



AMIGA[®]

AMIGA[®] A1200

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AMIGA[®]



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Amiga Character Set

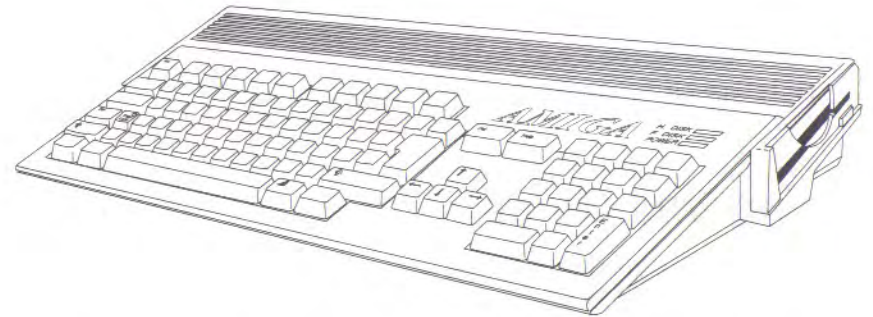
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Welcome



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 modelling, animation, and other graphics-intensive applications. The Amiga 1200 line features sophisticated standard graphics capabilities and a compact, expandable base unit for maximum flexibility.

Features

The Amiga 1200 (A1200) offers a set of advanced features, including:

- Motorola 68EC020 microprocessor running at 14 mHz
- AGA custom chipset offering graphics with 256 colours from a palette of 16.8 million in all colour modes
- Built-in de-interlacing of NTSC and PAL video modes
- Up to 2 MB 32-bit Chip memory

- AT IDE hard drive interface (16-bit)
- Integral full-size keyboard with numeric keypad
- PCMCIA "credit card" memory/accessory slot
- Internal 150-pin local bus CPU slot
- Expandable to 8 MB Fast memory
- RGB, colour composite, and RF (television) outputs
- Built-in 880 KB floppy drive
- Four-voice stereo sound output
- Optional internal 2.5-inch hard drive

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 startup screen, keyboard layout, and keys.

Chapter 3. Before Expanding Your System: This chapter provides general advice for adding expansion devices.

Chapter 4. Using PCMCIA Cards: This chapter describes how to use PCMCIA memory cards and devices.

Chapter 5. Help with System Problems: This chapter describes how to avoid common problems, how to identify and solve basic hardware problems, and how to interpret startup diagnostics results.

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

Appendix D. Floppy-Only Systems: This appendix contains information on booting and using systems without a hard drive.

Appendix E. Amiga Character Set: This appendix lists the entire Amiga character set, and the keycodes that produce each character.

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, A1200 | The Amiga 1200 main unit is usually referred to as the A1200 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*

The *Amiga Hard Drive User's Guide* is included with A1200 HD models, and is available with the AMIGA Technologies hard drive upgrade kit to customers who purchased floppy-only systems.

The AmigaDOS and ARexx books, not included with the A1200 system, are available from your AMIGA Technologies dealer.

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
- Video options
- Audio options
- Powering up your system

Before You Begin

- Choose a location for your system away from heat, dust, smoke, vibration, and electrical interference.
- Choose a stable work surface at least 6 inches/15 cm away from a wall.
- 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.

- Read the descriptions in this chapter to acquaint yourself with the purpose and function of each feature and port.

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 ports with the illustrations in this chapter. Use the illustrations to help you identify the lights, switches, ports, and disk drive.
- Use the instructions to connect the monitor, mouse, 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 plug into a port.
- 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, and optional expansion module are located in the main unit. Most other parts of your computer system connect to the main unit by cables.

Top Panel

The top panel, illustrated in Figure 1-1, identifies system features such as the keyboard and disk drive activity lights.

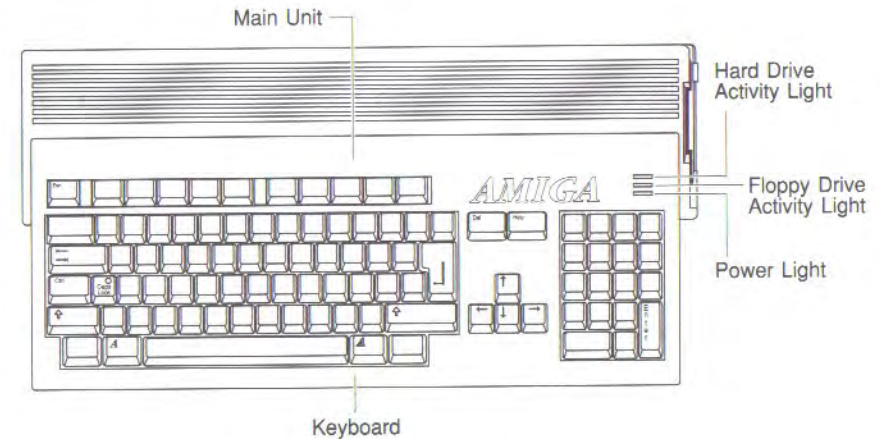


Figure 1-1. A1200 Top Panel

Right Side Panel

The right side panel, illustrated in Figure 1-2, shows the floppy drive slot and disk eject button.

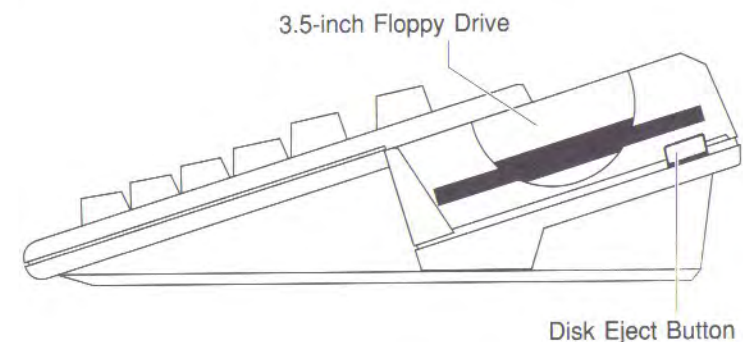


Figure 1-2. A1200 Right Side

Left Side Panel

The left side panel, illustrated in Figure 1-3, shows the PCMCIA card slot.

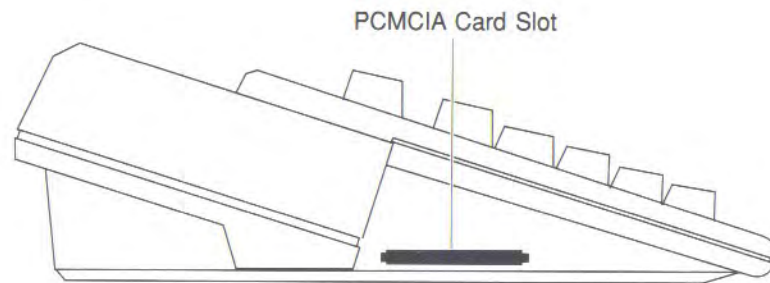


Figure 1-3. A1200 Left Side

Bottom Panel

The bottom panel, illustrated in Figure 1-4, shows the location of the CPU expansion slot door.

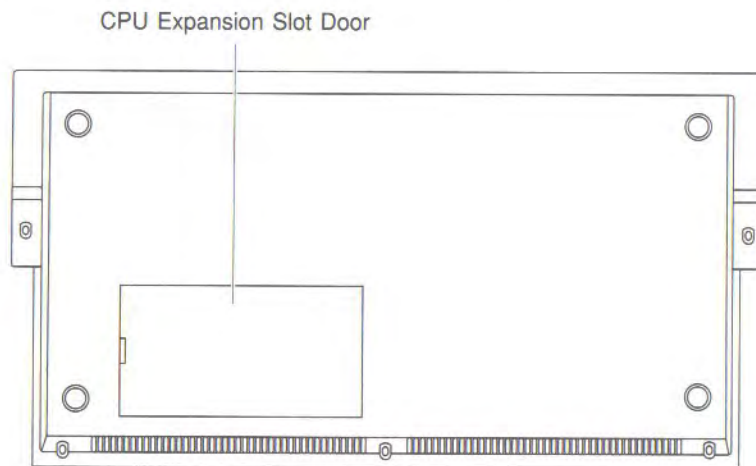


Figure 1-4. A1200 Bottom

Rear Panel

The rear panel, illustrated in Figure 1-5, shows where the other parts of your system (for example, the monitor and mouse) plug into the main unit.

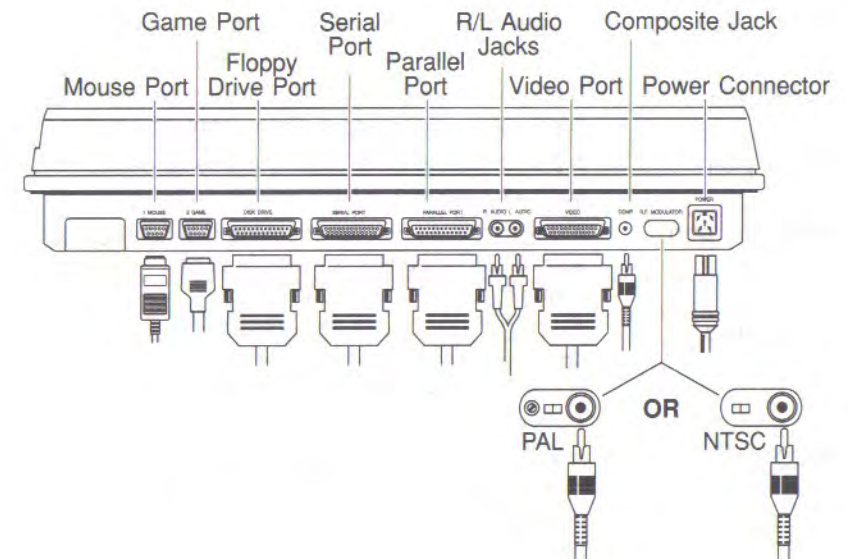


Figure 1-5. A1200 Rear Panel

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

Table 1-1. Rear Panel Ports

| Port | Description |
|--|---|
| MOUSE/ CONTROLLER ports | Two 9-pin male ports for attaching a mouse, joystick, light pen, or other controller. Attach the mouse to port 1, marked MOUSE. See page 1-7 for more information. |
| FLOPPY port | A 23-pin female port for attaching an external floppy drive. See page 1-13 for more information. |
| SERIAL port | A 25-pin male port for attaching a serial device such as a modem, MIDI interface, or serial printer. |
| PARALLEL port | A 25-pin female port for attaching a parallel device such as a Centronics compatible printer or a scanner. |
| AUDIO jacks | Two RCA jacks for attaching the Amiga's left and right audio output to a monitor, speakers, or stereo system. For detailed information, see "Audio Options" on page 1-12. |
| VIDEO port | A 23-pin male port for attaching an analog RGB monitor to view the Amiga's video output. For detailed information, see "RGB Monitors" on page 1-8. |
| COMP jack | An RCA jack for attaching a composite video monitor or connecting to a video cassette recorder. For detailed information, see "Composite Monitors" on page 1-9. |
| RF MODULATOR | An RCA jack for connecting to a television. The associated controls vary depending on whether the Amiga is NTSC or PAL. For detailed information, see "NTSC Televisions" on page 1-9 or "PAL Televisions" on page 1-10. |
| POWER port | A square, 5-pin female port for attaching the Amiga's power supply. |

Note Refer to Appendix F for technical information on the external ports.

Tips for Using the Mouse



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

When using the mouse:

- Leave a clear area approximately 30 centimeters (12 inches) square to the right or the left of the Amiga so that 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.
- Using a mouse pad helps keep the mouse from getting dirty and makes it respond better.

Video Options

The A1200 has three display outputs, allowing you to use a variety of display devices.

| Display Output | Display Device to Connect |
|--------------------------|---|
| VIDEO port | Analog RGB monitor (multiscan/15 kHz/VGA/SVGA) Television with SCART connection |
| COMP jack | Composite monitor Television (using VCR video input) |
| RF MODULATOR jack | NTSC television PAL television |

See the documentation for your graphics expansion hardware and your monitor for specific information about making the proper connections. See Appendix B for information on RGB monitor types

and choosing a monitor. Your dealer can help you choose the right combination of graphics hardware, monitor, and monitor cable or adapter for your use.

RGB Monitors

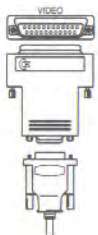
An RGB monitor gives the highest quality picture and allows you the widest selection of the Amiga's many display modes. Several types of analog RGB monitors can be used with the A1200, including multiscan, 15 kHz, and VGA/SVGA monitors.

- A multiscan (multiple horizontal scan rate or "multi-sync") RGB monitor provides the greatest flexibility. A multiscan monitor is required if you wish to use display modes that have different horizontal scan rates.
- A 15 kHz analog RGB monitor can display only the Amiga's default display mode and other 15 kHz scan rate modes.
- A VGA or SVGA type monitor can display the Amiga's de-interlaced and higher resolution modes, but not the standard 15 kHz video modes.
- With the proper adapter cable, a television with a SCART input can be used as a 15 kHz RGB monitor. See the "SCART Televisions" section on page 1-11 for more information.

Connecting an RGB monitor

Some RGB monitors can be connected directly to the A1200 VIDEO port, while others require an adapter.

Connect a 15 kHz monitor, such as the AMIGA Technologies 1084 or 1084S, that has a 23-pin female connector directly to the A1200 VIDEO port.



For a monitor such as a multiscan, VGA, or SVGA model that has a small 15-pin VGA-style connector, you require a 23-pin to 15-pin adapter. (This adapter, Part Number 390682-01, is available from your AMIGA Technologies dealer or service centre.) Connect the adapter to the VIDEO port, then connect the monitor cable to the adapter.

Composite Monitors

Use a connector cable with a male RCA-type plug at one end and a plug compatible with your monitor input to connect a composite monitor. Plug the RCA end into the Amiga's composite output jack (labelled COMP) and the other end into the composite input jack on the monitor.

You can also plug this end of the cable into a VCR that has a composite input (usually an RCA-type jack labelled VIDEO IN or EXTERNAL VIDEO). This allows you to record Amiga output onto video cassette and use a television connected to the VCR for the Amiga display.

This method provides a higher quality picture than using the RF modulator output to connect to the VCR or television antenna inputs. However, only the standard 15 kHz display modes can be displayed this way. An RGB monitor is required to properly reproduce the Amiga's de-interlaced and higher resolution display modes.

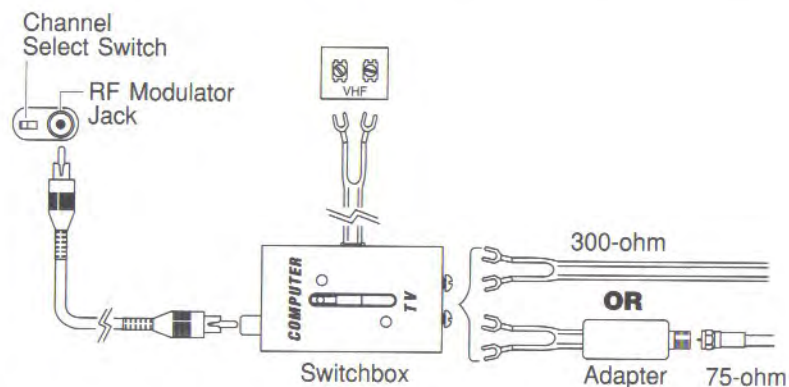
NTSC Televisions

Connecting an NTSC television requires a computer/TV switch box and a connector cable with male RCA-type plugs at both ends. If your television reception is through a coaxial cable with a round F connector you also need a 75-ohm to 300-ohm adapter. These items are available from department or electronics stores.

If you have a VCR or television set with a composite video input (an RCA jack usually labelled VIDEO IN or EXTERNAL VIDEO) you should use the composite output as described in the "Composite Monitors" section. This is simpler and produces a better picture. If your TV or VCR has antenna inputs only, use the following procedure:

1. Disconnect the cable or VHF antenna wire from the TV or VCR.
2. For coaxial cable: connect the end of the cable to a 75-ohm to 300-ohm adapter.
3. Connect the VHF antenna or adapter leads to the CONNECT TO ANTENNA terminals on the switch box.

4. Connect the short twin-lead wire on the side of the switch box to the VHF terminals on the TV or VCR.
5. Plug one end of the connector cable into the RF MODULATOR jack on the Amiga.
6. Plug the other end of the connector cable into the COMPUTER jack on the switch box.



7. Set the Channel Select switch to the left for channel 3 or to the right for channel 4, whichever is not used in your geographical area.
8. Select the COMPUTER switch setting on the switch box.

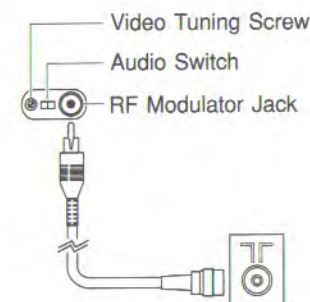
Audio output from the Amiga will use the television's speakers. You can also connect the Amiga audio outputs as described in the "Audio Options" section on page 1-12.

PAL Televisions

If you have a PAL VCR or television set with a SCART input, see the "SCART Televisions" section on page 1-11. If your TV or VCR has a composite video input (a jack usually labelled VIDEO IN) you should use the COMP output as described in the "Composite Monitors" section on page 1-9. Either of these methods is simpler and produces a better picture than using the RF MODULATOR output.

Connecting a PAL television with only an antenna input requires a connector cable with a male RCA-type plug at one end and a standard 75-ohm PAL connector at the other end. Use the following procedure:

1. Insert the PAL end of the connector cable in the 75-ohm antenna jack on the TV.
2. Insert the RCA-type end of the cable in the RF MODULATOR jack on the Amiga.
3. Plug in and turn on the Amiga (see the section "Powering Up the Amiga" on page 1-13).
4. Turn on the TV and tune it to channel 36.
5. Use a small flat-blade screwdriver to turn the A1200 Video Tuning screw near the RF MODULATOR jack until the picture is clear and stable.
6. Run some software that produces sound, such as a game.
7. Set the PAL Audio switch to the left or right position, whichever gives the best sound.
8. Turn off the Amiga and disconnect it from power if you have any other equipment to connect.



Audio output from the Amiga will use the television's speakers. You may also connect the Amiga audio outputs as described in the "Audio Options" section on page 1-12.

SCART Televisions

Use a SCART/RGB adapter cable to connect the Amiga to equipment with a SCART connector. Insert the 23-pin end of the cable into the VIDEO port on the Amiga and the RCA plugs into the left and right Amiga audio jacks. Insert the SCART connector on the other end of the cable into the connector on the equipment.

Audio output from the Amiga will use the television's speakers. You may also connect the Amiga audio outputs as described in the "Audio Options" section.

Note Since the definition of the SCART interface varies somewhat among TV manufacturers, consult an electronics or computer dealer to get the proper SCART adapter cable for your TV.

Audio Options

Two RCA jacks (female ports) labelled R AUDIO and L AUDIO connect the Amiga's left and right sound channels to a monitor with speakers or audio equipment. You need to connect these to hear sound from your Amiga unless you are using an RF connection to a TV or VCR.

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, colour-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. Either use a Y adapter cable plugged into both Amiga audio jacks or plug a single audio cable into either one of the jacks. Insert the other end of the cable into the monitor's audio input jack. Both audio channels are routed to the monitor speaker.

Audio Connection to Other Equipment

If your monitor does not have speakers, you can connect the Amiga's audio output to self-powered speakers, a stereo system, or other audio equipment. Use input ports on the equipment labelled Auxiliary, Aux, Audio In, CD, Tape, or VCR Audio. 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.

Attaching an External Floppy Drive

To attach an external 3.5-inch floppy drive to the Amiga, use the port labelled DISK DRIVE. The drive must be Amiga compatible, with a 23-pin male port. This drive is device DF1:. A second external floppy drive attached to a pass-through port on a DF1: drive would be device DF2:.

Powering Up 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.

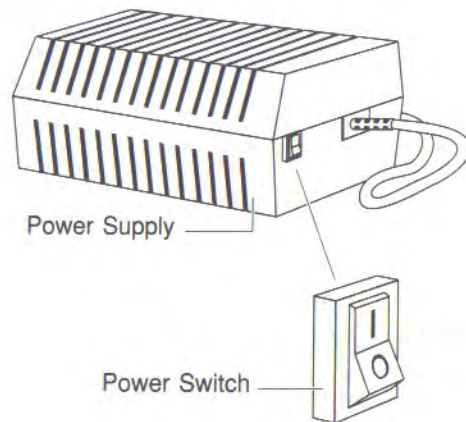
1. Connect all peripheral equipment as described in the previous sections.
2. Plug in peripherals to power.

3. Attach the Amiga power cable to the port labelled POWER up the rear of the A1200.

In the United States and Canada the Amiga power cable has a square 5-pin male connector at one end, the power supply in the middle, and a standard 3-prong male power plug on the other end. The system power switch is on the power supply.

Note Different countries may use other power cable designs. Be sure your Amiga matches the electrical voltage requirements 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. Turn on the Amiga by turning the power switch on the power supply to the on (I) position.



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 Floppy-Based Systems

Booting a floppy-based Amiga (a system without a hard drive) requires you to insert one or more of the software disks you received with the Amiga. Which disks you have to insert depends on how you set up your work disks for use.

Please see Appendix D, "Floppy-Only Systems," for detailed instructions on booting and using a floppy-based Amiga.

Booting Hard Disk-Based Systems

The Amiga automatically boots if your system has a hard disk. You do not need to insert any floppy disks. Hard disk users may boot from floppy, however, by inserting a bootable disk in DF0: before rebooting or turning the Amiga on.

Booting from hard disk generally takes about 30 seconds. When the process is complete, you should see a screen similar to that illustrated in Figure 2-1.

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 Chapter 5.

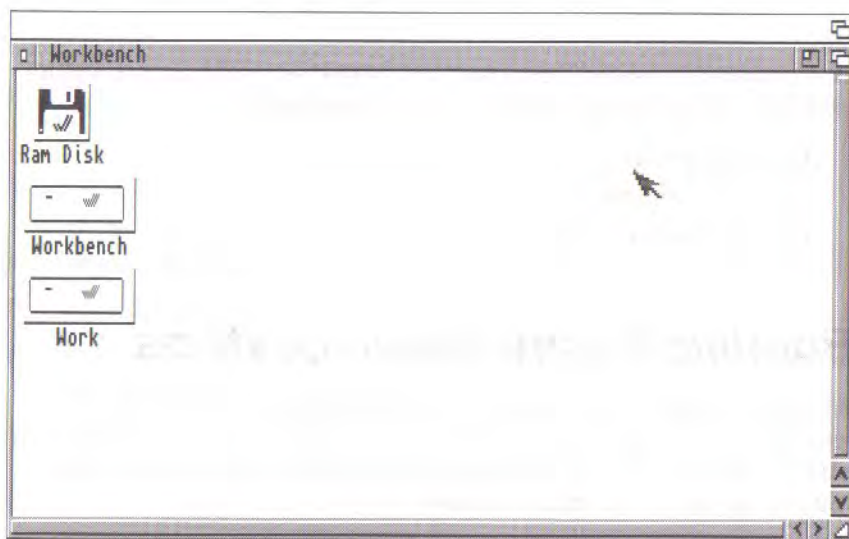


Figure 2-1. Workbench Screen

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 the 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 down or rebooting.

2. Remove any disks from the floppy drives.
3. Press the power switch on the side of the power supply to the off (O) position. The power light on the right front of the Amiga goes out.
4. Turn off the monitor and any peripherals.

Note If you want to turn the Amiga on again immediately, wait at least 30 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.

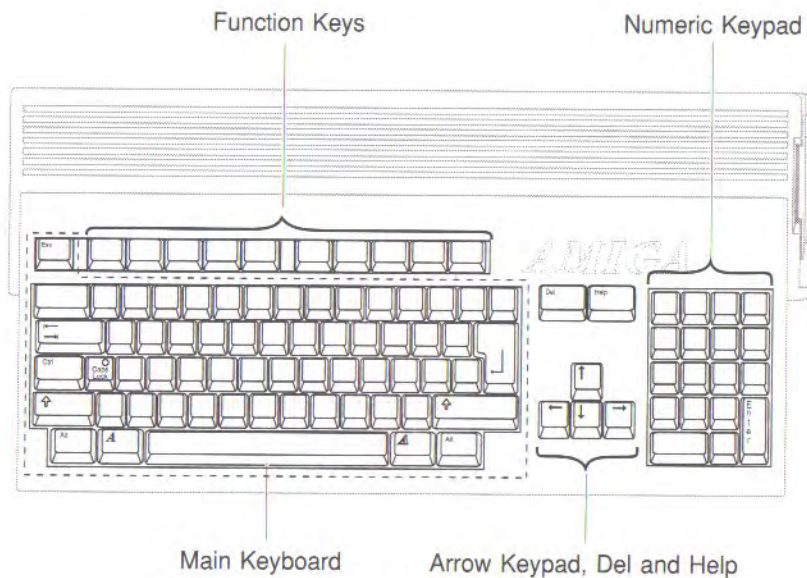

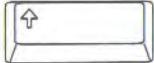





Figure 2-2. Amiga Keyboard

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 keycap 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 often used with other keys to perform special functions. |
| 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 <i>Workbench User's Guide</i> for details. | |

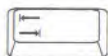
Other special keys include the following:

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 labelled F1 to F10, are programmable keys. Applications can define these keys to activate special functions or may allow you to define them.

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 to 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 may 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.

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 might 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 a 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 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.

| | |
|---------------------------|------------------------------|
| Move left | Either Amiga key+left arrow |
| Move right | Either Amiga key+right arrow |
| Move up | Either Amiga key+up arrow |
| Move down | Either Amiga key+down arrow |
| Left mouse button | Left Alt+left Amiga |
| Right mouse button | 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

Before Expanding Your System

You can expand your system by installing both internal and external options. Before you expand your system, use the information provided in this chapter to understand the expansion options for the Amiga and the safety requirements that must be followed to protect yourself and your equipment.

This chapter summarizes the expansion options for the Amiga other than peripherals connected to the rear panel ports. In all cases, see the installation manual for the option you are installing for detailed information on how to install it.

The A1200 can accommodate several types of expansion options:

- Memory expansion
- Drive expansion
- CPU expansion
- PCMCIA expansion

Memory Expansion

The amount of random access memory (RAM) in the A1200 is expandable to 10 megabytes (10 MB). All RAM automatically configures and is 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. The A1200 can use up to 2 MB of Chip RAM and 8 MB of Fast RAM.

Chip RAM on 1 MB machines can be expanded to 2 MB of 32-bit memory with an internal expansion module. (An expansion module can also contain a battery-backed clock/calendar.)

Up to 4 MB of 32-bit Fast RAM can be added using the CPU slot. (A CPU slot board containing its own microprocessor, such as a 68030 accelerator, could contain more than 4 MB of Fast RAM.) An additional 4 MB of 16-bit memory can be added using the PCMCIA memory card slot.

Drive Expansion

The A1200 can accommodate a 2.5-inch hard drive internally. The A1200 contains a built-in 16-bit Intelligent Drive Electronics (AT IDE) hard disk controller, to which the hard drive can be connected.

External storage devices such as a CD-ROM, tape, or hard drives may be added using the PCMCIA slot. (An external drive may require a controller, such as a SCSI adapter, in addition to the drive itself.)

CPU Expansion

The 150-pin CPU slot accessible through the door in the bottom of the A1200 can accommodate various types of expansion. This includes accelerator boards, additional RAM, PC emulators, and other options that need direct access to the Amiga's internal hardware.

PCMCIA Expansion

The PCMCIA "credit card" slot is a standard, general purpose expansion connector. It allows you to use a wide range of expansion options, such as additional system RAM, modems, ROM card

applications, networking hardware, SCSI adapters, and so on. PCMCIA devices are available for compact computers from various manufacturers. These options can be connected and disconnected easily, without the need to open the computer. Only one PCMCIA expansion item at a time can be used.

The next chapter contains details on PCMCIA expansion.

When Installing Internal Options

This section gives general information on installing Amiga expansion options.

Note Because optional items from different manufacturers can occasionally have unforeseen interactions, AMIGA Technologies strongly recommends that new expansion devices be tested first without any other expansion devices connected. If you experience problems after installing any device, try removing any other optional items from the system, and test the new item by itself, then in various combinations with other items. Often a solution to the problem can be found when the interacting items are identified.

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

Chapter 4

Using PCMCIA Cards

The card slot in the left side of the A1200 accepts a standard 68-pin memory or accessory card that complies with the PCMCIA 2.0 specification.

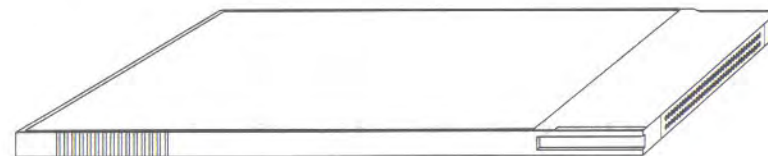


Figure 4-1. Typical PCMCIA Card

Although any PCMCIA 2.0 compliant products should work properly together, some cards and accessories may be designed with a particular type of computer in mind. You should check with your Amiga dealer to help you determine whether a certain item will work as expected.

Inserting and Removing Card Slot Devices

To use a memory card or a card slot accessory, insert the edge of the connector that has the row of small holes into the slot in the left side of the Amiga, as illustrated in Figure 4-2. A memory card's label should be facing up. Only about 3 cm (1 inch) of the card or accessory connector enters the slot. Insert it firmly, but do not use excessive force—it does not click into place.

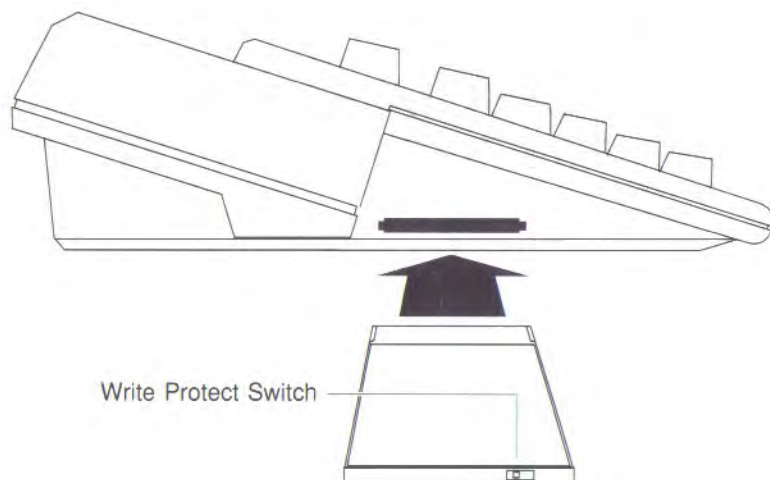


Figure 4-2. Inserting a PCMCIA Card

Unlike with other types of expansion devices, the A1200 allows the safe insertion and removal of cards while it is turned on. However, some caution must be taken. Removing a card or card slot accessory that is in use will interrupt its operation and almost certainly will produce undesired or unexpected results, as noted in this chapter's final section.

Memory Cards

Memory cards can function as expansion RAM or as disk-like storage devices. Use the PrepCard utility, described in the *Workbench User's Guide*, to prepare memory cards for use either as RAM or as a "card disk."

Write-Protection

Like floppy disks, memory cards can be write-protected. There is a small switch on the edge of the card opposite the end that goes into the slot. You can use the point of a pen or a similar implement to move the switch back and forth to write-protect or write-enable it.

Card Battery

Static RAM (SRAM) memory cards have a small battery to allow the card to retain the data stored in the card's memory chips after it has been removed. The batteries are long-lasting, but must eventually be replaced when they run down for the card to continue functioning.

Cards Prepared as RAM

When prepared as system RAM, the card memory is added to the other memory in the Amiga, just as if additional memory were installed internally. Cards are available in many sizes, from 64 KB to over a megabyte. A maximum of 4 MB of RAM may be added using the card slot.

A memory card must be write-enabled and inserted before you boot or reboot for its memory to be added to the Amiga's RAM. Card memory is added to Fast memory. The total number of bytes of available Fast RAM is shown in the Workbench screen title bar as "other mem".

Cards Prepared as Disk

A card disk is used much as a floppy disk is used: you can read from and write to the card as you normally do, from applications, the Workbench, or the Shell. The contents of the card remain even when you remove the card or turn off the Amiga. Read and write operations using memory cards are very fast.

You can insert and remove the card while the Amiga is turned on. However, wait a few seconds after attempting any card disk access before you remove the card to be sure the disk activity has finished.

ROM Applications

Games or other applications may be available on PCMCIA ROM cards. To be usable on the A1200, the application must be written specifically for the Amiga. A PCMCIA ROM application can "take over" the Amiga, preventing multitasking (running the Workbench, or other applications). See the ROM card's documentation for more information.

Other Devices

Accessories, such as modems or network adapters having a PCMCIA connector, can also be attached with the card slot. Directions for using these items are included with the device.

Notes on Insertion and Removal

- Only one memory card or accessory may be inserted at a time.
- Removing a ROM application card or a memory card that is currently in use as RAM immediately reboots the Amiga.
- Do not write-protect a memory card while it is in use as RAM—this causes the Amiga to lock up, requiring you to reboot.
- Do not remove a card disk immediately after attempting an open or save operation on it.
- Removing an accessory such as a modem or network adapter while it is operating immediately breaks its communication connection.
- Removing an accessory, such as a SCSI adapter, that connects to storage devices while it is operating may cause a disk error, damaging files or directory structures on the associated storage devices.

Chapter 5

Help With System Problems

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 centre 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 other than the PCMCIA slot, including the mouse and game controllers. 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 floppy disks, hard disks, and PCMCIA card disks. When floppy or hard disk activity is in progress, the drive activity light on the top of the computer is lit. (There is no drive activity light for a card disk.) Interrupting disk activity (by removing a disk from its drive, rebooting, or powering down) can cause disk errors. Always wait a few seconds after the drive activity lights seem to 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 Startup

The system initialization sequence 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 the following CPU and keyboard tests to verify basic system operations:

- Disables and clears all DMA and interrupts
- Checks the general hardware configuration
- Performs checksum test on ROMs

- Sets up temporary exception processing
- Tests the Chip RAM
- Tests Custom IC register addresses
- Checks to see if the system software is operating properly
- Restores the screen

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 colour 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 centre to correct the problem. The following screen colours represent the results of the system startup tests:

| Test Status | Colour | Description |
|-------------|------------|--|
| Passed Test | Light Grey | 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 (GURU) |

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 Preferences 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?

Appendix A Technical Specifications

| | | |
|----------------------------|---|--|
| Clock Speed | NTSC | 14.32 MHz |
| | PAL | 14.19 MHz |
| Processor | Surface-mount Motorola 68EC020 microprocessor | |
| Custom Chips | AGA multichip coprocessor system (Alice, Lisa, Paula) for video, graphics, sound, and DMA | |
| Fast Memory | Expandable to 4 MB of 32-bit RAM in CPU slot, additional 4 MB of 16-bit RAM in PCMCIA card slot | |
| Chip Memory | 1 MB or 2 MB of 32-bit RAM; second megabyte on motherboard or on internal expansion module | |
| ROM | 512 KB | |
| External Interfaces | Mouse / Game | (DB9 male, two) |
| | Serial | (DB25 male, RS-232, PC-compatible) |
| | Parallel | (DB25 female, Centronics-compatible) |
| | Floppy | (DB23 female, standard Amiga) |
| | Memory card | (standard 68-pin PCMCIA 2.0) |
| | Video | (DB23 male, analog RGB / digital RGBI / SCART) |
| | Composite | (RCA, NTSC / PAL) |
| | RF modulator | (RCA, NTSC / PAL) |
| | Stereo audio | (RCA, two) |
| | | |
| Internal Interfaces | AT IDE | (40-pin header) |
| | CPU local bus | (150-pin edge) |

| | | |
|------------------------------------|--|--|
| Keyboard | Integral, 96 keys; international (configurable keymap) | |
| Internal Disk Drives | One internal 3.5-inch floppy drive standard (880 KB formatted maximum) | |
| | Mounting provisions for one 2.5-inch AT IDE hard drive | |
| External Disk Drives | Up to two compatible floppy drives | |
| | Additional drives possible as PCMCIA accessories | |
| Video Display | Output type | RGB, analog and digital; color composite; RF modulated; interlaced and non-interlaced; up to 8 bitplanes |
| | Compliance | NTSC and PAL |
| | Color palette | 16.8 million |
| | Horizontal scan rates | 15.6 kHz to 31.4 kHz |
| | Vertical scan rates | 50 Hz to 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 and your monitor specifications to help determine monitor compatibility. | |
| Sound | 4 independent voices configured as two stereo channels | |
| Power Supply | 23 watts, switching | |
| Environmental Specification | 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 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 Amiga systems.

Monitor Types

The Amiga requires an analog RGB (colour) monitor. There are three general types of analog RGB monitors that you might use with your Amiga. The difference among 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, however, as 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.

An Appendix in 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 |

- 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 sections in the *Workbench User's Guide* and your monitor manual.

Disk Problems

Booting Floppy-Based Systems

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

- Did you insert a copy of your Workbench disk when prompted by the animated sequence?
- Did you insert the floppy properly into the drive?
- Is the Workbench disk you inserted an exact copy of your original Workbench disk or a disk you know to be bootable?

If the Amiga does not boot from a given disk, try others that you know to be bootable. You should always keep your original, unmodified Workbench disk available in case of such a problem. See Appendices C and D for additional information.

If the Amiga will not boot from any floppy, even those you know to be good, then it is probable that the floppy drive or the computer itself has some hardware problem.

Notes on Hard Disk Systems

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?

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—probably is 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 connector improperly
- A drive is not connected to power or the power supply is overloaded
- A drive ID or unit number jumper is set incorrectly
- A drive controller 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 has the wrong ROM version
- A drive ribbon cable is faulty
- A drive is faulty

For solutions to these problems, also check:

- Sections on disk use in the *Workbench User's Guide*
- The *Amiga Hard Drive User's Guide*
- The drive's and drive controller's user manuals

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 might 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 may offer.

Installation Problems

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

- A board installed in the CPU slot is fully seated in the slot
- An accessory installed in the PCMCIA slot is fully seated in the slot
- A PCMCIA memory card is write-enabled when it needs to be
- All jumpers are set properly according to the documentation
- All peripherals were properly reconnected to the Amiga after installation

Maintenance Problems

- A floppy, removable media, or CD-ROM drive is dirty or out of alignment. Use a commercial cleaning product according to the drive manufacturer's directions, or have your dealer/service centre adjust 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 might have a hardware problem that requires professional attention. Have your Amiga examined by your Amiga dealer/service centre 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.

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 DbINTSC and DbIPAL monitor drivers.

| Monitor Driver | Horizontal Scan Rate | Vertical Scan Rate |
|----------------|----------------------|--------------------|
| DbINTSC | 27.66 kHz | 58 Hz |
| DbIPAL | 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 will work 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 DblINTSC and Super72 modes, a multiscan monitor must re-sync to the new scan rate. While the monitor adjusts itself, the image may jump, or the display may go blank briefly, depending on the monitor. This is normal and does not indicate a problem with the Amiga or the monitor.

Appendix C

Using Floppy Disks

Floppy disks are a type of portable magnetic recording media that is 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 floppy disk drive installed. This drive accepts standard double-density (880 KB storage capacity) floppy disks. Do not use high-density floppy disks (distinguished by a sensing hole in the corner opposite the write-protect tab) as these do not reliably store information written by a double-density drive.

Figure C-1 illustrates a floppy disk. Double-density disks have a write-protect tab in one corner and do not have a high-density sensing hole in the other corner.

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

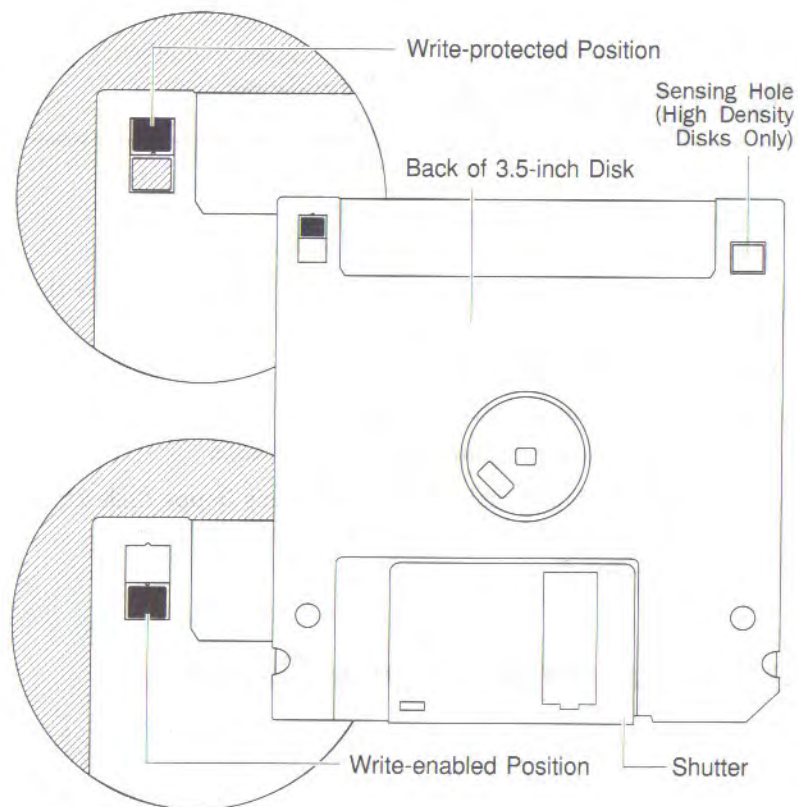


Figure C-1. 3.5-inch Floppy Disk

Figure C-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.

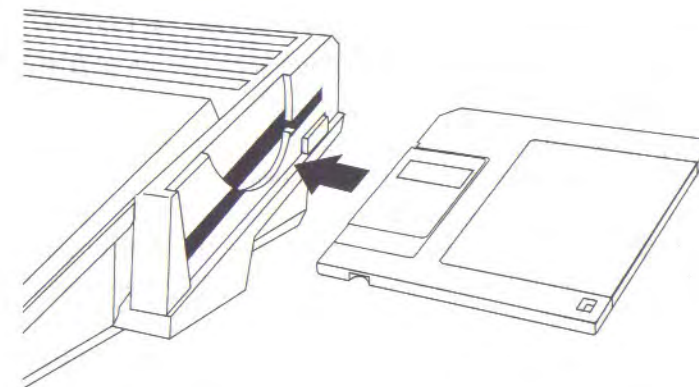


Figure C-2. Inserting a Floppy Disk

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, as there can be additional disk activity after it appears to have 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.
- If you regularly use floppy disks to transfer software and data between Amigas, particularly software that has been downloaded through a modem, keep application disks and your Amiga system disks write-protected. 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 doesn't contain anything you want to save. Formatting a disk erases all data stored on it.

Floppy disks may be formatted with the original Amiga 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 slightly decreases the amount of space on the disk.

The following options are available for formatting disks in the Amiga's floppy drive.

| Amiga File System | Approximate Formatted Capacity |
|-------------------|--------------------------------|
| OFS | 837 KB |
| FFS | 879 KB |
| DC-OFS | 837 KB |
| DC-FFS | 879 KB |
| CrossDOS | 720 KB |

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 D

Floppy-Only Systems

Working with floppy-based Amiga systems (those with no hard drive) differs compared to working with systems with hard drives. This appendix contains information for using a floppy-based Amiga under Release 3 of the Amiga system software.

Although you can use all features of your Amiga with one floppy drive, adding additional drives can make using your system easier. We recommend that you acquire a hard drive or external floppy drive as soon as possible. Adding RAM can also be effective for reducing the limitations of a floppy-only system.

Using This Appendix

If you have never used an Amiga before, read the introductory chapters of the *Workbench User's Guide* to familiarize yourself with Amiga terminology and using the mouse and menus.

Note In this and your other Amiga documentation, the Amiga Workbench3.x, Amiga Extras3.x, and Amiga Fonts floppy disks are referred to as the Workbench, Extras, and Fonts disks, respectively.

The following lists the basic tasks covered in this appendix:

- Booting the Amiga
- Making working copies of your system disks
- Rebooting from the Workbench working copy

- Copying information from your disks into memory
- Setting preferences
- Working faster on a floppy-based system

This appendix contains steps directing you to enter certain AmigaDOS commands. Familiarity with AmigaDOS is not necessary to use these commands; however, be sure to enter them as shown.

Booting Floppy-Based Systems

When a floppy-based Amiga is turned on, it looks for a bootable floppy disk in the internal floppy drive. This disk can be a copy of your Workbench disk or a bootable application disk.

If a bootable disk is not found, the Amiga displays an animated screen showing a disk being inserted into a drive. Inserting a bootable floppy disk into the drive causes the screen to go blank while the Amiga loads the necessary system information from the disk. The Amiga may need information from other disks, such as Fonts or Locale. If so, insert these disks when prompted by requesters.

Booting from a Workbench floppy takes from 30 seconds to a minute, depending on your language and font settings. When the process is complete, you should see a screen similar to that illustrated in Figure D-1.

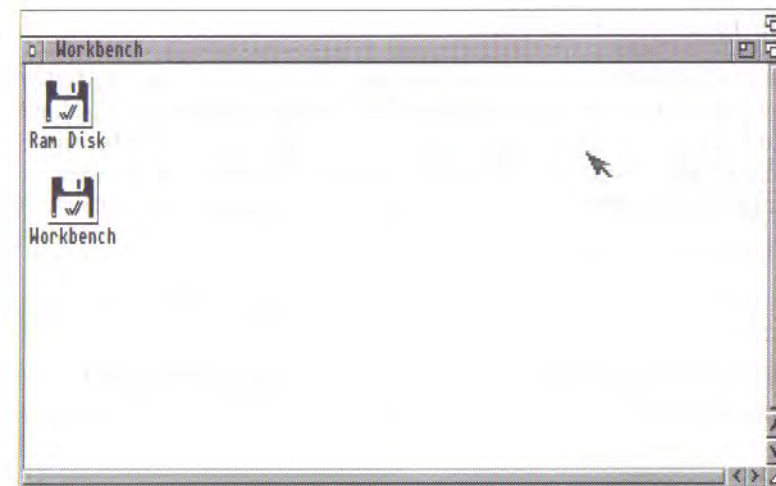


Figure D-1. Floppy System Workbench Screen

Using Different Languages

The Amiga's localization features allow you to select any of several languages for displaying Workbench menus, gadget labels, requesters, and other messages. However, selecting a language other than English requires you to load the text for that language from the Locale disk whenever it is needed, which can lead to frequent disk swaps on floppy-only systems.

Boot Tasks

This section describes booting a floppy-based Amiga for the first time and setting your Preferences, including selecting a language other than English. Note that before alternate language settings are chosen and activated, the beginning portion of the system setup must be executed in English.

Booting for the First Time

Once your Amiga system is set up and connected according to the directions in this manual, allow thirty minutes to an hour to boot, make backup copies of your disks, and make all your Preferences settings. Most settings need to be made only once, but you may wish to spend additional time experimenting with some options.

1. Turn on your monitor.
2. Insert the Workbench disk into the Amiga's internal floppy drive.
3. Turn on the Amiga and wait for the Workbench screen to be displayed.

Copying Your System Disks

After booting and before any other operations, you must create working copies of your Amiga system software disks. You will need blank 3.5-inch double-density floppy disks to make the copies, one for each system disk you received. Always use these copies when working with your Amiga. Store the original Workbench disks in a safe place for future use if necessary.

If you have an external floppy drive:

1. Insert a blank disk in the external drive.
2. Drag the icon of the Workbench disk over the blank disk's icon (labelled **DF1:????**) and release the mouse button.

If you do not have an external floppy drive:

1. Select the Workbench disk icon.
2. Choose Copy from the Workbench Icons menu.
3. Select the Continue gadget on the displayed requester. A bar-graph display shows the progress of the copy.
4. When prompted, remove the Workbench disk and insert a blank, write-enabled disk into DF0:.

5. Repeat the disk copy process for every disk you received. After each disk copy is complete, a second disk icon appears on the screen with the prefix **Copy_of_** before the disk name. Use the Rename menu item to remove the prefix.

Label each of the copies clearly and write-protect all of them, except the Workbench copy. Write-protect the disk by sliding the tab in the corner so that the hole is uncovered and open.

Rebooting

Insert the Workbench copy into DF0: and reboot the Amiga by pressing the Ctrl, left Amiga, and right Amiga keys at the same time and releasing them.

Copying Information From Your Disks

When you set your Preferences, the Amiga needs information from each of your system disks, normally requiring repeated disk swaps on floppy-based systems. The following procedure minimizes the amount of disk swapping by copying information to the Workbench disk or to the Amiga's internal memory.

If you have two floppy drives, you can leave the Workbench disk in DF0: most of the time and use the second floppy drive (DF1:) for the other disks as they are needed.

1. Open the Ram Disk icon following rebooting.
2. Insert the Locale disk.
3. Drag the Locale disk icon into the Ram Disk window.
4. When the disk activity stops, remove the Locale disk and insert the Storage disk.
5. Open the Storage disk icon.
6. Open the Printers, Keymaps, and Monitors drawers in the Storage disk window.

7. Drag the icons for the printer drivers, keymaps, and monitor drivers that you intend to use from the Storage disk's Printers, Keymaps, and Monitors windows to the Ram Disk window. Because there is limited space on the Workbench disk to which you will be copying these files, select only the files you need. Close the Printers, Keymaps, Monitors, and Storage windows.
8. Insert the Workbench disk. Open the Workbench disk icon.
9. Open the Devs drawer.
10. Copy the printer driver icons into the DEVS:Printers drawer by dragging them from the Ram Disk window to the Printers drawer icon.
11. Repeat for both the keymaps and the monitor drivers, copying them into DEVS:Keymaps and DEVS:Monitors, respectively.
12. Choose the Execute Command... menu item.
13. Type the command **ASSIGN LOCALE: RAM:Locale** and press Return or select the OK gadget.
14. Insert the Extras disk in the drive and open its disk icon.
15. Drag the Prefs drawer from the Extras window into the Ram Disk window.
16. When the Amiga finishes copying the Prefs drawer to the Ram Disk, remove the Extras disk and close its window.
17. Insert the Workbench disk.

Setting Preferences

To work in a language other than the default, English, you must first change the Preference settings for language, country, and keyboard type in the Locale and Input Prefs editors.

1. Open the Prefs drawer in the Ram Disk window.
2. Double-click on the Locale Preferences editor icon in the Prefs window. (If the Available Languages and Country lists are not full of choices, repeat Steps 2 - 3 and 12 - 13 in the previous section.)

3. Make your Locale settings. See the *Workbench User's Guide* for directions on using this and the other Preferences editors.
4. When your Locale settings are made and the name of your chosen language appears at the top of the Preferred Languages list, select the Save gadget. The Workbench resets and displays the menus, requesters, and messages in the selected language.
5. Run each of the other Preferences editors similarly, saving your preferred settings for keyboard, display mode, printer driver, and so on. Insert system disks when prompted.
6. When all of your preferences are set, reboot the Amiga to clear the Ram Disk and activate the saved Preferences settings.

If you saved Preferences settings for Locale and Font, the Amiga must access information from the Locale and Fonts disks to boot. This requires several disk swaps, slowing the boot process. Cancelling the requesters that ask for disks during booting causes the system to use the default settings: English/USA for language and country, Topaz 8 for system fonts.

Subsequent Preferences Editing

To make adjustments to your Preferences settings in future computing sessions, use the same method described above:

One floppy drive:

1. Copy the Prefs editors you want to use from Extras to the Ram Disk.
2. Insert the Workbench disk and run the desired editor.

Two or more floppy drives:

1. Keep the Workbench disk in DF0:.
2. Insert the Extras disk in DF1:.
3. Load and run the editor from the Extras disk.

To make available additional selections for keyboard type, printer driver, or Workbench display mode, you must copy the appropriate keymap, driver, or monitor file from the Storage disk to the Workbench disk, as described in Steps 4 - 11 in the "Copying Information From Your Disks" section on page D-5.

Working Faster with Floppies

Disk swapping can be minimized by copying to your Workbench disk the information normally needed from other disks or by copying some information to the Ram Disk.

The following sections explain how to use AmigaDOS to minimize disk swapping and maximize your available work space with the following:

- Making commands resident
- Removing files from your Workbench disk
- Making directory assignments
- Using the Ram Disk
- Using RAD:
- Using directory caching on floppy disks

You can enter the AmigaDOS commands shown using the Execute Command... menu item or in a Shell window. Type in the command and press Return to enter it. If you will be entering several commands, using the Shell is more convenient.

Making Commands Resident

The RESIDENT command allows you to copy other AmigaDOS commands into the Amiga's memory, making them resident. Resident commands are available without requiring insertion of the Workbench disk each time the command is used. AmigaDOS users with floppy-based systems are advised to make frequently-used commands resident for quick access and reduced disk swapping.

Since resident commands use RAM space, make resident only those commands you use most often. The more RAM in your system, the

more commands you can make resident. Use the LIST command to show an approximation of the memory each command uses. For example, entering **LIST C:COPY** produces output similar to this:

```
Directory "Sys:C" on Monday 15-Jun-92
copy          5496 --p-rwed 03-Jun-92 17:22:02
```

The size of the file appears to the right of the filename. It shows that the COPY command uses approximately 5.5 KB of RAM if made resident.

Recommendations

To conserve as much memory as possible for your applications, make resident only the AmigaDOS commands and programs that you use frequently and are not built into Workbench. These include ASSIGN, ED, STATUS, Format, and DiskCopy. If you have sufficient memory and you use AmigaDOS regularly, you can also make resident commands that have Workbench equivalents, such as COPY, DELETE, DIR, LIST, MAKEDIR, and RENAME.

Do not make resident commands that are not used often, such as the startup command ADDBUFFERS. The following commands cannot be made resident: BINDDRIVERS, IPREFS, LOADWB, and SETPATCH.

To make a command resident, include the full path to the command. For most AmigaDOS commands, which are stored in the C directory, the path is C:, as in the following:

```
RESIDENT C:ASSIGN
RESIDENT C:COPY
RESIDENT C:DELETE
RESIDENT C:DIR
RESIDENT C:ED
RESIDENT C:LIST
RESIDENT C:MAKEDIR
RESIDENT C:RENAME
RESIDENT C:STATUS
RESIDENT SYS:Utilities/MultiView
RESIDENT SYS:System/DiskCopy
RESIDENT SYS:System/Format
```


Making these commands resident uses approximately 89 KB of RAM. To have the commands available at all times, place the statements in S:User-startup as follows:

1. Enter the command **ED S:User-startup** in the Shell.
2. Type in the RESIDENT commands above as shown, each on a separate line.
3. Press Esc,X,Return.

Enter the command RESIDENT with no arguments to list the Internal and resident commands.

Making Room on Your Workbench Disk

Copying printer drivers, fonts, and Preferences editors to your Workbench disk makes them readily available. However, a **Volume Workbench is full** requester can result if you try to copy too much to your Workbench disk. It is possible to delete files from the Workbench disk to make room for other files.

Caution When working with your Workbench disk, use a backup copy of the original disk that came with your system. Your original Workbench disk should never be altered, in case you need to restore files or directories from it.

Deleting any system software results in some limitation of your Amiga's capabilities and can possibly cause an error if an application attempts to use a file that was deleted. If you experience an unexpected requester or error, repeat the same operation using the original Workbench disk. If no error occurs, the application uses something that was deleted and it should be restored.

Document all changes that you make to your system disks. Adding a comment in the disk's User-startup file can remind you that you are working with a non-standard Workbench disk.

What You Can Delete

- Delete files from your Workbench disk starting with the least critical files, such as the Clock program, and programs that do not apply to your system, such as C:MAGTAPE if you do not use a tape drive and System/NoFastMem if you do not have any Fast ("other") memory.
- Delete the AmigaDOS text editor C:EDIT to free approximately 18 KB of disk space.
- If you do not need to use CrossDOS, delete DEVS:mfm.device, L:CrossDOSFileSystem, and L:FileSystem_Trans, to free approximately 33 KB.
- Deleting everything in REXXC, in addition to System/RexxMast, System/RexxMast.info, LIBS:rexsyslib.library, and LIBS:rexsupport.library frees almost 50 KB of disk space. However, we do not recommend this since many Amiga applications use ARexx and must call upon these files.
- Deleting the contents of the Classes directory can save about 115 KB; however, this contains subdirectories that other programs use. The Classes/DataTypes directory, for example, is used by MultiView and should not be deleted if you wish to use that program to view files. The Classes/Gadgets directory is used by the Palette Preferences editor and should not be deleted if you wish to change your colour settings.

What Not to Delete

Do not delete the following under any circumstances:

- Any directory normally found on the Workbench disk; delete only the files within directories
- DEVS:parallel.device
- DEVS:printer.device
- DEVS:serial.device
- LIBS:asl.library
- LIBS:commodities.library
- LIBS:diskfont.library
- LIBS:iffparse.library

- LIBS:locale.library (if your language and country are not English and united_states)
- S:Startup-sequence
- L:Port-handler
- Any non-Internal command that appears in the default Startup-sequence

Do not delete any file whose purpose you do not know. Do not delete more files than necessary to fit the new material you intend to add to the disk.

Using the ASSIGN Command

The AmigaDOS ASSIGN command is an important tool for the floppy-only user. It allows you to control where the Amiga looks for the commands and programs it needs. AmigaDOS uses certain standard assigned names to access the directories that contain specific types of files, such as fonts and language files. The assignments you are most likely to change are LOCALE:, FONTS:, LIBS:, and C:.

In some circumstances, such as when you want to prevent the Amiga from requesting another floppy disk, ASSIGN lets you direct AmigaDOS to somewhere other than the default location. For example, you can create a directory called Fonts on your Workbench disk, and copy your preferred fonts to it. When the name FONTS: is assigned to this directory, the Amiga looks there for its fonts, rather than requesting the Fonts disk.

Placing FONTS: on Your Workbench Disk

If you select anything other than the default Topaz 8 or 9 font in the Font Preferences editor, you are asked to insert the Fonts disk when booting so the Amiga can load the custom font. If there is enough room on your Workbench disk, you can copy the needed fonts to it, eliminating the need to insert the Fonts disk every time you boot.

Follow this procedure to copy a bitmap font such as Diamond or Helvetica to your Workbench disk:

1. Open the Ram Disk window.
2. Choose Show All Files from the Window menu.
3. Place your Fonts disk in the internal drive and open its disk window.
4. Choose Show All Files from the Window menu. A variety of file and drawer icons appear in the Fonts window. You can ignore the file icons in the Fonts window.
5. Drag the drawer icon with the name of the font you want to use into the Ram Disk window.
6. When copying is complete, remove the Fonts disk and insert the Workbench disk.
7. Open the Workbench disk window.
8. Choose New Drawer from the Window menu.
9. Give the new drawer the name Fonts in the Rename requester.
10. Drag the font drawer from the Ram Disk window to the new Fonts drawer.
11. When copying is complete, choose Execute Command... from the Workbench menu.
12. Enter the command **ASSIGN FONTS: SYS:Fonts** in the Execute Command requester.
13. Choose Execute Command... again.
14. Enter the command **FIXFONTS** in the requester.

The standard Startup-sequence checks for a directory on the boot disk called Fonts and automatically assigns FONTS: there if it is found. The next time you boot, the Amiga looks there for the fonts you selected and does not request the Fonts disk.

For access to more fonts than can fit on your Workbench disk, use an ASSIGN statement to add another disk or directory to the FONTS: assignment. To add a disk called FontDisk to the FONTS: assignment, enter the command **ASSIGN FONTS: FontDisk: ADD**

at a Shell or Execute Command prompt or place it in your S:User-startup.

PATH Option

Using the PATH option of the ASSIGN command reduces disk swaps by directing AmigaDOS to search any disk that is inserted in the floppy drive for the required command. Normally AmigaDOS requests the original boot disk even if the currently inserted disk contains the necessary file.

Add the following commands to your S:User-startup to use the PATH option:

```
ASSIGN LIBS: DF0:Libs PATH
ASSIGN DEVS: DF0:Devs PATH
ASSIGN C: DF0:C PATH
ASSIGN L: DF0:L PATH
ASSIGN FONTS: DF0:Fonts PATH
```

Then copy the directories from the Workbench disk onto application disks that require them.

Using the Ram Disk

On a floppy-only system, using the Ram Disk (RAM:) reduces the amount of disk swapping required for floppy-to-floppy transfers.

For example, the most efficient way to copy information from one disk to another on a single-floppy system is to copy the information from the source floppy to the Ram Disk, then remove the source floppy, insert the destination disk, and copy the information to it from the Ram Disk. This is illustrated in the "Copying Information From Your Disks" procedures on page D-5.

Using the Ram Disk can also speed work with groups of related files. You can load files into RAM: as a group, work with them individually while they are in RAM:, and then copy them back to the floppy disk as a group when the operation is finished.

Note You cannot copy a disk to RAM: by dragging the source disk icon over the Ram Disk icon. To copy a disk to RAM:, open the Ram Disk icon and drag the floppy disk icon into the Ram Disk window to create a drawer with the name and contents of the floppy disk.

Recoverable Ram Disk

AmigaDOS also provides a recoverable Ram Disk, which has the device name RAD:. The contents of RAD: survive reboots and most software failures, making it a safer place for work files. (Data in RAD: is still lost if the Amiga is turned off.)

RAD: is not automatically created. To activate a recoverable Ram Disk, double-click on the RAD icon in the DOSDrivers drawer of the Storage disk. To start RAD: whenever you boot, copy the RAD icon to the Devs/DOSDrivers drawer on the Workbench disk. When RAD: has been activated, a disk icon labelled RAM_0 appears on the Workbench screen.

Unlike RAM:, the size of RAD: is fixed. The size is set in the RAD: mount file's HighCyl parameter. Change its size by entering a different value for HighCyl. A HighCyl entry of 79 results in a RAD: with the same capacity as a normal 880 KB floppy disk.

A Bootable RAD:

On an Amiga with more than 2 MB of RAM, you can create a floppy-size RAD:. By copying your Workbench files into this RAD: and re-assigning to it all the directories normally assigned to the Workbench disk, it can be used as a recoverable Workbench-in-RAM. This allows you to reboot from RAD: instead of from the Workbench disk.

You can also set up multiple RAD: devices of different sizes by copying the RAD: mount file and changing the name and unit number.

Using Directory Caching on Floppy Disks

Release 3 of AmigaDOS provides a directory cache option for disk formatting. Disks formatted with this option open their windows and perform most disk operations faster than regular disks. This is especially noticeable on floppy-based systems.

To format a disk with the directory cache option, select the Directory Cache gadget in the Format window. For best performance, also select the Fast File System gadget.

Directory Caching on System Disks

To use directory caching on your system disks, copy the contents of the disk to a disk you have formatted with the Directory Cache option. Do this the way you normally copy files and directories:

1. Open the system disk window.
2. Choose Show All Files and Select Contents from the Window menu.
3. Hold down Shift.
4. Drag all the selected icons to the destination disk.

This method, rather than a standard disk copy, is necessary to preserve the directory cache formatting of the destination disk.

The following apply when using directory caching on floppy disks:

- Disks formatted with directory caching hold slightly less than if formatted without directory caching. The exact capacity depends on the number of items on the disk.

Before copying a full system disk to a directory caching floppy, you might need to delete something from the system disk to fit everything on the destination disk.

- Disks formatted with directory caching are not compatible with pre-Release 3 Amigas.

Appendix E

Amiga Character Set

The Amiga uses the ECMA-94 Latin 1 International 8-bit character set. The following tables list the printable characters in the lower and upper portions of the character set, by character code.

Table E-1. Amiga Character Set (lower)

| Code | Code | Code | Code | Code | Code |
|-------|------|------|------|-------|-------|
| 32 sp | 48 0 | 64 @ | 80 P | 96 ` | 112 p |
| 33 ! | 49 1 | 65 A | 81 Q | 97 a | 113 q |
| 34 " | 50 2 | 66 B | 82 R | 98 b | 114 r |
| 35 # | 51 3 | 67 C | 83 S | 99 c | 115 s |
| 36 \$ | 52 4 | 68 D | 84 T | 100 d | 116 t |
| 37 % | 53 5 | 69 E | 85 U | 101 e | 117 u |
| 38 & | 54 6 | 70 F | 86 V | 102 f | 118 v |
| 39 ' | 55 7 | 71 G | 87 W | 103 g | 119 w |
| 40 (| 56 8 | 72 H | 88 X | 104 h | 120 x |
| 41) | 57 9 | 73 I | 89 Y | 105 i | 121 y |
| 42 * | 58 : | 74 J | 90 Z | 106 j | 122 z |
| 43 + | 59 ; | 75 K | 91 [| 107 k | 123 { |
| 44 , | 60 < | 76 L | 92 \ | 108 l | 124 |
| 45 - | 61 = | 77 M | 93] | 109 m | 125 } |
| 46 . | 62 > | 78 N | 94 ^ | 110 n | 126 ~ |
| 47 / | 63 ? | 79 O | 95 _ | 111 o | |

Table E-2. Amiga Character Set (upper)

| Code | Code | Code | Code | Code | Code |
|--------|-------|-------|-------|-------|-------|
| 160 sp | 176 ° | 192 À | 208 Ð | 224 à | 240 ò |
| 161 ¡ | 177 ± | 193 Á | 209 Ñ | 225 á | 241 ñ |
| 162 ¢ | 178 ² | 194 Â | 210 Ò | 226 â | 242 ò |
| 163 £ | 179 ³ | 195 Ã | 211 Ó | 227 ã | 243 ó |
| 164 ¤ | 180 ´ | 196 Ä | 212 Ô | 228 ä | 244 ô |
| 165 ¥ | 181 µ | 197 Å | 213 Õ | 229 å | 245 õ |
| 166 ¦ | 182 ¶ | 198 Æ | 214 Ö | 230 æ | 246 ö |
| 167 § | 183 · | 199 Ç | 215 × | 231 ç | 247 ÷ |
| 168 ¨ | 184 ¸ | 200 È | 216 Ø | 232 è | 248 ø |
| 169 © | 185 ¹ | 201 É | 217 Ù | 233 é | 249 ù |
| 170 º | 186 º | 202 Ê | 218 Ú | 234 ê | 250 ú |
| 171 « | 187 » | 203 Ë | 219 Û | 235 ë | 251 û |
| 172 ¬ | 188 ¼ | 204 Ì | 220 Ü | 236 ì | 252 ü |
| 173 - | 189 ½ | 205 Í | 221 Ý | 237 í | 253 ý |
| 174 ® | 190 ¾ | 206 Î | 222 Þ | 238 î | 254 þ |
| 175 ¯ | 191 ¿ | 207 Ï | 223 ß | 239 ï | 255 ÿ |

Appendix F

Input/Output Connector Pin Assignments

This section lists pin assignments (pinouts) for input/output ports 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 ports provide power outputs and non-standard signals. Attempting to use cables not wired specifically for the Amiga may damage the Amiga or the equipment you connect.

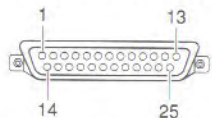
The descriptions that follow include specific warnings for each port. For more information about connecting peripherals, consult your Amiga dealer or service centre.

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.

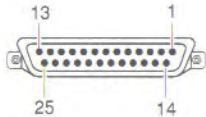
Caution Pins 9 and 10 on the Amiga serial port are used for external power. Connect these pins **ONLY** if power from them is required by the external device. The table lists the power provided by each of these pins.

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

| Pin | Amiga | RS232 | HAYES | I/O | Description |
|-----|--------|-------|-------|-----|---------------------------------|
| 1 | SHIELD | GND | GND | -- | Shield Earth |
| 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 Earth |
| 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



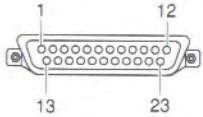
Caution Pin 14 on the Amiga parallel port supplies +5 volts of power. Connect this pin **ONLY** if the power from it is required by the external device. **NEVER** connect this pin to an output of an external device or to a signal earth.

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

| 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 Earth |
| 18 | GND | -- | Signal Earth |
| 19 | GND | -- | Signal Earth |
| 20 | GND | -- | Signal Earth |
| 21 | GND | -- | Signal Earth |
| 22 | GND | -- | Signal Earth |
| 23 | GND | -- | Signal Earth |
| 24 | GND | -- | Signal Earth |
| 25 | GND | -- | Signal Earth |

VIDEO Port

Connector type: DB23 male



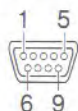
Caution Pins 21, 22 and 23 on the RGB monitor port are used for external power. Connect these pins **ONLY** if power from them is required by the external device.

Pins 16-20 are used for signal earth. **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 earth) |
| 14 | /PIXELSW | O | Genlock overlay (47 Ohm) |
| 15 | /C1 | O | Clock Out (47 Ohm) |
| 16 | GND | -- | Video Earth |
| 17 | GND | -- | Video Earth |
| 18 | GND | -- | Video Earth |
| 19 | GND | -- | Video Earth |
| 20 | GND | -- | Video Earth |
| 21 | -12V | -- | -12 Volts DC (10 mA) |
| 22 | +12V | -- | +12 Volts DC (100 mA) |
| 23 | +5V | -- | +5 Volts DC (100 mA) |

MOUSE/GAME Controller Ports

Connector type: DB9 male



To use a mouse to control the Workbench, you must attach it to the MOUSE port (port 1). You can attach joysticks, light pens, and other controllers to either of the ports.

Caution Pin 7 on both ports supplies +5 Volts DC (50 mA). Connect this pin **ONLY** if power from it is required by the external device.

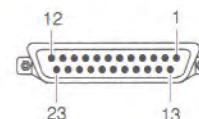
| Pin | Mouse / Trackball | Light Pen | Digital Joystick | Proportional Joystick | I/O |
|-----|-------------------|---------------|------------------|-----------------------|-----|
| 1 | V-pulse | n/c | /Forward | Button 3* | I |
| 2 | H-pulse | n/c | /Back | n/c | I |
| 3 | VQ-pulse | n/c | /Left | 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.

DISK DRIVE (floppy) Port

Connector type: DB23 female (external)

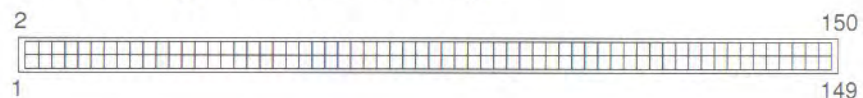


| Pin | Name | I/O | Description |
|-----|--------|-----|--|
| 1 | /RDY | I/O | Disk Ready |
| 2 | /DKRD | I | Disk Read Data |
| 3-7 | GND | -- | Earth |
| 8 | /MTRXD | OC* | Disk Motor Control |
| 9 | /SEL2 | OC* | Select Drive 2 |
| 10 | /DRES | OC* | Disk Reset |
| 11 | /CHNG | I/O | Disk Removed From Drive--Latched Low |
| 12 | +5V | -- | +5 Volts DC (250 mA maximum) |
| 13 | /SIDE | O | Select Disk Side--0=Upper, 1=Lower |
| 14 | /WPRO | I/O | Disk Is Write Protected |
| 15 | /TK0 | I/O | Drive Head Position Over Track 0 |
| 16 | /DKWE | OC* | Disk Write Enable |
| 17 | /DKWD | OC* | Disk Write Data |
| 18 | /STEP | OC* | Step The Head--Pulse, First Low, Then High |
| 19 | DIR | OC* | Select Head Direction--0=Inner, 1=Outer |
| 20 | /SEL3 | OC* | Select Drive 3 |
| 21 | /SEL1 | OC* | Select Drive 1 |
| 22 | /INDEX | I/O | Disk Index Pulse |
| 23 | +12V | -- | +12 Volts DC (160 mA max.) |

*OC=open collector

CPU Slot

Connector type: 150-pin male edge



| Pin | Name | Pin | Name | Pin | Name | Pin | Name |
|-----|----------|-----|-------|-----|-------|-----|-------|
| 1 | reserved | 21 | A15 | 41 | D31 | 61 | D15 |
| 2 | reserved | 22 | A14 | 42 | D30 | 62 | D14 |
| 3 | reserved | 23 | A13 | 43 | D29 | 63 | D13 |
| 4 | reserved | 24 | A12 | 44 | D28 | 64 | D12 |
| 5 | reserved | 25 | A11 | 45 | D27 | 65 | D11 |
| 6 | reserved | 26 | A10 | 46 | D26 | 66 | D10 |
| 7 | reserved | 27 | A9 | 47 | D25 | 67 | D9 |
| 8 | reserved | 28 | A8 | 48 | D24 | 68 | D8 |
| 9 | GND | 29 | GND | 49 | GND | 69 | GND |
| 10 | +5VDC | 30 | +5VDC | 50 | +5VDC | 70 | +5VDC |
| 11 | A23 | 31 | A7 | 51 | D23 | 71 | D7 |
| 12 | A22 | 32 | A6 | 52 | D22 | 72 | D6 |
| 13 | A21 | 33 | A5 | 53 | D21 | 73 | D5 |
| 14 | A20 | 34 | A4 | 54 | D20 | 74 | D4 |
| 15 | A19 | 35 | A3 | 55 | D19 | 75 | D3 |
| 16 | A18 | 36 | A2 | 56 | D18 | 76 | D2 |
| 17 | A17 | 37 | A1 | 57 | D17 | 77 | D1 |
| 18 | A16 | 38 | A0 | 58 | D16 | 78 | D0 |
| 19 | GND | 39 | GND | 59 | GND | 79 | GND |
| 20 | +5VDC | 40 | +5VDC | 60 | +5VDC | 80 | +5VDC |

| Pin | Name | Pin | Name | Pin | Name |
|-----|----------|-----|-----------|-----|---------------|
| 81 | /IPL2 | 106 | /RMC | 131 | /OE |
| 82 | /IPL1 | 107 | reserved | 132 | /WE |
| 83 | /IPL0 | 108 | reserved | 133 | /OVR |
| 84 | reserved | 109 | reserved | 134 | XRDY |
| 85 | /RST | 110 | reserved | 135 | /ZORRO |
| 86 | /HLT | 111 | /BR | 136 | /WIDE |
| 87 | reserved | 112 | /BG | 137 | /INT2 |
| 88 | reserved | 113 | reserved | 138 | /INT6 |
| 89 | SIZE1 | 114 | /BOSS | 139 | GND |
| 90 | SIZE0 | 115 | /FPUCS | 140 | +5VDC |
| 91 | /AS | 116 | /FPUSENSE | 141 | SYSTEM1 (GND) |
| 92 | /DS | 117 | CCKA | 142 | SYSTEM0 (GND) |
| 93 | R/W | 118 | /RESET | 143 | /xRxD |
| 94 | /BERR | 119 | GND | 144 | /xTxD |
| 95 | reserved | 120 | +5VDC | 145 | /CONFIG OUT |
| 96 | /AVEC | 121 | /NETCS | 146 | AUDIO GND |
| 97 | /DSACK1 | 122 | /SPARECS | 147 | AUDIO LEFT |
| 98 | /DSACK2 | 123 | /RTCCS | 148 | AUDIO RIGHT |
| 99 | CPUCLKA | 124 | /FLASH | 149 | +12VDC |
| 100 | E Clock | 125 | /REG | 150 | -12VDC |
| 101 | GND | 126 | /CCENA | | |
| 102 | +5VDC | 127 | /WAIT | | |
| 103 | FC2 | 128 | /KBRESET | | |
| 104 | FC1 | 129 | /IORD | | |
| 105 | FC0 | 130 | /IOWR | | |

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