

**C<sup>®</sup>Commodore<sup>®</sup>**  
***AMIGA<sup>®</sup>*** **2090**

**HARD DISK/SCSI CONTROLLER**

**user's guide**

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# 1. Introduction

A hard disk drive is a large capacity data storage unit that can be installed inside your Amiga 2000. A hard disk can store more data than a floppy disk, and files stored on hard disk can be accessed more quickly.

The Amiga 2090 Hard Disk/SCSI Controller can support both ST506 hard disks and SCSI (Small Computer System Interface) systems. Both 3 1/2" and 5 1/4" drives can be installed.

In addition, the A2090 can function as a SCSI "host adapter," allowing you to connect one or more external SCSI storage subsystems such as hard disks, tape streamers, or combined disk/tape systems. Most external SCSI subsystems designed for the Macintosh® Plus will plug directly into the rear connector of the A2090 Controller. (Hard disks and SCSI subsystems are available from your Commodore-Amiga dealer.)

In order to use a hard disk, you must install the A2090 Hard Disk/SCSI Controller in your A2000. The Controller acts as a link between the hard disk and the Amiga 2000's system.

There are several models of hard disks available for use with the Amiga 2000, including the following:

ST506 Drives	SCSI Drives
MiniScribe 3425	Epson® HMD-726A
MiniScribe 3650	MiniScribe 8425S*
Miniscribe 8425	Quantum Q280
Seagate® ST225	Rodime RO 652
Seagate ST251	Seagate ST138N
	Seagate ST157N
	Seagate ST225N
	Seagate ST251N

\*with Version 2.04 or higher firmware

This user's guide tells you:

- how to install your hard disk(s)
- how to install the Hard Disk Controller
- how to connect your hard disk to the controller
- how to use the Install software to initialize and partition your hard disk

This guide assumes the user has a basic understanding of AmigaDOS and the CLI (Command Line Interface). If you are not familiar with using the CLI, refer to the *Introduction to the Commodore-Amiga 2000* that came with your computer or purchase *The AmigaDOS Manual* published by Bantam Books.

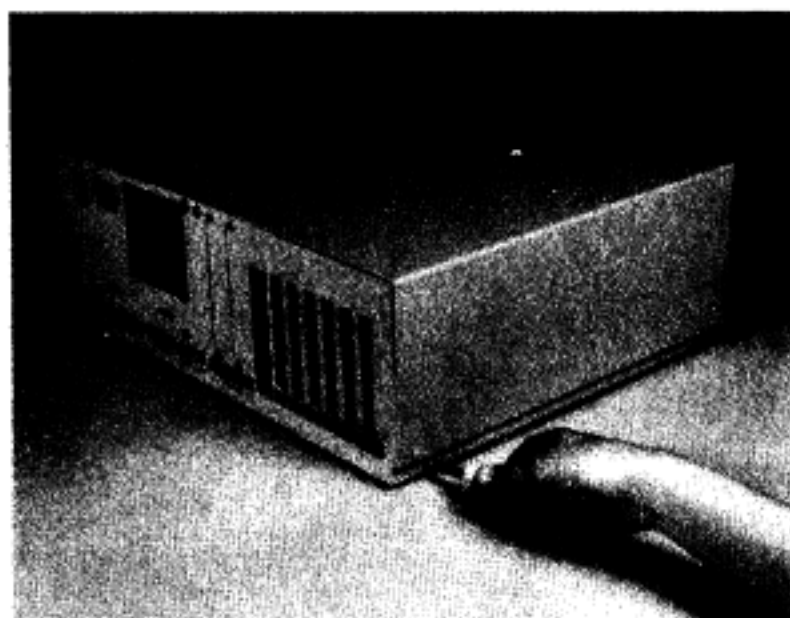
## 2. How to Install Your Hard Disk

**WARNING:** Unplug the Amiga 2000 before installing the hard disk or the A2090 Hard Disk Controller. Installing the hard disk or the A2090 with the power on could cause possible injury to yourself and damage the equipment. Commodore will not be responsible for any damages caused by improper installation of the hard disk or the A2090. Such improper installation will void the warranties on both the Amiga 2000 and the A2090.

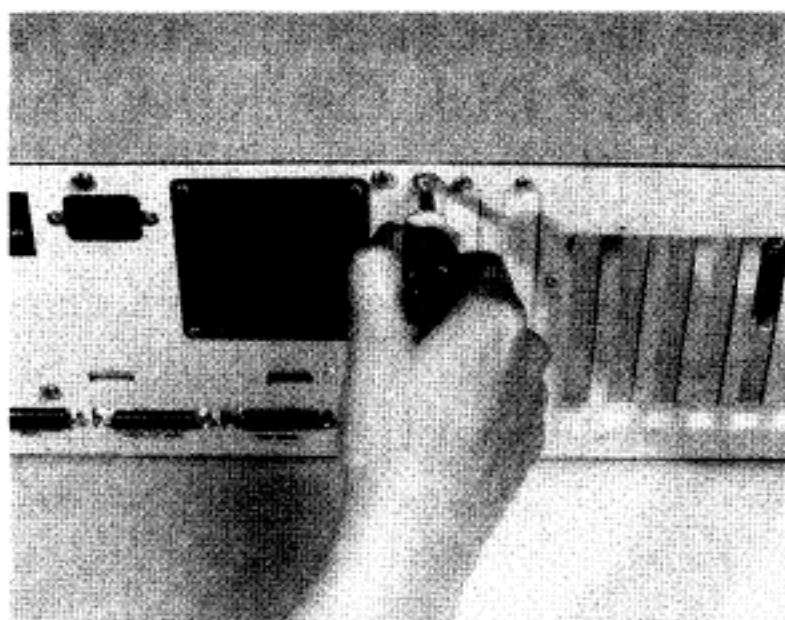
Before you start, disconnect the mouse and the keyboard from the front of the Amiga and the power cord and any peripherals attached in the rear.

### Removing the Amiga's Cover

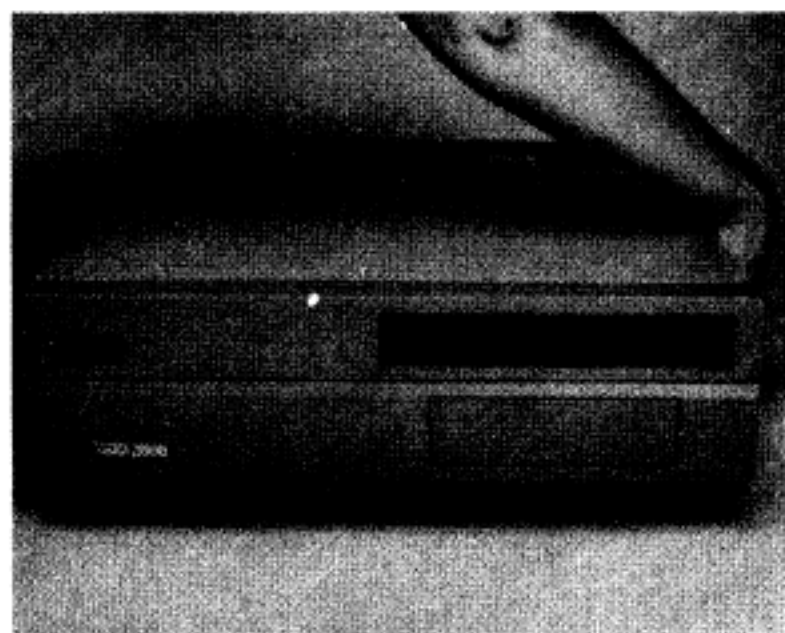
Remove the two screws on the lower left side of the Amiga that hold the metal cover to its base. Remove the two screws on the lower right side of the Amiga. Put the screws and washers aside for later.



Remove the center screw from the rear of the Amiga. Be careful to unscrew the correct screw as shown.



Turn the Amiga so that you are facing the front of the machine; the disk drive(s) should be facing you. Grasp the cover on both sides, slide it towards you, and lift upward.



If the cover gets stuck, do not force it. Look under the top of the cover towards the middle. Check to see if any wires or cables are caught under the small projection where the middle screw had been attached. If anything is caught, gently untangle it, and continue to slide the cover off.



**Be sure the power to the Amiga 2000 has been disconnected, and remove any expansion cards you may have added to the system.**

Your hard disk has **jumpers** and **terminator packs** that may need to be set to identify the unit number of each hard disk you are using. You should set the jumpers before installing the disk. (Refer to the hard disk manufacturer's documentation for the location of the jumpers and terminator packs.)

You may use one or two ST506 hard disks with the A2090. If you are using one ST506 hard disk, set the jumper to "0". For two ST506 hard disks, set the jumper on the first drive to "0" and the jumper on the second drive to "1", and remove the terminator pack from the first drive.

You can use up to seven SCSI devices. The jumpers should be set as follows:

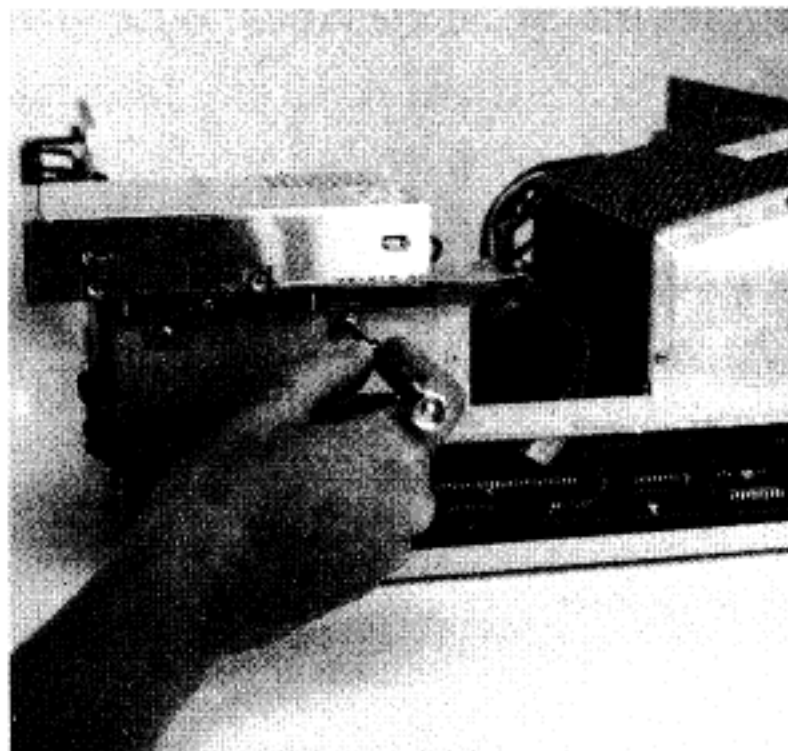
SCSI Device	Jumper Setting
1st	0
2nd	1
3rd	2
4th	3
5th	4
6th	5
7th	6

In the case of SCSI hard drives, you must also remove the terminator packs from all **but the last** device. Again, refer to the manufacturer's documentation for the location of the jumpers and the terminator packs.

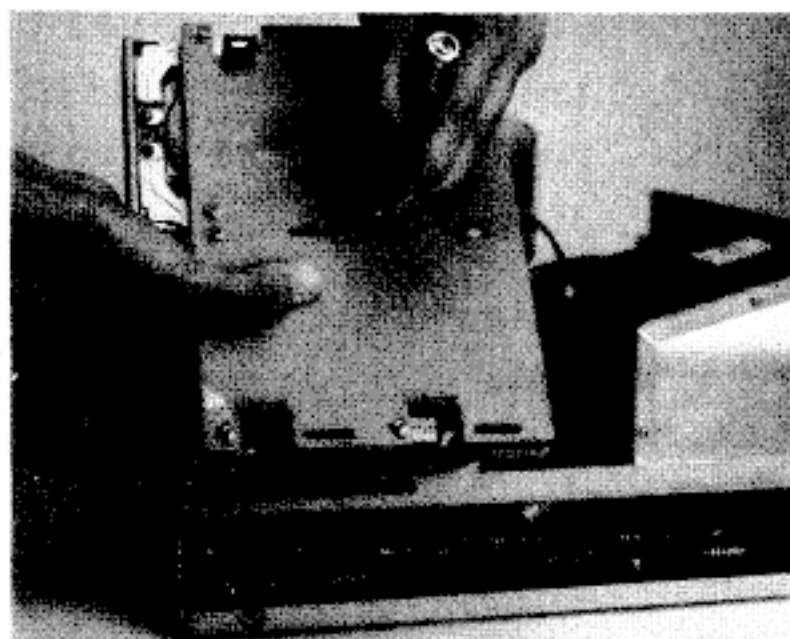
## **Installing a 3 1/2" Hard Disk**

Notice the metal plate where the internal floppy disk drive is attached. Your 3 1/2" hard disk will be mounted on that plate to the left of the floppy drive. To secure the screws that will hold your hard disk in place, you need to lift up the plate.

Four screws hold the metal plate in place; two on the right side and two on the left. Remove the four screws, and gently lift up the plate.



Notice the vertical and horizontal slots cut into the plate. The screws for your hard disk will go through these slots.



Position your hard disk on the plate, and working from the underside of the plate, secure the screws, as shown above.

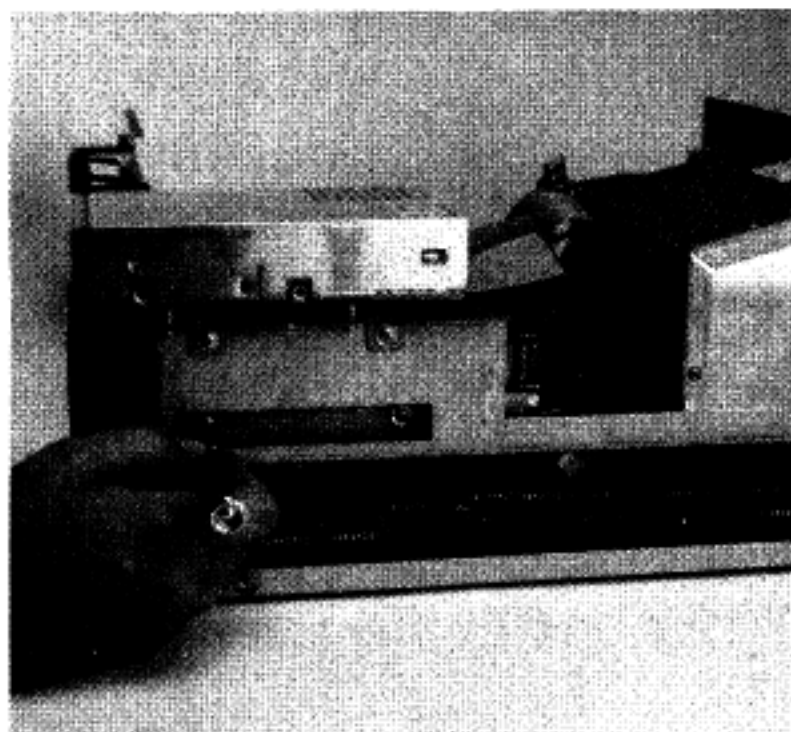
Put the metal plate back in place, and insert the screws **loosely**. **Do not screw them all the way in.** You should have some leeway to slide the plate back and forth, since you need to make sure that the face of the floppy disk drive is flush with the face of the Amiga.

To do this, slide the metal plate forward, and place the cover over the top of the machine **without replacing the screws**. If the disk drive is not flush with the face of the machine, gently slide it back until it is in place. Carefully lift off the cover, and tighten the screws holding the metal plate.

Note: Some 3 1/2" hard disks may come with a 5 1/4" frame. If you have a disk like this, it can be mounted as described above without using the frame. Or it can be installed as a 5 1/4" drive. If you want to use two 3 1/2" hard disks, one of them must have the 5 1/4" frame.

## Installing a 5 1/4" Hard Disk

Your 5 1/4" hard disk slides into the slot underneath the internal floppy disk drive. There will be at least four screw holes on your hard disk. Working through the rectangular openings on each side of the enclosure, insert the screws **loosely**. **Do not screw them all the way in.**



If your hard disk does not have a front bezel with a drive light (LED), you can skip the next paragraph. Simply, slide the drive toward the back of the opening and tighten the screws.

If your drive does have a front bezel with a drive LED, you need to remove the screws that hold the cover over the 5 1/4" drive opening. You should be able to slide the hard disk back and forth so that you can make sure the hard disk is flush with the face of the Amiga. To do this, push the drive forward, then place the cover over the top of the machine **without replacing any screws**. If the hard disk is not flush with the face of the Amiga, gently slide it back until it is in place. Carefully lift off the cover, and finish tightening the screws.

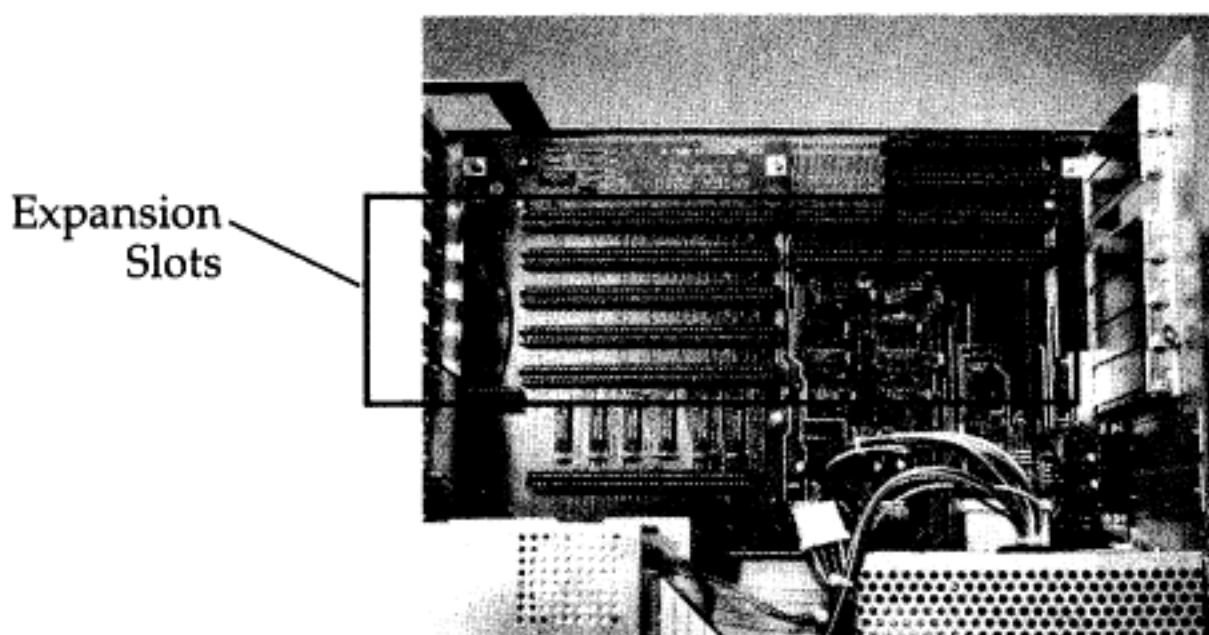
## **Connecting the Hard Disk to the Power Supply**

You must also connect your hard disk to the Amiga's power supply. Locate the cord running from the power supply that separates into two sets of wires, each with a large, plastic 4-pin connector on the end. Attach one of the 4-pin connectors to your hard disk. (The second 4-pin connector can be used for a second hard disk.) Refer to the manufacturer's documentation for the exact location of the disk drive's power connector.

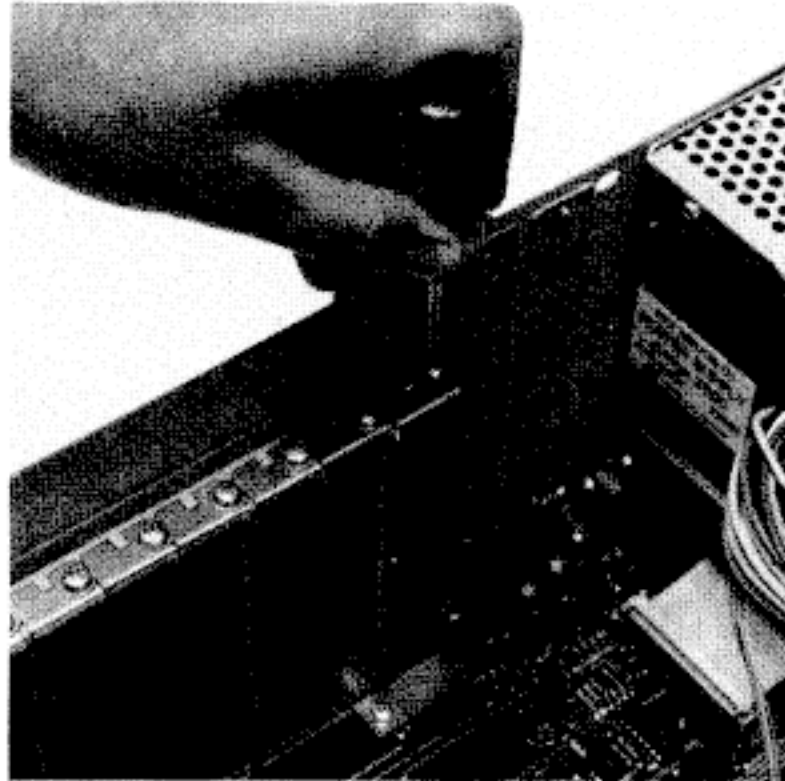


### 3. How to Install the A2090 Hard Disk/SCSI Controller

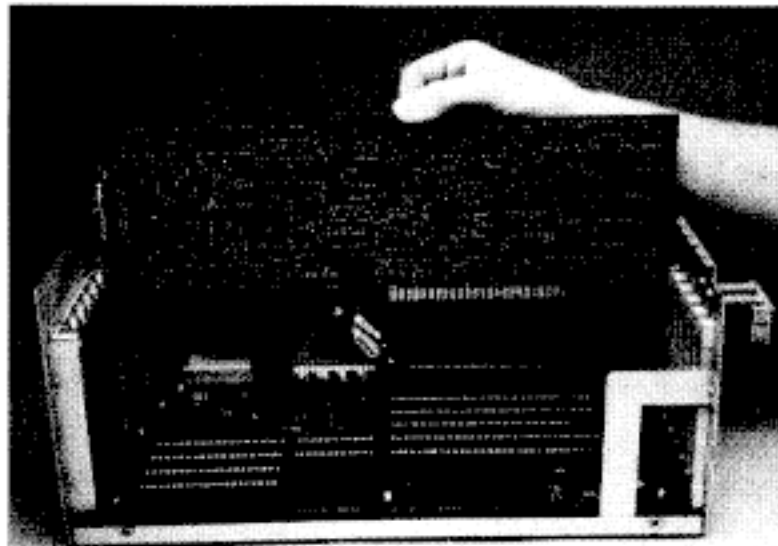
You can install the A2090 in any one of the five 100-pin expansion slots shown, but preferably, it should go in a slot that is as close to the disk drives as possible.



Remove the screw that holds down the metal plate in the back of the slot. Lift out the plate, and save the screw. You may also want to save the plate in case you ever remove your Hard Disk Controller.



Applying slight pressure, insert the board into the slot, as shown. The bracket should be towards the back with the chips facing the right.



Using the screw that held down the metal plate, secure the A2090 board.



If your hard disk drive does not have it's own built-in light, you may want to connect the Amiga's hard disk light (LED). The hard disk LED is on the front left side of the Amiga under the power LED. Look inside the casing, and there will be two wires with a very small connector on the end running from this light. Plug the connector into the appropriate connector on your hard disk. Again, refer to the manufacturer's documentation for the exact location of the LED connector.

Alternatively, you can plug the LED wire into the two-pin connector on the A2090 marked "J5 LED." It's near the lower right rear corner of the Controller board.

If the LED does not light during your initial testing, reverse the polarity of the LED plug.

The Hard Disk/SCSI Controller is now installed, but you still must connect the board to your hard disk.



## 4. How to Connect a ST506 Hard Disk

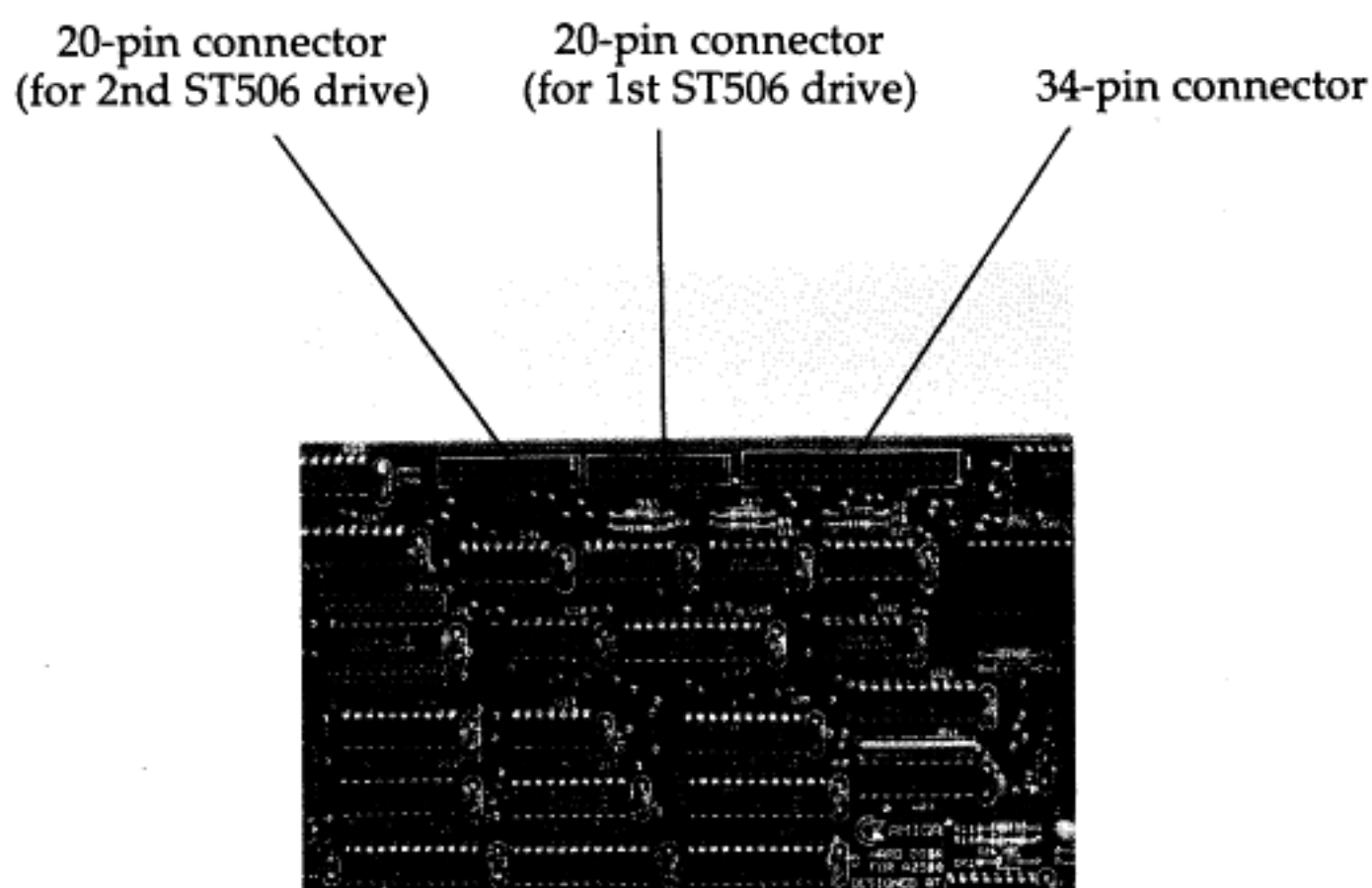
The A2090 Hard Disk Controller can support up to two ST506 hard disk units.

To connect the hard disk to the Controller, you need two cables. The cables will run from the back of the hard disk and connect to pins in the top row of the A2090.

When connecting the cables, you must make sure that pin 1 of the cable is aligned with pin 1 of the connector. Pin 1 on the cable will be designated by a colored stripe running along the edge of the cable and by an arrow or indentation in the plastic housing surrounding the pins.

Pin 1 on the Hard Disk Controller connectors is designated by a small "1" on the top, righthand side of the connector. Pin 1 on your hard disk should also be marked in some fashion. Check the documentation supplied by the manufacturer of the device.

Locate the three pin connectors running horizontally along the top of the Hard Disk Controller; there are two 20-pin connectors (two rows of 10 pins) and one 34-pin connector (two rows of 17 pins).



The wide cable connects to a connector on the back of your hard disk, and then to the 34-pin connector on the Hard Disk Controller.

**Warning:** Be sure to insert the cable gently so that you don't damage any pins. When you are positive that the cable is oriented in the right direction, insert it all the way.

The narrow cable also connects to the rear of your hard disk, and then to the 20-pin connector on the Hard Disk Controller. If you are facing the Hard Disk Controller, it's the connector immediately to the left of the 34-pin connector.

## Connecting Two ST506 Hard Disks

If you're using two ST506 hard disks, you need three cables: two narrow, 20-pin cables and one wide 34-pin cable that "daisy chains" so that you can connect it to both hard disks. In other words, the wide cable should have three connectors.

Attach one edge card connector of the wide cable to the rear of the first hard disk, the other edge card connector to the rear of the other hard disk, and the pin connector to the Hard Disk Controller.

Use one 20-pin cable for each hard disk. For your first drive, attach the edge card connector to the rear of the drive, then attach the pin connector end to the 20-pin connector on the Hard Disk Controller that is immediately to the left of the 34-pin connector.

For your second drive, attach the edge card connector to the hard disk, then connect the pin connector to the remaining 20-pin connector on the Hard Disk Controller.

Now you need to format your hard drive. Just as you can't use a blank floppy disk without formatting it first, your new hard disk must also be initialized. See Chapter 6, "Hard Disk Installation Software," for further instructions.



## 5. How to Connect a SCSI Device

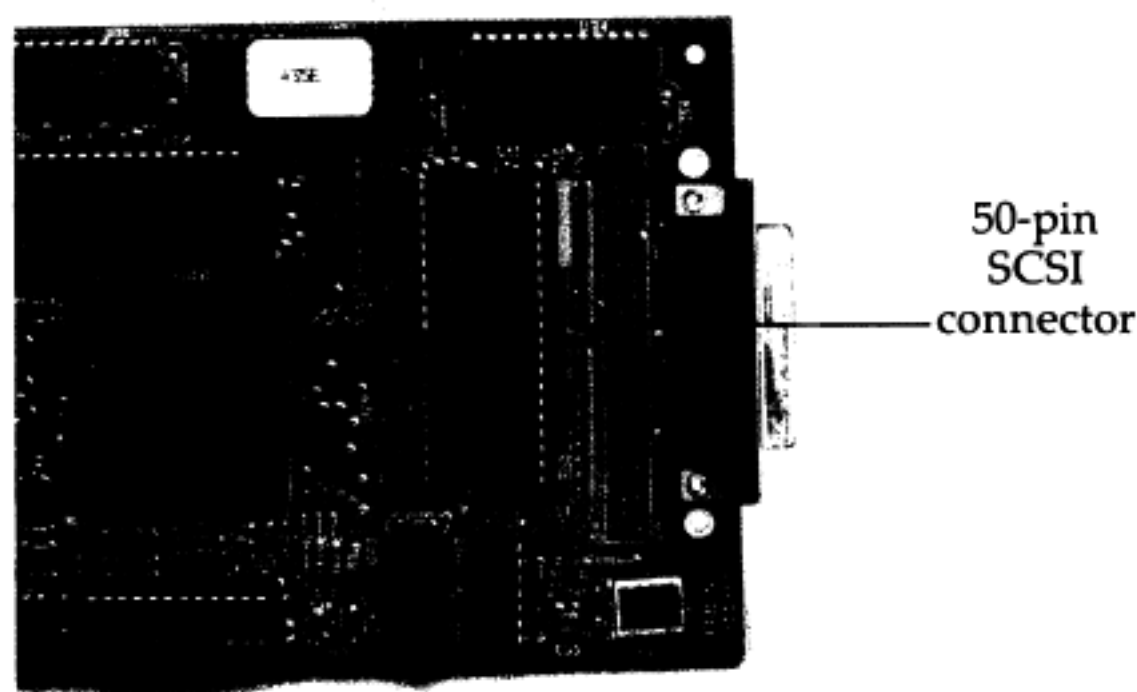
You can use up to seven SCSI devices with your Amiga 2000 and the A2090 Hard Disk Controller. However, there is only room for two internal hard drives. Additional external SCSI devices can be connected to the port on the rear of the Hard Disk Controller (it is accessible from the rear of the Amiga without removing the cover).

To connect an internal SCSI hard disk to the controller board, you need one cable with a 50-pin connector on each end.

When connecting the cable, you must make sure that pin 1 of the cable is aligned with pin 1 of the connector. Pin 1 on the cable will be designated by a colored stripe running along the edge of the cable and by an arrow or indentation in the plastic housing surrounding the pins.

Pin 1 on the SCSI connector on the Hard Disk Controller is in the lower right. There will be a small "1" marked on the board.

The cable for your SCSI drive connects to the rear of the hard disk, then to the long, 50-pin connector that runs vertically along the rear of the Hard Disk Controller.



**Warning:** Be sure to insert the cable gently so that you don't damage any pins. When you're positive that the cable is oriented properly, insert it all the way.

## **Connecting Two Internal SCSI Devices**

To connect a second SCSI drive, you need a cable that "daisy chains" so that you can connect it to both hard disks and to the Hard Disk Controller. In other words, the cable must have three connectors instead of two.

Attach one edge card connector to the rear of your first hard disk, the other edge card connector to the rear of the second hard disk, and the pin connector to the 50-pin connector on the Hard Disk Controller.

## **Connecting External SCSI Devices**

External SCSI drives are connected to the Hard Disk Controller through the port on the rear of the Hard Disk Controller. This port is accessible from the rear of the Amiga 2000 without removing the Amiga's cover. Gently insert the cable or connector on your SCSI device into this port. There should be a screw on each side of your cable which can be tightened to secure the connection.

Your external SCSI drive will need its own power source; it cannot be connected to the Amiga's power supply. Consult the hard disk manufacturer's documentation for details.

Once the hard disk(s) and the Hard Disk Controller are installed and properly connected, you can slide the cover back onto its base and replace the five screws. Remember to use the washers to hold the cover tightly in place.

Now you need to format your hard disk(s). Just as you can't use a blank floppy disk without formatting it first, your new hard disk must also be initialized. See Chapter 6, "Hard Disk Installation Software," for further instructions.



## 6. Hard Disk Installation Software

In order to use your hard disk with the Amiga, you need to tell the machine that a hard disk has been installed. To do this you'll use the Install disk that came with the Hard Disk Controller. In this chapter, you'll learn how to:

- initialize your ST506 or SCSI hard disk
- add additional hard disks to the system
- partition your hard disk(s)

We'll start by giving you a brief overview on how the Install software actually works. **Please read through this Chapter thoroughly before using the Install software.**

### The Install Software

When you insert the Install disk into your Amiga and double-click on its icon, a window will open. In this window you'll see three icons: the Trashcan, a hard disk drawer, and the Install icon. To start the Install program, double-click on the Install icon. **Don't do this yet, however. Be sure to read through all the instructions first.**

The Install program will copy files from the Install disk onto a RAM: disk, then into directories on your Workbench. These files must be on your Workbench in order to format and partition your hard disk. The files include:

File	Directory	Description
hddisk hddisk.info	Expansion	Device Driver (tells the Amiga that a hard disk has been installed)
prep	c	A special CLI command that is used to initialize the first two cylinders of a hard disk.
MountList	devs	Tells the Amiga the specifications of the particular disk you are using (i.e. the size of the partitions, etc.). Used in conjunction with the CLI "mount" command.

After Install copies the files onto your Workbench, it will automatically go into **Prep**. Prep is the program the Amiga uses to initialize the first two cylinders of your hard disk (cylinders 0 and 1). These two cylinders are specifically allocated for Amiga software use. The rest of the drive will be available for data storage.

**Warning:** You only need to run the Install program once. Running Install more than once will recopy the same files to your Workbench disk.

## The MountList Entries

When you run the Install program, it will add MountList entries to the MountList file in the "devs" directory on the Workbench. After you run Install and Prep, but **before you format your drive**, you should compare the entries to any specifications outlined by the manufacturer of your hard disk.

For each hard disk device you install, the Amiga needs a **unit assignment**. The unit assignment is included in the MountList entry to tell the Amiga which hard drive the entry refers to—the first ST506 drive, the second ST506, the first SCSI drive, etc. Likewise, an AmigaDOS assignment is used by the CLI to differentiate between multiple hard disks. The allowable Unit and AmigaDOS assignments are as follows:

Hard Disk	Unit	AmigaDOS Assignment
1st ST506 device	1	dh0:
2nd ST506 device	2	dh1:
1st SCSI device	3	dh2:
2nd SCSI device	4	dh3:
3rd SCSI device	5	dh4:
4th SCSI device	6	dh5:
5th SCSI device	7	dh6:
6th SCSI device	8	dh7:
7th SCSI device	9	dh8:

A unit of 0 is never allowed.

Use the CLI screen editor to access the Mountlist file:  
ed df0: devs/Mountlist

The MountList entries correspond with the following information:

<b>Device</b>	must be "hddisk.device"
<b>Unit</b>	must correspond with the physical drive, as outlined in the preceding table
<b>Flags</b>	should be "0"
<b>Surfaces</b>	should correspond with the physical drive (same as number of heads)
<b>BlocksPerTrack</b>	should correspond with the physical drive's sectors per track
<b>Reserved</b>	must be "2"
<b>Interleave</b>	determines the number of physical sectors between consecutively formatted sector numbers; should be "0" for ST506 drives and some SCSI drives, but may vary for other SCSI devices (check the manufacturer's documentation). Drive manufacturers usually express interleave values as a ratio of the number of physical sectors the head travels to the number of sectors accessed. The interleave value for the MountList can be determined by subtracting the second number from the first (i.e., a ratio of 1:1 equals an interleave value of 0; 2:1 = 1; 3:1 = 2, and so on).
<b>LowCyl</b>	the cylinder where this partition begins
<b>HighCyl</b>	the cylinder where this partition ends
<b>Buffers</b>	the number of sector buffers AmigaDOS is to use for caching certain information, like directory and file headers. The larger the number, the faster the information is accessed. However, if the number is too large, too much RAM is taken from the system. It is recommended to use a number between 20 and 30 for each partition.
<b>BufMemType</b>	determines the type of memory that the buffers are stored in; should be "0" (any memory) for hard disks, but could also be 1 for public memory, 2 for chip memory, or 4 for fast memory

You should see an entry for an ST506 device such as the one shown below:

```
RES0: Device = hddisk.device
      Unit = 1
      Flags = 0
      Surfaces = 4
      BlocksPerTrack = 17
      Reserved = 2
      Interleave = 0
      LowCyl = 0; HighCyl = 1
      Buffers = 1
      BufMemType = 0
```

#

There should also be a similar entry for a SCSI device named "RES2:". Remember: You won't be able to check these entries until you run Install and the files are copied onto your Workbench.

The important thing to watch is that your unit designation is correct. (Refer to the table earlier in this chapter.) Be sure to give each MountList entry a different name. It's important that you can remember the name for each entry and can associate the name with the correct drive.

Also, each entry in the MountList must be followed by a # sign. The # sign must be entered on its own separate line.

Before you continue, keep in mind the following:

- 1) Always check your MountList entries before entering a mount, prep or format command.**
- 2) Always run mount before running Prep or formatting a drive.**
- 3) Always run Prep before formatting a drive. Never run Prep after formatting a drive, or you will lose everything you have stored on your disk.**
- 4) Formatting a drive will erase everything you have stored on your hard disk.**

## Installing One Hard Disk/No Partitions

Start the Install program by double-clicking on its icon. Install will update the files on your Workbench disk. Then, it will display the following prompt:

“Warning: This procedure will clear your hard disk. Your Amiga must be rebooted at the conclusion. Do you want to Continue?”

**Caution:** The default MountList entry for RES0: and RES2: is for a hard drive with 17 blocks per track and 4 surfaces. If this is not correct, exit the Install program and change the appropriate MountList entry now.

Type a “y” (for yes) and hit return to continue. (If for any reason, you don’t want to continue, type “n” (for no) and hit return.)

Continue to watch the screen. Next, the Amiga will ask:

“Is this a SCSI hard disk?”

If you are using a SCSI drive, type “y” and hit return for a yes answer; if you are using a ST506 drive, type “n” and hit return.

The Amiga will now display “PREP Version 33.16” and a list of compatible hard disks. **If your hard disk is not installed correctly, the program will not display the list of hard disks. Go back and double-check your cable and power hook-ups. You will have to reset your Amiga before continuing.**

The Amiga will ask you to choose your hard disk from this list. If your hard disk is on the list and you do not want to partition the disk, simply type in the corresponding number and hit return. The machine will then run through a short series of questions and will display default answers suited to your particular drive. Simply hit return to choose the default.



If your hard disk is not on this list, enter a "1" to choose "User Defined." Then answer the questions with the appropriate specifications for your particular disk (refer to the manufacturer's documentation that came with your hard disk).

Be careful of the last question that asks you if you want to proceed. The default for this question is "no," and you must answer yes, to continue.

If you answered "yes", the Amiga may now take anywhere from a few seconds to minutes to PREP the system. When it is finished it will tell you to format drive "dh0:", if you are using a ST506 device, or "dh2:" for a SCSI device.

You must reboot the system to continue.

## **Formatting Your Hard Disk**

**Before formatting your hard disk, be sure to check your MountList entries. If your entry is incorrect, see the next section "If Your MountList Entry Is Not Correct..." before formatting your drive.**

If your MountList entry is correct and you are just using one ST506 hard disk and/or one SCSI hard disk, format your hard disk using CLI's **Format** command. The correct command, for your first ST506 hard disk is:

```
format drive dh0: name "name"
```

For your first SCSI drive, use:

```
format drive dh2: name "name"
```

The "name" entry refers to what you want your disk to be called—the volume name.

The important thing to remember when formatting your disk is to use the correct AmigaDOS assignment for each drive you are formatting.

## If Your MountList Entry Is Not Correct...

If your Mountlist entry is not correct, make the necessary changes by using CLI's screen editor. The most common changes will be to the Unit, Surfaces, and BlocksPerTrack entries. Sometimes it may also be necessary to change the entries for LowCyl, HighCyl, and Buffers.

After you have made the changes, reboot the system. **Do not run Install again.**

Open a CLI window, and use the AmigaDOS **mount** command to make the Amiga aware of the new MountList information. Simply, type:

mount name: (use the name given to the first two cylinders of the disk — RES0: for a ST506 drive or RES2: for a SCSI disk)

Then you must run Prep to initialize these first two cylinders. Type:

prep name: (either RES0: or RES2:)

You will again be prompted for information describing your drive type, etc. Either select the default answers by hitting return, or enter the correct values as outlined by the hard disk manufacturer. Be sure to answer yes to the last question that asks you if you want to proceed. When Prep is complete, reboot the Amiga, and format the disk with CLI's format command (see the previous section on formatting your hard disk).

## Installing More Than One Hard Disk

If you are installing more than one hard disk, you need additional entries in your Mountlist file. For a second ST506 drive, that you are not going to partition, you need one entry for the first two cylinders. For example:



```
RES1: Device = hddisk.device
      Unit = 2
      Flags = 0
      Surfaces = 4
      BlocksPerTrack = 17
      Reserved = 2
      Interleave = 0
      LowCyl = 0;HighCyl = 1
      Buffers = 1
      BufMemType = 0
```

#

To make the Amiga aware of your second ST506 hard disk, you need to mount the disk and run Prep. For instance, if your second unit is named RES1: (as in the example above), you should open a CLI window and type:

```
mount RES1:
prep RES1:
```

Prep will again ask you a series of questions about the particular specifications of your drive. When Prep is complete, reboot the system, and mount and format your second drive. Remember, the AmigaDOS assignment for this hard disk will be dh1:.

For a second and each subsequent SCSI drive, you need at least two entries for each disk: one entry solely for the first two cylinders of the disk and another entry for the remaining cylinders. For example, an entry for your 2nd SCSI device, which is not partitioned, might look like this:

```
RES3: Device = hddisk.device
      Unit = 4
      Flags = 0
      Surfaces = 4
      BlocksPerTrack = 17
      Reserved = 2
      Interleave = 0
      LowCyl = 0;HighCyl = 1
      Buffers = 1
      BufMemType = 0
```

#

```
DH3: Device = hddisk.device
      Unit = 4
      Flags = 0
      Surfaces = 4
      BlocksPerTrack = 17
      Reserved = 2
      Interleave = 0
      LowCyl = 2;HighCyl = 611
      Buffers = 30
      BufMemType = 0
#
```

To make the Amiga aware of the existence of the second and subsequent SCSI hard disks, you need to mount each partition of each disk and run Prep for the first two cylinders of each disk.

For example, for a second SCSI drive, type:

```
mount RES3:
prep RES3:
```

Reboot your Amiga, open a CLI window, and type:

```
mount DH3:
format drive DH3: name "Second SCSI"
```

**Remember:** You do not need to mount the first partition (cylinders 2 through [default]) of drives dh0:, dh1:, and dh2:. The Amiga will automatically do that. But, you do need to mount the first partition of each subsequent SCSI device.

## Partitioning Your Hard Disk

If you are going to partition your hard disk, you must modify your Mountlist file. Remember, cylinders 0 and 1 are reserved for Amiga software use, but the rest of the disk is available for data storage. You can divide the remaining cylinders into as many partitions as you need.

For ST506 hard disks and the first SCSI device, you need an entry for every partition **except the first one** (cylinders 2 through x). When you run Prep, the third question will ask you to enter the last cylinder to be used for the first partition.

Here's a sample entry for a 20MB ST506 device divided into two equal partitions. (This example assumes that this is the first drive in the system.) The MountList entry for cylinders 0 and 1 would have been added when the Install program was running.

The first partition will use cylinders 2 through 305. When Prep is asking you its series of questions, be sure to change the last cylinder to be used for the first partition (question 3) to 305.

The second partition will use cylinders 306 through 611. Be sure that the low cylinder in your MountList entry for the second partition is just one above the last cylinder used for the first partition. For example:

```
P2: Device = hddisk.device
    Unit = 1
    Flags = 0
    Surfaces = 4
    BlocksPerTrack = 17
    Reserved = 2
    Interleave = 0
    LowCyl = 306; HighCyl = 611
    Buffers = 20
    BufMemType = 0
```

#

After modifying your MountList file, reboot the system.

Before you can format your hard disk, you must use the Amiga-DOS mount command to make the Amiga aware of the partition and run Prep to initialize the first two cylinders.

Open a CLI window, and type “mount RES0:”. Then Prep the first two cylinders, by typing “prep RES0:”. Be sure to change the default answer for question three. The ending cylinder for the first partition should be one number below the low cylinder in your MountList entry for the second partition. In this case the low cylinder for “P2:” is 306, so you should enter 305 for the last cylinder of the first partition.

You must mount the second partition—“mount P2:”. Then format each partition of the hard disk, including the first one, by using the CLI format command.

For example:

```
format drive dh0: name PART1
format drive P2: name PART2
```

Be sure that each partition is assigned a different name so that the Amiga can differentiate between them.

In the case of a second and each subsequent SCSI drive, you need an entry in the MountList for each partition, **including the first one** (cylinder 2 through x).

For instance, here’s sample entry for a 20MB SCSI device divided into two partitions. This device is the second SCSI device in the system.

```
RES3:    Device = hddisk.device
         Unit = 4
         Flags = 0
         BlocksPerTrack = 17
         Reserved = 2
         Interleave = 0
         LowCyl = 0;HighCyl = 1
         Buffers = 1
         BufMemType = 0
```

#

```
DH3:  Device = hddisk.device
      Unit = 4
      Flags = 0
      Surfaces = 4
      BlocksPerTrack = 17
      Reserved = 2
      Interleave = 0
      LowCyl = 2;HighCyl = 305
      Buffers = 30
      BufMemType = 0
```

#

```
PART2: Device = hddisk.device
        Unit = 4
        Flags = 0
        Surfaces = 4
        BlocksPerTrack = 17
        Reserved = 2
        Interleave = 0
        LowCyl = 306;HighCyl = 611
        Buffers = 30
        BufMemType = 0
```

#

Then you would need to mount each partition, prep the first two cylinders, and format each partition. For example:

```
mount RES3:
prep RES3:
```

Reboot your Amiga, open a CLI window, and type:

```
mount DH3:
mount PART2:
```

```
format drive DH3: name "Drive 3A"
format drive PART2: name "Drive 3B"
```

**Remember**, for ST506 hard disks and/or your first SCSI drive:

- 1) Mount the first two cylinders and every partition, **except the first one**.
- 2) Prep the first two cylinders.
- 3) Format **every** partition, including the first one.

For additional SCSI drives:

- 1) Mount the first two cylinders and every partition.
- 2) Prep the first two cylinders.
- 3) Format **every** partition.

## Using Multiple Hard Disk Controllers

It is possible to install more than one A2090 Hard Disk Controller into the Amiga 2000 if you would want to use more than two ST506 hard disks and 7 SCSI devices with your Amiga system.

If you were to add a second Controller, you could use up to 18 hard disks. The unit assignments for hard disks connected to the second Controller would be as follows:

Hard Disk	Unit	AmigaDOS Assignment
3rd ST506 device	11	di0:
4th ST506 device	12	di1:
8th SCSI device	13	di2:
9th SCSI device	14	di3:
10th SCSI device	15	di4:
11th SCSI device	16	di5:
12th SCSI device	17	di6:
13th SCSI device	18	di7:
14th SCSI device	19	di8:

# 7. How To Use Your Hard Disk

Once your hard disk has been properly installed and formatted, you can use the disk for program and data storage.

The Amiga automatically recognizes hard disks with the AmigaDOS designations dh0:, dh1:, and dh2: (the first two ST506 hard disks and the first SCSI drive). However, if you've added additional SCSI drives to your system, or if you've partitioned **any** of your drives, you must tell the Amiga these drives or partitions are in place **each time** you boot the system.

You can do this by opening a CLI window and separately mounting each drive and partition (by using the AmigaDOS MOUNT command). Or, you can add the MOUNT commands to your Startup-Sequence. This way, each time you boot the system all the drives and partitions will be recognized.

For instance, if you've partitioned a second SCSI device (as outlined on pages 32 and 33), you'd enter:

```
mount dh3:  
mount PART 2:
```

Each hard disk and partition can be accessed through disk icons that appear on the Workbench screen. If an icon for a hard disk or partition doesn't appear when you boot the system, don't be alarmed. To bring the icon to the screen, simply enter a CLI command involving that disk or partition. For example, use the CD command for each drive and partition. When the CLI accesses that disk, its icon will be displayed on the screen.

To have the icon(s) appear on the screen each time you boot the Amiga, add a simple CLI command for each disk or partition to your Startup-Sequence.



## Copying Data to Your Hard Disk

You can either use the Workbench or the CLI to copy files to your hard disk. To move a file to your hard disk using the Workbench, simply double-click on the icon for the hard disk or partition you want to use, and a window will appear. Drag the file's icon into the window, and that file will be copied to the hard disk. (We suggest you create drawers on your hard disk for storing your files.)

To copy a file using CLI, use the **copy** command. The correct syntax for this command is:

```
copy [from] <name> [to] <name>
```

For example, if you had a file named "Payables" on a floppy disk labeled "Acctng", and you wanted to copy "Payables" to your first ST506 hard disk named "HardDisk", you would type:

```
copy [from] Acctng:Payables [to] HardDisk:
```

You can also copy all the files from a floppy disk to the hard disk by using the copy command with the **all** option. For example:

```
copy df0: to dh0: all
```

copies all the directories and subdirectories on the floppy disk DF0: onto the hard disk DH0:.

To open a file stored on hard disk, double-click on the icon for the hard disk or its partition. When the hard disk window appears, double-click on the icon for the file you wish to open.

If you've partitioned your hard disk, or if you are using several hard disks, you should make a list of the names you've assigned to each disk and each partition. Also, remember to periodically make a back-up copy of your hard disk files by copying them onto floppy disks. This way your information is safe if anything should ever happen to your hard disk.



# 8. Technical Specifications for the A2090 Hard Disk/ SCSI Controller

The Amiga Hard Disk/SCSI Controller is an intelligent high performance controller designed to interface both ST506 hard disk drives and SCSI devices to the Amiga expansion bus architecture. A background command processor provides high level command interpretation minimizing Host intervention. Data is transferred to and from the Host via DMA (direct memory access) with FIFO allowing high data throughput while maintaining reasonable bus bandwidth for other bus controllers.

## Features

- Support for up to two ST506 hard disk drives
- High level command interpretation and exceptional handling performed by Z80 processor
- Individually Programmable Drive Characteristics
- 32 bit ECC for data correction
- Multiple block transfers
- Full auto-config compatibility
- Real time data transfer rates of up to 800ns/byte via DMA

## Specifications

### Performance

#### Hard Disk (ST506)

Encoding method:	MFM
Cylinder per head:	Up to 2048
Sectors per track:	Up to 17
Sector length:	512
Heads:	8
Drive Selects:	2
Step Rate:	3.2 us to 6.5ms
Data Transfer Rate:	5.0 Mbit/sec.
Write Precomp Time:	12 nanoseconds
Sector Interleave:	1:1
Sector Interleave Across Heads:	1:2
Ecc Polynomial:	32 bits
Burst Error Correction:	11 bits

### SCSI

ANSI X3T9.2 compatible

MacIntosh Plus compatible connector

### Host Interface

Amiga expansion bus compatible

Full Auto-config compatibility

### Power Requirements

+5 Volts  $\pm 5\%$  3 Amps. Max.

### Environmental

Ambient Temperature: 0° - 55° C

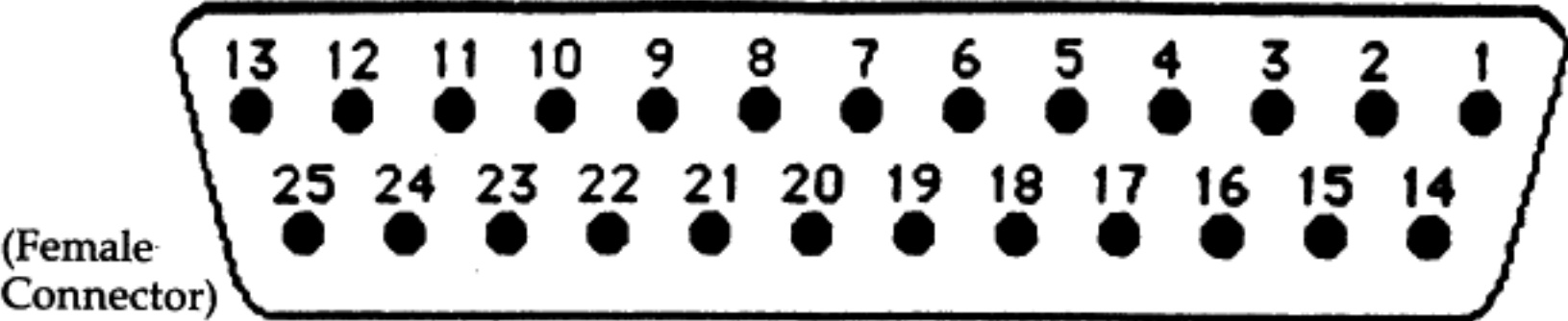
Relative Humidity 20% - 80%

# Internal SCSI Connector

		Pin	Name
● 50	● 49	50	– I/O
● 48	● 47	48	– REQ
● 46	● 45	46	– C/D
● 44	● 43	44	– SEL
● 42	● 41	42	– MSG
● 40	● 39	40	– RST
● 38	● 37	38	– ACK
● 36	● 35	36	– BSY
● 34	● 33	34	Ground
● 32	● 31	32	– ATN
● 30	● 29	30	Ground
● 28	● 27	28	Ground
● 26	● 25	26	N.C.
● 24	● 23	24	Ground
● 22	● 21	22	Ground
● 20	● 19	20	Ground
● 18	● 17	18	– DB(P)
● 16	● 15	16	– DB(7)
● 14	● 13	14	– DB(6)
● 12	● 11	12	– DB(5)
● 10	● 9	10	– DB(4)
● 8	● 7	8	– DB(3)
● 6	● 5	6	– DB(2)
● 4	● 3	4	– DB(1)
● 2	● 1	2	– DB(0)

All odd pins, except pin 25, are ground. Pin 25 is open.

# External SCSI Connector (DB-25)



Pin	Name	Pin	Name
1	– REQ	14	Ground
2	– MSG	15	– C/D
3	– I/O	16	Ground
4	– RST	17	– ATN
5	– ACK	18	Ground
6	– BSY	19	– SEL
7	Ground	20	– DBP
8	– DB0	21	– DB1
9	Ground	22	– DB2
10	– DB3	23	– DB4
11	– DB5	24	Ground
12	– DB6	25	TPWR
13	– DB7		





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