIMM Size jumper setting matches the type of SIMM in the Fast RAM banks
- No other jumpers have been moved from their factory-set positions
- The processor, disks, and audio/video modules are fully seated in their slot connectors
- The ports module is properly connected
- All expansion boards are fully seated in their slots and connected according to their instructions
- All peripherals were properly reconnected to the Amiga after installation

Refer to the installation sections of Chapters 1, 4, and 5.

## Maintenance Problems

- A floppy, removable media, or CD-ROM drive is dirty or out of alignment. Use a commercial drive alignment and/or cleaning product according to the drive manufacturer's directions, or have your dealer/service center look at the drive.
- The mouse ball or mouse ball rollers are dirty. Open the mouse ball cavity, remove the ball, and clean the ball and interior with a cotton swab.
- Connector pins are bent or dirty. Carefully clean and straighten the pins.

## Non User-Serviceable Problems

If you still have a problem after trying the remedies suggested here, you could have a hardware problem that requires professional attention. Have your Amiga examined by your Amiga dealer/service center or a knowledgeable technician. If the problem appears to be with a third-party device, contact its manufacturer.

Do not try to repair a damaged or malfunctioning unit yourself. This could cause further damage, possible injury, and the voiding of your warranties.

## Appendix F

# Input/Output Connector Pin Assignments

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This section lists pin assignments (pinouts) for input/output connectors on the Amiga. The information in this section is technical and is intended only for those with special needs in connecting external devices to the Amiga. You should not need this information if you use cables designed specifically for the Amiga and the peripheral you want to connect.

**Caution** Some pins on Amiga connectors provide power outputs and non-standard signals. Attempting to use cables not wired specifically for the Amiga can damage the Amiga or the equipment you connect.

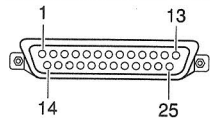
The descriptions that follow include specific warnings for each connector. For more information about connecting peripherals, consult your Amiga dealer or service center.

**Note** In the descriptions that follow, a forward slash in front of the signal name (for example, /STROBE) indicates a signal that is active low.

The I/O (Input/Output) column lists signal types: I for Input, O for Output, OC for Open Collector.

## Serial Port

### Connector Type: DB25 male



In the following table, column two gives the Amiga pin assignments. Columns three and four give pin assignments for other commonly used connections; the information in these two columns is given for comparison only.

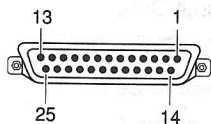
**Caution** Pins 9 and 10 on the Amiga serial connector are used for external power. Connect these pins **ONLY** if power from them is required by the external device. The table lists the power provided by each of these pins.

**Pin 7 is the system ground. Do not connect this to shield ground on Pin 1.**

Pin	Amiga	RS232	HAYES	I/O	Description
1	SHIELD	GND	GND	--	Shield Ground
2	TXD	TXD	TXD	O	Transmit Data
3	RXD	RXD	RXD	I	Receive Data
4	RTS	RTS	--	O	Request to Send
5	CTS	CTS	CTS	I	Clear to Send
6	DSR	DSR	DSR	I	Data Set Ready
7	GND	GND	GND	--	System Ground
8	CD	CD	DCD	I	Carrier Detect
9	+12V	--	--	--	+12 Volts DC (20 mA maximum)
10	-12V	--	--	--	-12 Volts DC (20 mA maximum)
11	AUDO	--	--	O	Amiga Audio out (Left)
12	n/c	S.SD	SI	--	Speed Indicate
13	n/c	S.CTS	--	--	
14	n/c	S.TXD	--	--	
15	n/c	TXC	--	--	
16	n/c	S.RXD	--	--	
17	n/c	RXC	--	--	
18	AUDI	--	--	I	Amiga Audio In (Right)
19	n/c	S.RTS	--	--	
20	DTR	DTR	DTR	O	Data Terminal Ready
21	n/c	SQD	--	--	
22	RI	RI	RI	I	Ring Indicator
23	n/c	SS	--	--	
24	n/c	TXC1	--	--	
25	n/c	--	--	--	

## Parallel Port

### Connector Type: DB25 female



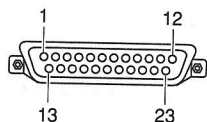
**Caution** Pin 14 on the Amiga parallel connector supplies +5 volts of power. Connect this pin **ONLY** if the power from it is required by the external device. **NEVER** connect this pin to an output of an external device or to a signal ground.

Pins 17-25 are for grounding signals. **DO NOT** connect these pins directly to a shield ground.

Pin	Name	I/O	Description
1	/STROBE	O	Strobe
2	D0	I/O	Data Bit 0 (LSB)
3	D1	I/O	Data Bit 1
4	D2	I/O	Data Bit 2
5	D3	I/O	Data Bit 3
6	D4	I/O	Data Bit 4
7	D5	I/O	Data Bit 5
8	D6	I/O	Data Bit 6
9	D7	I/O	Data Bit 7 (MSB)
10	/ACK	I	Acknowledge
11	BUSY	I/O	Busy
12	POUT	I/O	Paper Out
13	SEL	I/O	Select
14	+5V PULLUP	--	+5 Volts DC (10 mA)
15	n/c	--	
16	/RESET	O	Reset
17	GND	--	Signal Ground
18	GND	--	Signal Ground
19	GND	--	Signal Ground
20	GND	--	Signal Ground
21	GND	--	Signal Ground
22	GND	--	Signal Ground
23	GND	--	Signal Ground
24	GND	--	Signal Ground
25	GND	--	Signal Ground

## Video Port

### Connector Type: DB23 male



**Caution** Pins 21, 22 and 23 on the RGB monitor connector are used for external power. Connect these pins **ONLY** if power from them is required by the external device.

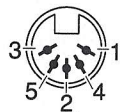
Pins 16-20 are used for signal ground. **DO NOT** connect these to Pin 13.

Pin	Name	I/O	Description
1	/XCLK	I	External Clock
2	/XCLKEN	I	External Clock Enable (47 Ohm)
3	RED	O	Analog Red (75 Ohm)
4	GREEN	O	Analog Green (75 Ohm)
5	BLUE	O	Analog Blue (75 Ohm)
6	DI	O	Digital Intensity (47 Ohm)
7	DB	O	Digital Blue (47 Ohm)
8	DG	O	Digital Green (47 Ohm)
9	DR	O	Digital Red (47 Ohm)
10	/CSYNC	O	Composite Sync (47 Ohm)
11	/HSYNC	O	Horizontal Sync (47 Ohm)
12	/VSYNC	O	Vertical Sync (47 Ohm)
13	GNDRTN	--	Return for /XCLKEN (e.g. digital ground)
14	/PIXELSW	O	Genlock overlay (47 Ohm)
15	/C1	O	Clock Out (47 Ohm)
16	GND	--	Video ground
17	GND	--	Video ground
18	GND	--	Video ground
19	GND	--	Video ground
20	GND	--	Video ground
21	-5V	--	-5 Volts DC (10 mA)
22	+12V	--	+12 Volts DC (100 mA)
23	+5V	--	+5 Volts DC (100 mA)



## Keyboard Port

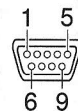
Connector Type: 5-pin female DIN



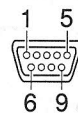
Pin	I/O	Description
1	O	Clock
2	I/O	Data
3		n/c
4		Ground
5		+5 VDC (100 mA)

## Mouse/Controller Ports

Connector Type: DB9 male



Game



Mouse

To use a mouse to control the Workbench, you must attach it to mouse connector 1 (the lower mouse connector on the rear panel of the Amiga). You can attach joystick controllers and light pens to either of the connectors. The following table describes mouse, game controller, and light pen connections.

**Caution** Pin 7 on each of these connectors supplies +5 volts of power. Connect this pin **ONLY** if power from it is required by the external device.

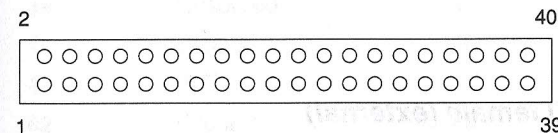
Pin	Mouse / Trackball	Light Pen	Digital Joystick	Proportional Joystick	I/O
1	V-pulse	n/c	/Forward	Button 3*	I
2	H-pulse	n/c	/Back	n/c	I
3	VQ-pulse	n/c	/Left	Button 1	I
4	HQ-pulse	n/c	/Right	Button 2	I
5	Button 3 (M)*	Pen Press	n/c	PotX	I**
6	Button 1 (L)	/Beam Trigger	/Button 1	n/c	I**
7	+5V	+5V	+5V	+5V	--
8	GND	GND	GND	GND	--
9	Button 2 (R)	Button 2*	Button 2*	PotY	I**

\*These buttons are optional.

\*\*These pins can also be configured as outputs.

## Internal AT IDE

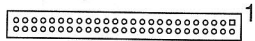
Connector Type: 40-pin male (motherboard)



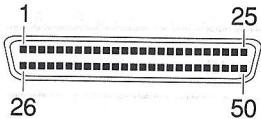
Pin	I/O	Signal	Pin	I/O	Signal
1	O	/RESET	21	--	n/c
2	--	Ground	22	--	Ground
3	I/O	Drive Data 7	23	O	/IOW (write strobe)
4	I/O	Drive Data 8	24	--	Ground
5	I/O	Drive Data 6	25	O	/IOR (read strobe)
6	I/O	Drive Data 9	26	--	Ground
7	I/O	Drive Data 5	27	I	IO_CH_RDY
8	I/O	Drive Data 10	28	--	n/c
9	I/O	Drive Data 4	29	--	n/c
10	I/O	Drive Data 11	30	--	Ground
11	I/O	Drive Data 3	31	I	Interrupt request
12	I/O	Drive Data 12	32	--	n/c
13	I/O	Drive Data 2	33	O	DA1 (address 1)
14	I/O	Drive Data 13	34	--	n/c
15	I/O	Drive Data 1	35	O	DA0 (address 0)
16	I/O	Drive Data 14	36	O	DA2 (address 2)
17	I/O	Drive Data 0	37	O	/IDE_CS1
18	I/O	Drive Data 15	38	O	/IDE_CS2
19	--	Ground	39	O	/ACTIVE (LED driver)
20	--	n/c	40	--	Ground

# SCSI-2

**Connector Type: 50-pin male (motherboard)**



**Connector Type: DB50 female (external)**

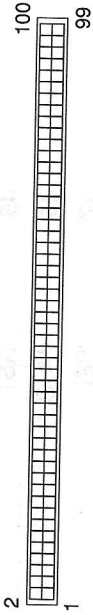


Pin	Signal Name	Pin	Signal Name
1	Ground	20	Ground
2	Ground	21	Ground
3	Ground	22	Ground
4	Ground	23	Ground
5	Ground	24	Ground
6	Ground	25	Ground
7	Ground	26	/DB(0)
8	Ground	27	/DB(1)
9	Ground	28	/DB(2)
10	Ground	29	/DB(3)
11	Ground	30	/DB(4)
12	Reserved	31	/DB(5)
13	Open	32	/DB(6)
14	Reserved	33	/DB(7)
15	Ground	34	/DB(P)
16	Ground	35	Ground
17	Ground	36	Ground
18	Ground	37	Reserved
19	Ground	38	TERMPWR

Pin (cont'd)	Signal Name (cont'd)	Pin (cont'd)	Signal Name (cont'd)
39	Reserved	45	/RST
40	Ground	46	/MSG
41	/ATN	47	/SEL
42	Ground	48	/C/D
43	/BSY	49	/REQ
44	/ACK	50	/I/O

# Amiga Expansion Slots

Connector Type: 100-pin female edge (motherboard)



Pin	Physical Name	Zorro II Name	Zorro III Address Phase	Zorro III Data Phase
1	Ground	Ground	Ground	Ground
2	Ground	Ground	Ground	Ground
3	Ground	Ground	Ground	Ground
4	Ground	Ground	Ground	Ground
5	+5VDC	+5VDC	+5VDC	+5VDC
6	+5VDC	+5VDC	+5VDC	+5VDC
7	/OWN	/OWN	/OWN	/OWN
8	-5VDC	-5VDC	-5VDC	-5VDC
9	/SLAVE <sup>n</sup> *	/SLAVE <sup>n</sup> *	/SLAVE <sup>n</sup> *	/SLAVE <sup>n</sup> *
10	+12VDC	+12VDC	+12VDC	+12VDC
11	/CFGOUT <sup>n</sup> *	/CFGOUT <sup>n</sup> *	/CFGOUT <sup>n</sup> *	/CFGOUT <sup>n</sup> *
12	/CFGIN <sup>n</sup> *	/CFGIN <sup>n</sup> *	/CFGIN <sup>n</sup> *	/CFGIN <sup>n</sup> *
13	Ground	Ground	Ground	Ground
14	/C3 Clock	/C3 Clock	/C3 Clock	/C3 Clock
15	CDAC	CDAC Clock	CDAC Clock	CDAC Clock
16	/C1 Clock	/C1 Clock	/C1 Clock	/C1 Clock
17	/CINH	/OVR	/CINH	/CINH
18	/MTCR	XRDY	/MTCR	/MTCR
19	/INT2	/INT2	/INT2	/INT2
20	-12VDC	-12VDC	-12VDC	-12VDC

\*n = slot number

Pin (cont'd)	Physical Name (cont'd)	Zorro II Name (cont'd)	Zorro III Address Phase (cont'd)	Zorro III Data Phase (cont'd)
21	A5	A5	A5	A5
22	/INT6	/INT6	/INT6	/INT6
23	A6	A6	A6	A6
24	A4	A4	A4	A4
25	Ground	Ground	Ground	Ground
26	A3	A3	A3	A3
27	A2	A2	A2	A2
28	A7	A7	A7	A7
29	/LOCK	A1	/LOCK	/LOCK
30	AD8	A8	A8	D0
31	FC0	FC0	FC0	FC0
32	AD9	A9	A9	D1
33	FC1	FC1	FC1	FC1
34	AD10	A10	A10	D2
35	FC2	FC2	FC2	FC2
36	AD11	A11	A11	D3
37	Ground	Ground	Ground	Ground
38	AD12	A12	A12	D4
39	AD13	A13	A13	D5
40	reserved	reserved	reserved	reserved
41	AD14	A14	A14	D6
42	reserved	reserved	reserved	reserved
43	AD15	A15	A15	D7
44	reserved	reserved	reserved	reserved
45	AD16	A16	A16	D8
46	/BERR	/BERR	/BERR	/BERR
47	AD17	A17	A17	D9

Pin (cont'd)	Physical Name (cont'd)	Zorro II Name (cont'd)	Zorro III Address Phase (cont'd)	Zorro III Data Phase (cont'd)
48	/MTACK	/(VPA)	/MTACK	/MTACK
49	Ground	Ground	Ground	Ground
50	E Clock	E Clock	E Clock	E Clock
51	/DS0	/(VMA)	/DS0	/DS0
52	AD18	A18	A18	D10
53	/RESET	/RST	/RESET	/RESET
54	AD19	A19	A19	D11
55	/HLT	/HLT	/HLT	/HLT
56	AD20	A20	A20	D12
57	AD22	A22	A22	D14
58	AD21	A21	A21	D13
59	AD23	A23	A23	D15
60	BRn*	BRn*	BRn*	BRn*
61	Ground	Ground	Ground	Ground
62	/BGACK	/BGACK	/BGACK	/BGACK
63	AD31	D15	A31	D31
64	/BGn*	/BGn*	/BGn*	/BGn*
65	AD30	D14	A30	D30
66	/DTACK	/DTACK	/DTACK	/DTACK
67	AD29	D13	A29	D29
68	READ	READ	READ	READ
69	AD28	D12	A28	D28
70	/DS2	/LDS	/DS2	/DS2
71	AD27	D11	A27	D27
72	/DS3	/UDS	/DS3	/DS3
73	Ground	Ground	Ground	Ground

\*n = slot number

Pin (cont'd)	Physical Name (cont'd)	Zorro II Name (cont'd)	Zorro III Address Phase (cont'd)	Zorro III Data Phase (cont'd)
74	/CCS	/AS	/CCS	/CCS
75	SD0	D0	N/A*	D16
76	AD26	D10	A26	D26
77	SD1	D1	N/A*	D17
78	AD25	D9	A25	D25
79	SD2	D2	N/A*	D18
80	AD24	D8	A24	D24
81	SD3	D3	N/A*	D19
82	SD7	D7	N/A*	D23
83	SD4	D4	N/A*	D20
84	SD6	D6	N/A*	D22
85	Ground	Ground	Ground	Ground
86	SD5	D5	N/A*	D21
87	Ground	Ground	Ground	Ground
88	Ground	Ground	Ground	Ground
89	Ground	Ground	Ground	Ground
90	Ground	Ground	Ground	Ground
91	SenseZ3	Ground	SenseZ3	SenseZ3
92	7M	E7M	7M	7M
93	DOE	DOE	DOE	DOE
94	/IORST	/BUSRST	/IORST	/IORST
95	/BCLR	/GBG	/BCLR	/BCLR
96	reserved	reserved	reserved	reserved
97	/FCS	not used	/FCS	/FCS
98	/DS1	not used	/DS1	/DS1
99	Ground	Ground	Ground	Ground
100	Ground	Ground	Ground	Ground

\*N/A = not applicable to this phase

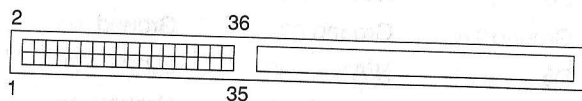
## Video Slots

### Connector Type: 36/54-pin female edge (motherboard)

An A4000T video slot consists of the 36-pin standard video connector and the 54-pin extended video connector. For both video slots, the standard and extended video connectors are in line with each other, with the standard connector on the left. The extended connector has 18 pins not found on previous Amiga video slots. Note that although the pin numbers of various signals have changed, the physical locations of pins with those signals are the same.

**Caution** DO NOT mix digital and analog grounds.

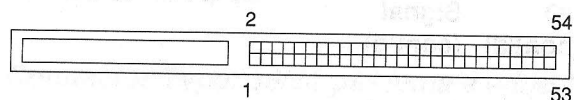
### Standard Video Connector



Pin	Name	I/O	Signal
1	RGB16	O	Red Bit 0
2	RGB17	O	Red Bit 1
3	LINELF	O	Audio Line Out Left
4	LINERT	O	Audio Line Out Right
5	C28D	O	Pixel-Synchronous Clock
6	+5V	--	+5 Volts DC (main power; 1 amp)
7	ARED	O	Analog Red
8	+5V	--	+5 Volts DC (1 amp)
9	GND	--	Digital Ground
10	+12V	--	+12 Volts DC (high voltage power; 40 mA)

Pin (cont'd)	Name (cont'd)	I/O (cont'd)	Signal (cont'd)
11	AGREEN	O	Analog Green
12	GND	--	Digital Ground
13	GND	--	Digital Ground
14	/CSYNC	O	Composite Sync
15	ABLUE	O	Analog Blue
16	/XCLKEN	I	Genlock Clock Enable
17	GND	--	Digital Ground
18	BURST	O	Burst Gate
19	/C4	O	3.55/3.58 MHz Clock
20	GND	--	Digital Ground
21	GND	--	Digital Ground
22	/HSYNC	O	Horizontal Sync (47 Ohm)
23	RGB4	O	Blue Bit 4
24	GND	--	Digital Ground
25	RGB7	O	Blue Bit 7
26	/VSYNC	O	Vertical Sync (47 Ohm)
27	RGB15	O	Green Bit 7
28	BLANK	O	Video Blank
29	RGB23	O	Red Bit 7
30	/PIXELSW	O	Genlock Overlay (47 Ohm)
31	-5V	--	-5 Volts DC (negative supply)
32	GND	--	Digital Ground
33	/XCLK	I	Genlock Clock
34	/C1	O	C1 Clock
35	+5V	--	+5 Volts DC (1 amp)
36	PSTROBE	O	Printer Port Handshake

## Extended Video Connector

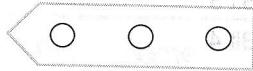


Pin	Name	I/O	Signal
1	GND	--	Digital Ground
2	RGB20	O	Red Bit 4
3	RGB21	O	Red Bit 5
4	RGB22	O	Red Bit 6
5	GND	--	Digital Ground
6	RGB12	O	Green Bit 4
7	RGB13	O	Green Bit 5
8	RGB14	O	Green Bit 6
9	GND	--	Digital Ground
10	RGB5	O	Blue Bit 5
11	RGB6	O	Blue Bit 6
12	GND	--	Ground
13	SOG	O	Sync-On-Green Indicator
14	TBASE	O	50/60 Hz Software Clock Timebase
15	CDAC	O	7.09/7.16 MHz Clock
16	PPOUT	I/O	Printer Port Paper Out
17	/C3	O	3.55/3.58 MHz Clock
18	PBUSY	I/O	Printer Port Busy
19	/LPEN	I	Light Pen Input
20	/PACK	I/O	Printer Port Acknowledge Handshake
21	PSEL	O	Printer Port Select
22	GND	--	Digital Ground
23	PPD0	I/O	Printer Port Data Bit 0
24	PPD1	I/O	Printer Port Data Bit 1
25	PPD2	I/O	Printer Port Data Bit 2

Pin (cont'd)	Name (cont'd)	I/O (cont'd)	Signal (cont'd)
26	PPD3	I/O	Printer Port Data Bit 3
27	PPD4	I/O	Printer Port Data Bit 4
28	PPD5	I/O	Printer Port Data Bit 5
29	PPD6	I/O	Printer Port Data Bit 6
30	PPD7	I/O	Printer Port Data Bit 7
31	/LED	O	LED (audio filter bypass) Setting
32	GND	--	Digital Ground
33	RAWLF	O	Raw (unfiltered) Audio Left
34	AGND	--	Audio Ground
35	RAWRT	O	Raw (unfiltered) Audio Right
36	AGND	--	Audio Ground
37	VCOM0	--	Interslot Video Communication Line
38	VCOM1	--	Interslot Video Communication Line
39	GND	--	Digital Ground
40	GND	--	Digital Ground
41	VCOM2	--	Interslot Video Communication Line
42	VCOM3	--	Interslot Video Communication Line
43	GND	--	Digital Ground
44	GND	--	Digital Ground
45	RGB18	O	Red Bit 2
46	RGB19	O	Red Bit 3
47	RGB8	O	Green Bit 0
48	RGB9	O	Green Bit 1
49	RGB10	O	Green Bit 2
50	RGB11	O	Green Bit 3
51	RGB0	O	Blue Bit 0
52	RGB1	O	Blue Bit 1
53	RGB2	O	Blue Bit 2
54	RGB3	O	Blue Bit 3

## DSP/CDROM

**Connector Type: 3-pin male (audio/video module board)**



Pin	I/O	Signal
1		Left Channel
2		Ground
3		Right Channel

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