

Introduction to the

**C<sup>®</sup> Commodore<sup>®</sup>**  
***AMIGA*<sup>®</sup> 2500**



Introduction to the

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

***2500***

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## **User's Manual Statement**

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- Reorient the receiving antenna or AC plug.
- Change the relative positions of the computer and the receiver.
- Plug the computer into a different outlet so that the computer and receiver are on different circuits.

**CAUTION:** Only peripherals with shield-grounded cables (computer input-output devices, terminals, printers, etc.), certified to comply with Class B limits, can be attached to this device. Operation with non-certified equipment may result in communications interference.

Your house AC wall receptacle must be a three-pronged type (AC ground). If not, contact an electrician to install the proper receptacle. If a multi-connector box is used to connect the computer and peripherals to AC, the ground must be common to all units.

If necessary, contact your dealer or an experienced radio-television technician for additional suggestions. You may find the following FCC booklet helpful: "How to Identify and Resolve Radio-TV Interference Problems." The booklet is available from the U.S. Government Printing Office, Washington, DC 20402, stock no. 004-000-00345-4.

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# 1. Introducing the A2500

The Amiga 2500 computer combines the sophistication of the A2000 with the speed of an accelerator card and the increased storage capacity of a 40 megabyte hard disk drive. The accelerator card contains the circuitry for a 32-bit 68020 CPU, a 68881 Floating Point Unit and a 68551 Memory Management Unit. The advantages of using the accelerator card are:

- faster system operation
- ability to read/write data in 32-bit chunks instead of 16-bit
- on-chip cache memories for faster performance even with slower memory systems
- direct use of the 68881 Floating Point Unit for fast math calculations
- direct use of the 68551 Memory Management Unit for translated, virtual, and protected memory

The hard disk works in conjunction with the A2090A Hard Disk/SCSI Controller card allowing you to *boot* (start operations) directly from the hard drive. What this means is that there is no need to insert a Workbench disk, or other bootable application diskette, into the machine's floppy disk drive to get the system up and running.

Before proceeding any further, you should familiarize yourself with the material included in the A2500 package. In addition to the A2000, the keyboard, and the mouse, you also have three manuals (aside from this one):

- *Introduction to the Commodore-Amiga 2000*
- *Commodore-Amiga Enhancer Software*
- *Amiga Basic*

The *Introduction to the Commodore-Amiga 2000* covers setting up your machine, mouse, and keyboard, and using the Workbench software.

The *Commodore-Amiga Enhancer Software* manual explains the improvements that were made to Workbench with the release of Version 1.3. It also documents the utilities on Extras and contains valuable information concerning printers, the SHELL and CLI (tools that let you communicate with the Amiga through typed AmigaDOS commands), and startup sequences.

*Amiga Basic* teaches the Amiga Basic programming language, an adaption of Microsoft® BASIC that was developed especially for the Amiga.

Before reading any further, set up your machine! Follow the instructions in Chapter 2 of the *Introduction to the Commodore-Amiga* manual. It explains the various ports on the back of the machine and how to attach the mouse, keyboard, monitor, and power cord.

Because the information in Chapter 3 of the A2000 manual is for a floppy disk-based system and not an autobooting hard drive system, you should return to this manual for instructions on how to proceed after plugging in the machine.

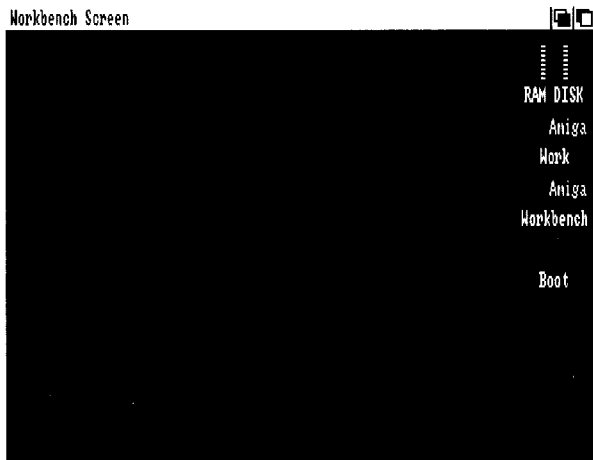


## 2. Getting Started with the A2500

### Turning on Your Machine

By now your machine should be set up, as outlined in Chapter 2 of the *Introduction to the Commodore-Amiga 2000*, and you should be ready to get started! Turn on the power switch on the back of the A2500 and the power switch on your monitor. Remember, since the A2500 is an autobooting machine, **you do not need to insert a diskette into the floppy disk drive.**

After a few seconds, a screen will appear on your monitor. This screen, which contains the copyrights and version information for Workbench, disappears quickly. The next screen that appears is the Workbench screen.

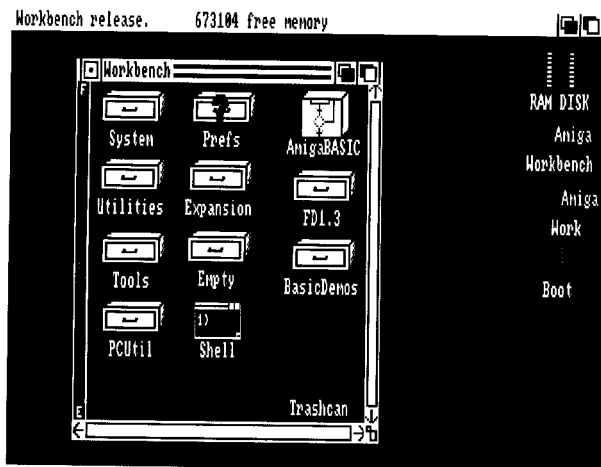


**Workbench Screen**

Note the four icons that appear along the right side of the screen. These icons represent the RAM disk and the three partitions of the hard drive—Boot, Workbench and Work.

You should refer to the Introduction manual for general instructions on using icons, the mouse, menus, etc. To access the files on Workbench, double-click on the Workbench icon that appears on your screen; you do not need to insert the Workbench disk into the disk drive.

When the Workbench window opens, it will not look exactly the same as the Workbench window pictured on page 3-11 of the A2000 manual. Don't worry. You have everything you need; it's just arranged a little differently. Also, since the Workbench partition of the A2500 contains the programs of both the Workbench and the Extras disks, the drawers for both disks appear in your window. Your display will look like this:



**Workbench Window**

Take some time to get used to using the mouse and the Workbench menus. Open the drawers, and try out some of the utilities documented in the Introduction and Enhancer manuals.

## Using the Accelerator Card

When you power on or reset your machine, the accelerator card automatically takes over control from the 68000 CPU. You do not need to run any special software programs or use any special commands to take advantage of its capabilities. As mentioned in the introduction, the accelerator card speeds up system operations in many ways. The 68020 CPU is clocked at approximately 14.3 MHz, twice the speed of the Amiga's 68000 CPU.

First of all, it reads and writes data in 32-bit chunks. In addition, the accelerator card also contains 2 megabytes of 32-bit wide, fast memory. (This is expandable to four megabytes.) The accelerator card's fast memory is recognized by the system as standard auto-configured expansion bus memory; it is the first type of memory to be configured by the system. With this fast memory installed, you should see a 250-400% speed increase in most integer based operations.

The Amiga 2500 comes equipped with one megabyte of internal RAM, and you can add up to eight megabytes of expansion RAM. This allows for a total of 9 megabytes of RAM that can be used by the system. The accelerator card comes with 2 megabytes of additional RAM; therefore, you can add up to 6 more megabytes of expansion RAM to the A2500. If you upgrade the accelerator card to its total of 4 megabytes of RAM, you can only add another 4 megabytes of expansion RAM to the A2500.

Although the accelerator card operates in a 32-bit environment, it must also access the 16-bit hardware bus system of the Amiga 2000. To do this, the 68020 CPU has a built-in dynamic bus sizing feature that adjusts memory cycles to any system resource that it addresses. On the card, logic tells the 68020 chip that its on-board memory is 32-bits wide, while any normal system resource, like CHIP RAM, CHIP registers, or expansion device, is only 16-bits wide.

For instance, while the 68020 is running at 14.3 MHz for internal and 32-bit wide operations, the Amiga's resources can only be accessed at the normal 7.2 MHz cycle. The card compensates for this by adding enough wait states to a normal 14.3 MHz cycle to span a full 7.2 MHz 68000 style cycle.

## Changing the Operating Mode

**NOTE:** Some Amiga software may not run properly with the accelerator card. It is possible to temporarily disable the accelerator card and run the system off the 68000 CPU. This may be necessary if the system crashes while using certain software applications. To change the operating mode, reset the machine by simultaneously pressing the CTRL, left Amiga, and right Amiga keys, then **hold down both mouse buttons**. Holding down the mouse buttons after the reset brings up the following display:

AmigaDOS on 68000  
AmigaDOS on 68020  
Amiga UX

This screen allows you to choose the Amiga's operating mode. To make a selection, move the pointer to the box next to the operating mode of your choice, then click either mouse button.

*If you choose AmigaDOS on 68000*, the accelerator card is disabled, and the system runs as a standard A2000 with hard drive.

*If you choose AmigaDOS on 68020*, the system runs off the 68020 CPU allowing you to take advantage of the accelerator card's advanced capabilities. This is the default option when you power on or reset the Amiga 2500.

*If you choose Amiga UX*, a UNIX® operating system is invoked (provided you have the proper hardware/software installed).

If you are having problems with a particular software program, contact the software developer for information on upgrades that may be compatible with the accelerator card.

**NOTE:** *If you develop software on the Amiga, please see Appendix D for information on writing code when the accelerator card is in operation.*

## Using Your Hard Disk

If you were to buy a hard drive and install it in your machine yourself, you would have to prepare the drive to receive data in a form compatible with the Amiga's operating system. This is called *formatting* the drive and is done via a software program. With the A2500 there is no need to do this; your hard drive has already been formatted at the factory.

The hard drive installed in your A2500 has a 40 megabyte capacity, roughly equivalent to the storage capacity of 50 floppy disks, and is divided into three *partitions*. (A partition is a subdivision of the drive's storage area.) The first partition is the **Boot** partition. It is slightly less than one megabyte in size and contains a copy of the Workbench and the startup sequence files for the hard drive.

The second partition is about 2½ megabytes and is called **Workbench**. It contains the directories and files that are on the Workbench and the Extras diskettes. There is also some storage room in this partition.

The third partition, **Work**, constitutes the rest of the hard drive. The only directories on this partition are the Empty drawer and the Trashcan. You should use this partition for storing software programs and data.

Both the Workbench and Work partitions are formatted using the FastFile-System (FFS). The FastFileSystem is solely for use with a hard drive system. It differs from the standard file system in that it increases data transfer speed and allows slightly more data to be stored on the disk. For more details on FFS, see Appendix A of the Enhancer manual.

## Copying Programs to Your Hard Disk

Aside from working with the utilities on Workbench and Extras, you will also want to transfer other software programs to your hard disk. Most software applications that you purchase will allow you to do this. Once you start running programs off your hard disk, you'll never want to return to a floppy based system.

This section demonstrates how to copy a generic software program to the Work partition of your hard drive. Since this procedure involves the CLI/SHELL and some basic AmigaDOS commands, you should refer to Chapter 7 of the Introduction manual if you are not familiar with using the CLI.

1. The Work partition is large enough to store dozens of floppy disks worth of information. To do this efficiently you should organize the partition into drawers. The easiest way to create a new drawer, and at the same time a new directory, is to make a copy of Work's Empty drawer by using the Workbench menu's Duplicate item.

Open the Work window by double-clicking on its icon. Click once on the Empty drawer, then select Duplicate from the Workbench menu. A new drawer called "Copy of Empty" will appear in the window.

2. Rename "Copy of Empty" using the Workbench menu's Rename item. For this example, we are going to call the drawer "Program." Select the drawer, choose Rename from the menu, and a string gadget appears. Delete the text in the gadget with the Delete key, and type in the new name.

You can name it anything you'd like, but you should use a name that reminds you of the contents. Also, if there are spaces in the name (i.e., if it is more than one word), you must put quotation marks around the entire name when using it in CLI commands.

3. Now that you have a new directory, you can copy your software disks to the hard drive. To do this you must use the CLI. Open the Workbench partition, then open the SHELL. We'll assume that the software is on a disk called DISK1 and that you are inserting it into the Amiga's internal floppy drive, DF0:.

Here are some general guidelines you should follow when copying programs to your hard disk partition:

1. Copy any files and directories that are on DISK1 **but are not already in the Workbench partition** to your new directory. Usually your software will contain many of the files that are already on Workbench, such as the Trashcan, the system directory, etc. You do not need to copy these files into your new directory.

To look at the files on DISK1 and on the Workbench partition, use the AmigaDOS DIR command. Simply type, DIR DISK1: and DIR Workbench:, and compare the files and directories that appear in the output window. (You can also refer to Appendices B and C of the Enhancer manual for a list of the files on Workbench and Extras.) Any files that are on DISK1 but are not in the Workbench partition should be copied to the new directory.

2. Examine the standard directories of DISK1 to see if there are any files or subdirectories included on the disk that do not appear in the Workbench partition. (Again, use the DIR command to do this.) If you find any, copy them into the corresponding directories of the Workbench partition. The directories to examine include:

L  
LIBS  
S  
DEVS  
DEVS/KEYMAPS  
DEVS/PRINTERS  
C  
FONTS  
SYSTEM  
UTILITIES  
EXPANSION

To copy a file or directory, you must use the AmigaDOS COPY command. For instance, to copy a file from DISK1 to the Program directory of Work:, you'd type:

```
COPY DISK1:filename Work:Program
```

To copy all the files from a directory on DISK1 to an equivalent directory within the Program directory, you'd type:

```
COPY DISK1:directory Work:Program/directory ALL
```

The ALL keyword tells the system to copy all the files in the directory. Please refer to the Enhancer manual for more information on using the COPY command. Before copying any software to your hard drive, check the documentation packaged with the program. It may include instructions for installing and using the software on a hard drive.

4. You may have to set up some special ASSIGN statements in order for your software to work correctly from the hard drive. The ASSIGN command allows you to assign a logical device name to a directory. In this case the device is DISK1, and the directory is Work:Program. *Be sure to remove DISK1 from the floppy drive before attempting to run the software from the hard drive.*

For example, suppose you copy a program into the directory Work:Program, and when you attempt to run the software a requester appears saying:

Please insert Volume DISK1 into any drive

This indicates that the software is looking for files on the original disk (volume) on which it was distributed. By assigning the volume name to your new directory, the software will be routed to the correct location. To do this, open a SHELL window, and type:

```
ASSIGN DISK1: Work:Program
```

If the requester is still on the screen, click on RETRY. If the requester does not reappear, the ASSIGN worked. You may want to add this command to the Workbench partition's StartupII file (Workbench:s/StartupII) so that the assignment is made when you boot the Amiga.

5. Double-click on the Program drawer. All the icons that normally appear on the software disk will now appear in the Program drawer. However, if you copied more than one disk to the drawer, it may be quite cluttered. Icons may be covering other icons, etc. To straighten up the display, select Clean Up from the Workbench menu.



6. After Clean Up organizes the drawers, save the display. To do this, use *multiple selection* to mark the position of each icon, then select Snapshot to save the positions. Using multiple selection is easy. After clicking once on the first icon, hold down the Shift key while clicking once on each of the other icons. Then release the Shift key and select Snapshot from the Workbench menu.

## **Saving/Retrieving Files**

You can save files to and retrieve files from the hard drive just as you would a floppy disk. For instance, if you want to save a file created with the Notepad to the Workbench's Utilities drawer, you would type:

Workbench:Utilities/newfile

in the Notepad's Save requester. The generic path for accessing files on the hard disk is:

Partition:Drawer/file

Partition is the name assigned to the particular area of the hard drive, for instance Workbench or Work. Drawer represents a directory on the partition, and file is the name of the file you are creating or retrieving.

## **Backing Up Your Hard Disk**

**IMPORTANT:** Before adding new data to your A2500, it is strongly suggested that you purchase a hard disk backup program for copying the information stored on the hard disk to floppy disks. (Please see your local software dealer for information on the available programs.) You should backup the hard drive frequently, daily or weekly depending on how often it is used. Without a floppy disk backup, it will be impossible for you to replace any files that may be lost due to user error or system failure.

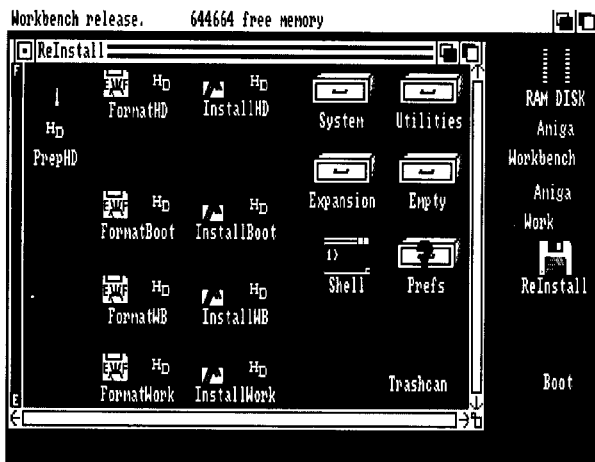


# 3. Running the ReInstall Software

Included with your A2500 is the ReInstall disk. This allows you to reconstruct the original files included on your hard drive in case of a catastrophic failure that prevents you from accessing your files. **WARNING: This disk can only replace the files that were stored on the hard drive at the time of purchase. It cannot recover programs and data that were stored throughout the hard drive's use. For this reason it is EXTREMELY IMPORTANT to perform regular backups of the hard drive's contents.**

Please keep in mind that you should only use the ReInstall program as a last resort. If only a few files or directories on your disk have been corrupted, you can use a program, such as the AmigaDOS program DISKDOCTOR, to try to recover the corrupted files. If you are unfamiliar with file recovery programs, please consult your dealer for advice before deciding to use the ReInstall disk.

If you decide to proceed with the ReInstall program, turn off the power to your Amiga 2500. Wait at least 30 seconds, insert the ReInstall disk into the internal floppy drive (df0:), and turn the machine back on. When the system boots, you will see a ReInstall icon on the screen. Double-click on the icon, and the following window appears:



The programs included on ReInstall are listed below. You may need to run one or more of these programs, depending on the severity of the damage.

|             |   |
|-------------|---|
| PrepHD      | Under severe conditions, your hard drive may be so damaged that a complete reconstruction is necessary. PrepHD sets up the control cylinders required to manage the disk as a whole prior to a complete reformatting. <b>This program should be run only as an absolute final resort.</b> |
| FormatHD    | This procedure reformats all three partitions and should be used only when a complete reconstruction is required. Again, this program should only be used as a last resort.   |
| InstallHD   | This program reinstalls Workbench in the Boot and Workbench partitions, Extras in the Workbench partition, and the Trashcan and Empty drawers in the Work partition.  |
| FormatBoot  | Use this program to rebuild only the Boot partition.  |
| InstallBoot | Run this program to reinstall the Workbench files on the Boot partition. FormatBoot automatically starts this program.  |
| FormatWB    | Use this program to rebuild only the Workbench partition.   |
| InstallWB   | Run this program to reinstall the Workbench and Extras files on the Workbench partition. FormatWB automatically starts this program.  |
| FormatWork  | Use this program to rebuild only the Work partition. This program will cause all of your application software to be lost. Back up your hard disk before using this program.   |
| InstallWork | Run this program to reinstall the Empty and Trashcan drawers in the Work partition. FormatWork automatically starts this program.   |

You should always try to recover your disk by using the least severe procedures first. Use the chart below as a guideline to help you determine which steps to take:

| <b>Problem</b>   | <b>Program to Use</b>  |
|--|--|
| When you boot the machine, you see a screen depicting a hand holding a Workbench disk (shown on page 3-6 of the A2000 manual).                     | First, try a soft reset (Ctrl, left Amiga, right Amiga) to try to resolve the problem. If that does not work, your disk may need a complete rebuilding, or the Boot partition may be damaged. First attempt to rebuild Boot by running FormatBoot and InstallBoot. If the problem still occurs, run PrepHD, FormatHD, and InstallHD. |
| After receiving read/write errors, you used the AmigaDOS DISKDOCTOR program. Copy the recovered files to a floppy disk then Format that partition. | Run FormatBoot, FormatWB, or FormatWork depending on which partition you used DISKDOCTOR. After Install recopies the original files, copy any other files that were salvaged with DISKDOCTOR onto the partition.   |
| You accidentally deleted a block of Workbench or Extras files.   | Run InstallBoot or InstallWB, whichever is appropriate.  |
| You get a requester during startup stating "Not a DOS disk in Unit 1".   | Run FormatWB and InstallWB.  |
| You get a requester stating "Please insert volume WORK in any drive".  | Run FormatWork and InstallWork. You should then rebuild the other files on Work from your backup utility.  |

## Running PrepHD

To re-prepare the entire hard disk, double-click on the PrepHD icon, and a new window will appear. The system will prompt:

This will re-prepare your hard disk.  
Any information on the hard disk may be lost!  
Are you sure you want to continue?

Type a Y for yes or an N for no. If you type Y, the Amiga automatically begins the Prep process, initializing the first two cylinders of your hard disk (cylinders 0 and 1) and defining the size of the Boot partition. When Prep is complete, the system will display the message:

Hard disk prep completed.  
Reboot the machine and run the FormatHD utility.

Reboot the machine by pressing the Ctrl, left Amiga, and right Amiga keys simultaneously. Be sure to leave the ReInstall disk in the disk drive when you reboot. When the ReInstall screen reappears, open the ReInstall window and proceed with the formatting process as described below.

## Running a Format Program

To reformat the **entire hard disk**, double-click on the FormatHD icon, and a new window appears. The system will prompt:

This will reformat your hard disk.  
All information on the hard disk will be lost!  
Are you sure you want to continue?

Again, type either a Y for yes or an N for no. If you type Y, the Amiga reformats all three partitions.

*If you do not want to reformat all the partitions, choose one of the other Format icons. These icons give you the option to only reformat one partition of the hard disk. Double-click on the icon that corresponds to the desired partition and proceed as outlined below.*

| <b>Icon</b> | <b>Corresponding Partition</b> |
|-------------|--------------------------------|
| FormatBoot  | Boot                           |
| FormatWB    | Workbench                      |
| FormatWork  | Work                           |

The formatting process for the Work partition will take quite a while (over thirty minutes). The system must format the partition cylinder by cylinder, so do not be alarmed if it seems to be taking a long time. You will be able to follow the progress on the screen. The system displays which cylinder is being formatted/verified and how many cylinders are left to be formatted.

When formatting is complete, the following message appears:

Hard disk format complete.

The software will now be installed on your hard disk.

Each Format program automatically begins the corresponding Install program (described below). You do not need to double-click on any of the Install icons.

## **Running an Install Program**

To reinstall the Workbench and Extras files on the entire hard disk, double-click on the InstallHD icon. (If you have run FormatHD first, you do not need to do this.) This program recopies the original files from Workbench and Extras disks onto the hard disk partitions. However, you have to help by inserting the diskettes into the disk drive at the proper time. Be sure to keep an unaltered copy of the both the Workbench and the Extras disks for this purpose.

2. Create a new MountList entry for the Data partition. Move down to a line or two below the # sign of the FH1: entry. Type the following information as shown below:

```
FH2: Device = hddisk.device
      Unit = 1
      Flags = 0
      Surfaces = 6
      BlocksPerTrack = 17
      FileSystem = 1:FastFileSystem
      Reserved = 2
      LowCyl = 472 ; HighCyl = 869
      Buffers = 50
      GlobVec = -1
      Mount = 1
      BufMemType = 0
      DosType = 0x444F5301
```

#

3. Exit ED by typing Escape-X. The changes will be saved to the MountList file.

4. Using ED, edit Boot:s/Startup-Sequence and add a new line to "Mount FH2: from Boot:devs/MountList.HD" under the Mount FH1: entry.

DO NOT DELETE the command to Mount FH0:. That is the command that mounts the Workbench partition. If that line is removed, you will receive error messages when you reboot the machine.

Save the changes to the file, by typing Escape-X.

5. Reboot the A2500.



6. Open a CLI/SHELL window, and format the new partitions, type:

```
FORMAT DRIVE FH1: NAME Programs QUICK  
FORMAT DRIVE FH2: NAME Data QUICK
```

Since the drive has been previously formatted, you can specify the QUICK option after the Format commands. This speeds up the formatting process considerably.

You should copy the Empty drawer from the Workbench partition into both the Programs window and the Data window. You can either use the Workbench or the CLI. The easiest way is to simply drag the drawer from the Workbench window into both the Programs and the Data window. The original will remain in the Workbench window, while copies will be made in the Programs and Data windows.

NOTE: After subdividing the Work partition, be careful when running FormatHD or FormatWork. If you use these programs, they will reformat your Work partition as one large partition (as the drive was shipped).



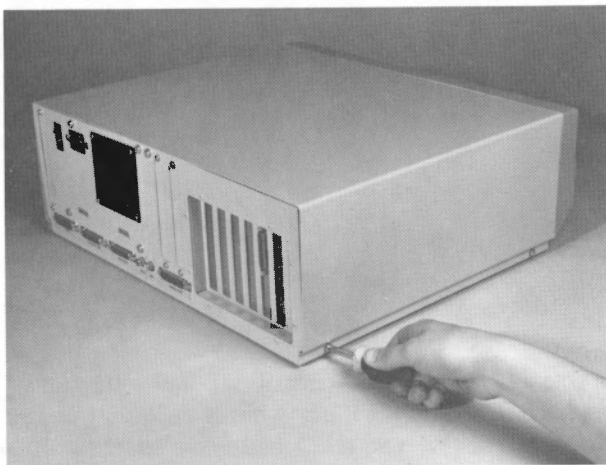
## B. Adding a Second Hard Disk to the A2500

You can add a second hard disk drive to the A2500. The A2090A Hard Disk/SCSI Controller card can support up to two ST506 drives and up to seven SCSI devices.

### Installing an Internal Hard Disk

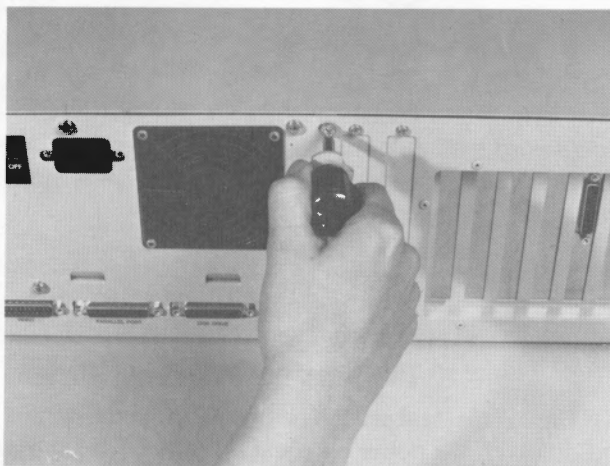
**WARNING:** Unplug the Amiga 2500 before installing the hard disk. Installing the hard disk with the power on could cause possible injury to yourself and damage the equipment. Commodore will not be responsible for any damages caused by improper installation of the hard disk. Such improper installation will void the warranties on the Amiga 2500.

1. 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.
2. 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.



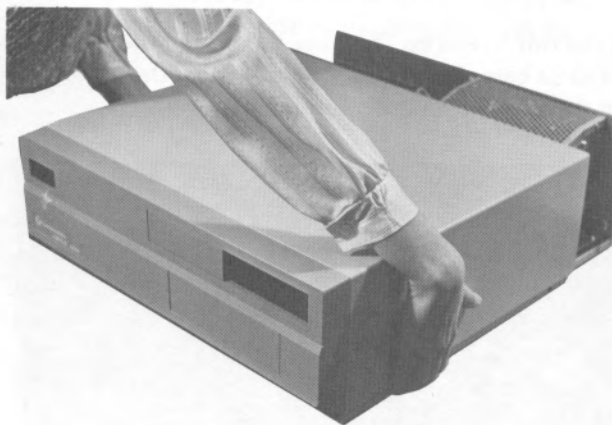
Side screws

**3. Remove the center screw from the rear of the Amiga.**



**Rear screw**

**4. 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.**



**Removing the cover**

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 rear screw had been attached. If anything is caught, gently untangle it, and continue to slide the cover off.

5. Your hard disk has jumpers 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.)

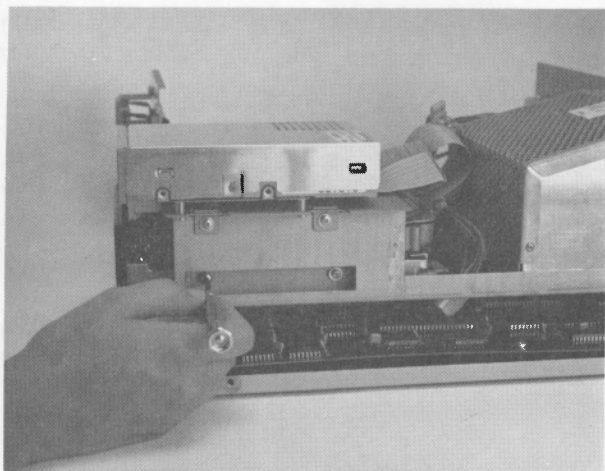
You may use one or two ST506 hard disks with the A2090A. The jumper on your original drive is already set to "0." You should set the jumper on the second drive to "1". You can use up to seven SCSI devices. The jumpers should be set as follows:

| 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 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 5 $\frac{1}{4}$ " Hard Disk**

A 5 $\frac{1}{4}$ " 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. (See photo on page 26.)



### **Installing 5 1/4" Hard Disk**

**Note:** If you want to install a 3 1/2" hard disk, you will need a 5 1/4" frame so that it can be installed as a 5 1/4" drive.

*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.*

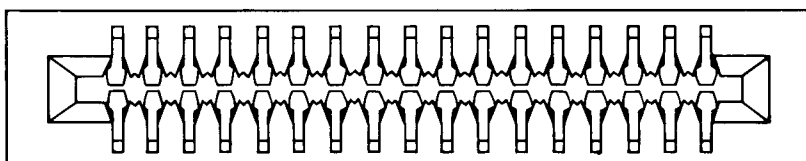
*If your drive does have a front bezel with a drive LED, you need to remove the screws that hold the cover over the 5 1/4" drive opening. You should be able to slide the hard disk back and forth so that you can make sure the hard disk is flush with the face of the Amiga. To do this, push the drive forward, 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.*

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. One of the 4-pin connectors will be attached to your original hard disk. Connect the second 4-pin connector to the second hard disk. Refer to the manufacturer's documentation for the exact location of the disk drive's power connector.

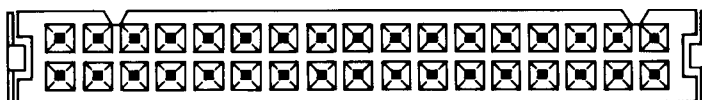
## Connecting the Hard Disk to the A2090A

You connect the hard disk to the controller card with cable(s). When making the connection, you must make sure that pin 1 of the cable is oriented in the proper direction. In other words, pin 1 of the cable must align with pin 1 of the connector, and so on. 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 of the connector is in the lower right corner. There will be a small "1" marked on the board.

One end of the cable has a *pin connector* (two rows of holes) and the other end may have either a pin connector or an *edge card connector* (flat opening). See the diagram below:



**Edge Card Connector**

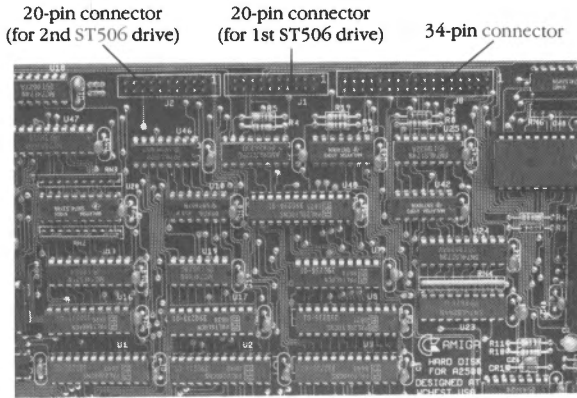


**Pin Connector**

*If your second hard drive is also ST506, you need two cables: a 20-pin cable and a 34-pin cable that "daisy chains" so that you can connect it to both the original and the second hard disk. In other words, the 34-pin cable should have two edge card connectors and one pin connector.*

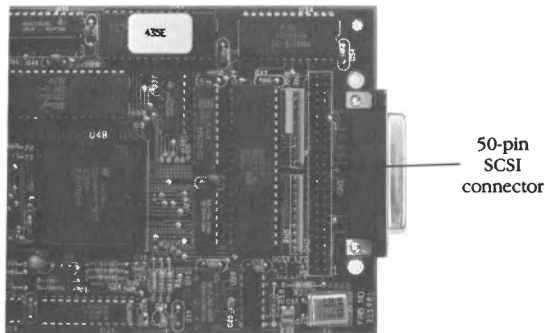
1. Remove the 34-pin cable that is attached to the original hard disk. Take the new 34-pin cable, attach one edge card connector to the original hard disk, attach the other edge card connector to the second hard disk, and attach the 34-pin connector to the A2090A card (see photo on next page).

2. Attach the edge card connector of the 20-pin cable to the hard disk, and attach the pin connector to the "second" 20-pin connector on the Hard Disk Controller.



**ST506 connectors**

*If your second drive is a SCSI device, you need a cable with a 50-pin connector on each end. One end connects to the rear of the hard disk, then the other end is attached to the long, 50-pin connector that runs vertically along the rear of the Hard Disk Controller (see photo below).*



**SCSI connector**

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.



## **Connecting External SCSI Devices**

External SCSI devices are connected to the Hard Disk Controller through the port on the rear of the Hard Disk Connector. This port is accessible from the rear of the Amiga 2500 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.

## **Running Install Software on the New Hard Disk**

You cannot use the ReInstall programs with your new hard disk. You will need to set up your new hard disk manually. The steps involved in this procedure are:

1. Deciding whether to divide your hard disk into partitions.
2. Creating the MountList entries for each partition.
3. Mounting the first two cylinders.
4. Prepping the entire hard drive.
5. Formatting each partition.

### **1. How Many Partitions?**

Before you actually run the Install software, you should decide how many partitions you want on the hard drive. Keep in mind that you will be auto-booting off the original drive, therefore you do not need any sort of boot partition on this new drive.

## 2. The MountList Entries

Every hard disk needs at least one MountList entry. This entry is for the first two cylinders of the hard disk. These cylinders are specifically allocated for Amiga software use. The rest of the drive is available for data storage. In order for the Amiga to properly recognize these two cylinders, the entry must be named as shown in Chart 1.

The MountList entry for the first two cylinders of your new drive will be RES1:, for a second ST506 drive, or RES2:, for a new SCSI drive.

If you do not partition the drive, no other entries are required. If you want to partition the drive, you need to create a MountList entry to correspond with each partition **after the first partition**.

You can name additional partitions any thing you like. However, it is suggested that you keep the name short and easy to remember, for instance, something on the order of P2: or PART3:.

The MountLists should be created in the Workbench:devs/MountList file as well as in the devs directory of the Boot partition of your original hard disk (boot:devs/MountList). An easy way to create the MountList entries for your new drive is to copy the entries for the original drive that are found in the file MountList.HD to a new file, and modify the MountList entries to correspond with your new hard drive.

The pertinent MountList keywords for use with a hard drive are explained below.

**Device** = hddisk.device. This tells the system that a hard disk has been connected to the first A2090A card installed in the Amiga.

**Unit** = <n>. For each hard disk device installed, the Amiga needs a different unit assignment. The unit assignment is used within the MountList to tell the Amiga how many drives have been installed. The appropriate Unit assignments are given in Chart 1.

Your new drive will have a unit number of 2, if it is also an ST506 drive, or 3, if it is a SCSI drive.

### Assignments for Devices Connected to 1st A2090A

| Device    | 1st 2 Cylinders | Unit* | Cyl. 2-? (1st Partition) |
|-----------|-----------------|-------|--------------------------|
| 1st ST506 | RES0:           | 1     | DH0:                     |
| 2nd ST506 | RES1:           | 2     | DH1:                     |
| 1st SCSI  | RES2:           | 3     | DH2:                     |
| 2nd SCSI  | RES3:           | 4     | DH3:                     |
| 3rd SCSI  | RES4:           | 5     | DH4:                     |
| 4th SCSI  | RES5:           | 6     | DH5:                     |
| 5th SCSI  | RES6:           | 7     | DH6:                     |
| 6th SCSI  | RES7:           | 8     | DH7:                     |
| 7th SCSI  | RES8:           | 9     | DH8:                     |

*\*A unit of 0 is never allowed.*

### Chart 1

**Flags** = 0.

**Surfaces** = <n>. This is the number of surfaces on your hard drive. This value varies among hard drives; please refer to the documentation that was packaged with your drive.

**BlocksPerTrack** = <n>. This is the number of blocks per track and corresponds with the hard drive's sectors per track. Again, refer to the manufacturer's documentation.

**FileSystem** = <n>. If you are using the FastFileSystem on this partition, you should add the entry `FileSystem = L:FastFileSystem`.

**Reserved** = 2. This is the number of blocks for the boot block, and it should always be 2.

**Interleave** = <n>. This determines the number of physical sectors between consecutively formatted sector numbers. It should be 0 for ST506 drives and for some SCSI drives. If the interleave value is equal to 0, you do not need to include the entry; if it is not zero, the entry must be included. But when using a SCSI device, please check the manufacturer's documentation to be sure.

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 number (i.e., a ratio of 1:1 equals an interleave value of 0; 2:1 = 1, 3:1 = 2, and so on).

**LowCyl** = <n>. The cylinder where the hard drive partition begins.

**HighCyl** = <n>. The cylinder where the hard drive partition ends.

**Buffers** = <n>. This is the number of initial cache buffers. The larger the number, the faster the information is accessed. However, if the number is too large, too much RAM is used.

**GlobVec** = -1. This determines the global vector for the process and should usually be -1, specifying that no global vector is used. NOTE: This entry is not needed in the MountList for RES#: (the first two cylinders).

**Mount** = 1. If a positive value, MOUNT loads the device or handler immediately rather than waiting for first access. NOTE: This entry is not needed in the MountList for RES#: (the first two cylinders). It must be used if FileSystem = L:FastFileSystem is specified.

**BufMemType** = <n>. This determines the type of memory used for the buffers. This should generally be 0 for hard disks.

**DosType** = <n>. This indicates the type of file system used within the partition. If you want to use the FastFileSystem, specify a value of 0x444F5301. Otherwise, the value should be 0x444F5300. Note: This entry can be omitted if the FastFileSystem is not being used. You cannot use the FastFileSystem with the hard drive's first two cylinders (RES#:).

When creating a MountList be sure to include the # symbol at the end on its own line.

### 3. Mounting the First Two Cylinders

Before you run the Prep program, you need to mount the partition for the first two cylinders. This makes the Amiga aware of the presence of the new disk. Open a CLI or SHELL window, and type:

```
MOUNT RES#: from Boot:devs/MountList.HD (or other MountList file—  
be sure to reference the correct MountList entry.)
```

You then need to Prep the first two cylinders.

### 4. Prepping the Hard Disk

You must be careful here to prep the new drive. If you make a mistake and run the Prep program on the original drive, you will wipe out everything that is stored on it. To run Prep, type:

```
ReInstall: PREP RES#: (Be sure to reference the correct partition  
and the correct drive.)
```

When you invoke Prep, you will see the following display:

```
PREP Version 33.34  
0) User defined  
1) SCSI  
2) ST506  
Select drive type [1]:
```

Type either 1, if it is a SCSI disk, or 2, if it is an ST506 drive. The Amiga will now display a list of compatible hard disks.

*If your hard disk is on the list and you do not plan to partition it*, simply type the corresponding number and hit Return. The system will then display a series of questions along with default answers suited to your drive. Simply hit Return at each prompt to choose the default answer.

*If your hard disk is on the list and you want to partition it*, you need to change the default answer for the third Prep question. The third question asks for the last cylinder to be used for the first partition. Change the default answer to correspond to the last cylinder for the first partition. This value should be one cylinder less than the LowCyl entry for the second partition, as defined in your MountList.

**NOTE:** The last question Prep asks is if you want to continue. The default answer is No. You must type a Y (yes) in order to proceed. After giving the system the go ahead, it will take anywhere from a few seconds to a few minutes to Prep the entire drive.

If you receive a message stating that the device is not PREPped, your hard disk is probably not installed correctly. Turn off your system, and double-check your cable and power hook ups. If you find a problem, correct it, and start again at Step 3, Mounting the First Two Cylinders.

*If your hard disk is not on the list*, simply hit Return after each prompt, and you will be returned to the CLI/SHELL prompt. Run Prep again, only this time when prompted to select a drive type, choose 0 for User Defined. The system will run through its series of questions, but default answers will not be provided. You will have to enter the appropriate specifications for your particular disk (refer to the manufacturer's documentation).

You must reboot the system to continue.

## 5. Formatting the New Disk

You're almost finished. Now that the first two cylinders are prepped, you need to mount all the partitions (except the one for the first two cylinders) and format the drive. Keep in mind that you **must not** format the first two cylinders, but you must format the remainder of the drive in order to store data on it.

First Mount the additional partitions:

MOUNT <Additional Partitions>: From Boot:devs/MountList.HD  
(or other MountList file)

Use the AmigaDOS FORMAT command on each partition:

FORMAT DRIVE <drive>: NAME <name>

The correct drive reference is the MountList name. The <name> you choose is the name that will appear under the disk icon for the partition.

## Sample Session

This section explains how to Mount, Prep and Format a second 20 MB ST506 drive.

### 1. How Many Partitions?

This drive will be divided into two partitions. There is a total of 612 cylinders on the hard drive. The first two (0 and 1) are reserved for the Amiga's use. That leaves cylinders 2 through 611 remaining. The first partition will consist of cylinders 2 through 20; this is a small partition similar in size to the Boot partition of your original hard disk. It is large enough to hold the Workbench files. The second partition will consist of cylinders 21 through 611.

### 2. Creating the MountLists

You can either create a brand new MountList file, or you can copy MountList.HD and modify it to suit your new hard disk.

```
RES1: Device = hddisk.device
      Unit = 2
      Flags = 0
      Surfaces = 6
      BlocksPerTrack = 17
      Reserved = 2
      LowCyl = 0 ; HighCyl = 1
      Buffers = 1
      BufMemType = 0
#
```

P2:     Device = hddisk.device  
        Unit = 2  
        Flags = 0  
        Surfaces = 6  
        BlocksPerTrack = 17  
        FileSystem = 1:FastFileSystem  
        Reserved = 2  
        LowCyl = 21 ; HighCyl = 611  
        Buffers = 50  
        GlobVec = -1  
        Mount = 1  
        BufMemType = 0  
        DosType = 0x444F5301

#

3. Mount the first partition:

Mount RES1:

4. Prep the first two cylinders:

Prep RES1:

Reboot the machine.

5. Mount the additional partition:

Mount P2:

6. Format each partition:

Format Drive DH1: Name Part1

Format Drive P2: Name Part2

You would then be able to access the Boot, Workbench and Work partitions of the original drive, as well as Part1 and Part2 of the second drive.



# C. Installing Expansion Cards in the A2500

You can install expansion cards, such as the A2052 or A2058 RAM Expansion card or the A2088 or A2286 Bridgeboard cards, in the A2500 just as you would in an ordinary A2000. However, a metal bar has been installed inside the A2500's cabinet to provide extra support while shipping the machine. This bar extends from the front side of the Amiga, underneath the cover, and across the expansion slots to the rear of the machine. It is connected by a single screw on each end.

While the bar is in place, you can still install expansion boards into the slots on either side of the bar. However, if you need to use the slot underneath the bar, you must remove the bar to insert the board. Simply loosen the screw at the front of the machine, and remove the screw from the rear bracket. After inserting the board and connecting any necessary cables to it, you can then replace the bar or you can leave it out.



# D. Developing Software with the Accelerator Card

You should have little difficulty in developing programs that are compatible with both the 68000 CPU and the 68020 CPU. Because there are differences between the two CPUs (mainly the fact that the 68020 is a fast, full 32-bit CPU), you should follow some guidelines when creating programs.

Below is a list of some DOs and DON'Ts to keep in mind when working on your programs:

- **DON'T** use the upper 8 bits of 68000 addresses for tables if you want your program to be compatible with 68020 CPUs.
- **DON'T** use signed math on addresses. **DO** make sure that all your address arithmetic is 32 bits long to prevent things like sign extensions from creeping in and changing the address.
- **DON'T** write self-modifying code. This can break on the accelerator card since it is normally running out of its on-chip instruction cache.
- **DON'T** run code on the CPU stack.

Also, here are some points to consider regarding the compatibility of 68000 programs and 68020 programs:

- You should base program code that is time dependent on a system clock, not on the CPU speed, since the accelerator card causes integer operations to occur between 3 and 4 times faster than they did on the 68000. This will result in more free CPU time on either system by eliminating software timing loops.

- Be sure to test everything written on a 68020 based Amiga on a 68000 based Amiga. The 68020 requires word alignment only for its instructions, but the 68000 requires word data on the stack to be word aligned. Therefore, it is possible to write non-aligned code that runs properly on the 68020 but not on the 68000.
- When creating programs on the 68020 CPU, there are some instructions that only exist in the 32-bit chips. While most compilers and assemblers know not to generate 68020 code unless specifically instructed, this could cause a compatibility problem with the 68000 CPU.
- Be sure to consider both 68020 and 68000 environments when writing floating point code. The 68020 can have in-line code that takes advantage of the maximum speed of the 68881 as a coprocessor; however, this must also be emulated on the 68000. The Amiga math libraries will solve this problem in general, but they are not as efficient as the in-line code.

For additional reference, please consult:

*The Motorola MC68020 Manual*

*The Motorola MC68881 Manual*

*The Motorola MC68851 Manual*

*The AmigaDOS Technical Reference Manual*

# E. Adjusting the Accelerator Card Hardware

The accelerator card does provide the option of installing a faster math chip and/or an additional two megabytes of memory. There are also several jumpers on the board that may have to be adjusted should you make any changes to the system. This appendix explains the procedures involved in making any of these changes. However, **installation of any chips should be performed by qualified service personnel. Improper installation may void your warranty.**

## Installing a Faster Math Chip

A faster 68881 or 68882 math chip can be installed on the accelerator card to increase the speed of math intensive operations. Motorola supplies both 68881 and 68882 chips in 16MHz, 20MHz, 25MHz, and 33MHz versions. The accelerator card has been tested with and supports chips running up to 25MHz. In addition to the new math chip, you'll also need a clock module of a lesser or matching frequency rating. (The clock module is an industry standard 4-pin oscillator can with TTL compatible output level.)

Before installing any chips, **remove the accelerator card from the A2500.** Remove the A2500's cover. The accelerator card is installed in the 86-pin CPU slot to the left of the hard disk. The card is held in place by a screw that is inserted in the rear plate of the expansion slot. Remove the screw, and gently, but firmly, remove the accelerator card from its slot.

To install the chip and clock module, a chip puller and a soldering iron are required. **This procedure should be performed by qualified service personnel. Improper installation may void your warranty.** First the clock module should be replaced, then the math chip.

Normally the clock module is soldered into the accelerator card as device U204, directly under the math chip socket. (Please see the diagram on page 43.) Before removing the old clock module, be sure to note its orientation. The shield ground pin of the module looks like it is directly attached to the clock module's case. This pin corresponds with the lower right pin of the U204 location. The new module should be inserted in the same fashion.

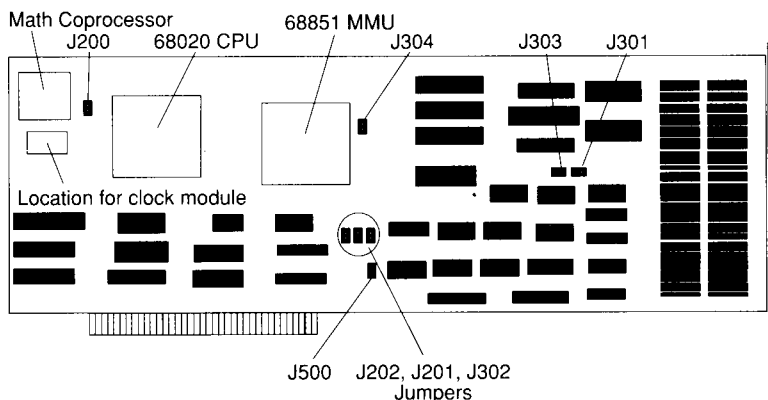
Once the new clock module is installed, the 68881 math chip, located in the U201 position, can be replaced. Remove the old chip, then put the new, faster 68881 or 68882 chip right into the chip socket. Be sure to install it in the right direction. Pin 1 of the math chip is located by a dot and a gold stem in the corner of the chip. Pin 1 on the socket should be in the lower right corner; look for a small "1" on the board.

Once the new chips are in place, switch on the fast clock by moving jumper J200 to the lower position (see the diagram of the card). Replace the accelerator card in the A2500, replace the machine's cover, and re-connect any peripherals that were removed from the system. Power up the A2500, and test the math chip with a math-intensive program. Everything should work, and there should be a marked improvement in the system's speed.

*If the accelerator card does not seem to be working*, re-check the installation of the card and the chips. Test the board by moving the J200 jumper to the higher position. This will run the new math chip from the 14.3MHz CPU clock instead of from the fast clock. If the card works, the new clock module is probably installed incorrectly. If the card continues to fail, it is probably due to the wrong math chip.

*If the card works but you don't notice an improvement in speed*, several things may have happened. First, check to see if the J200 jumper is in the wrong position. If the jumper has not been moved to the lower position, the system will not run any faster. A faster math chip needs a faster clock in order to work properly.

Then, check to see if the software uses hardware floating point. If it doesn't, installing a faster math chip won't make a difference in the software's performance. While the program will run faster on the 68020 than on a standard Amiga, a faster math chip does not cause any additional improvement. There are various MandelBrot programs in the public domain that use hardware floating point when available. Also, the Amiga OS Version 1.3 floating point libraries access hardware floating point when it is available.



Accelerator Card

A jumper must be set on J302 for proper operation on 4-layer motherboards (applicable in Europe). The jumper should not be installed on 2-layer motherboards.

The J200 jumper block specifies the clock used by the 68881 FPU. As shipped (with the jumper in the upper position), the FPU uses the basic 14.3 MHz clock that is used by the 68020 and the 68551. If a faster 68881 or 68882 math chip and clock module are installed, the jumper must be set to the lower position to route the module's output to the 68881.

The J301 jumper block specifies the amount of RAM installed. When no jumper is in place, the system expects 2 megabytes. If a jumper is set, the system expects 4 megabytes.

If a jumper is set on J303, all the card's DRAM is disabled.

The J304 jumper block specifies which operating system to autoboot. When no jumper is in place, the system autoboots AmigaDOS. If a jumper is set, the system autoboots a UNIX operating system (provided the appropriate software is supplied on a hard drive or tape streamer).

The J500 jumper block specifies the DRAM timing. When the jumper is in the upper position, the timing is set for 100 nanoseconds. If the jumper is in the lower position, the timing is set for 80 nanoseconds. If the jumper is removed, the system will not work.

## **Installing an Additional 2MB of Memory**

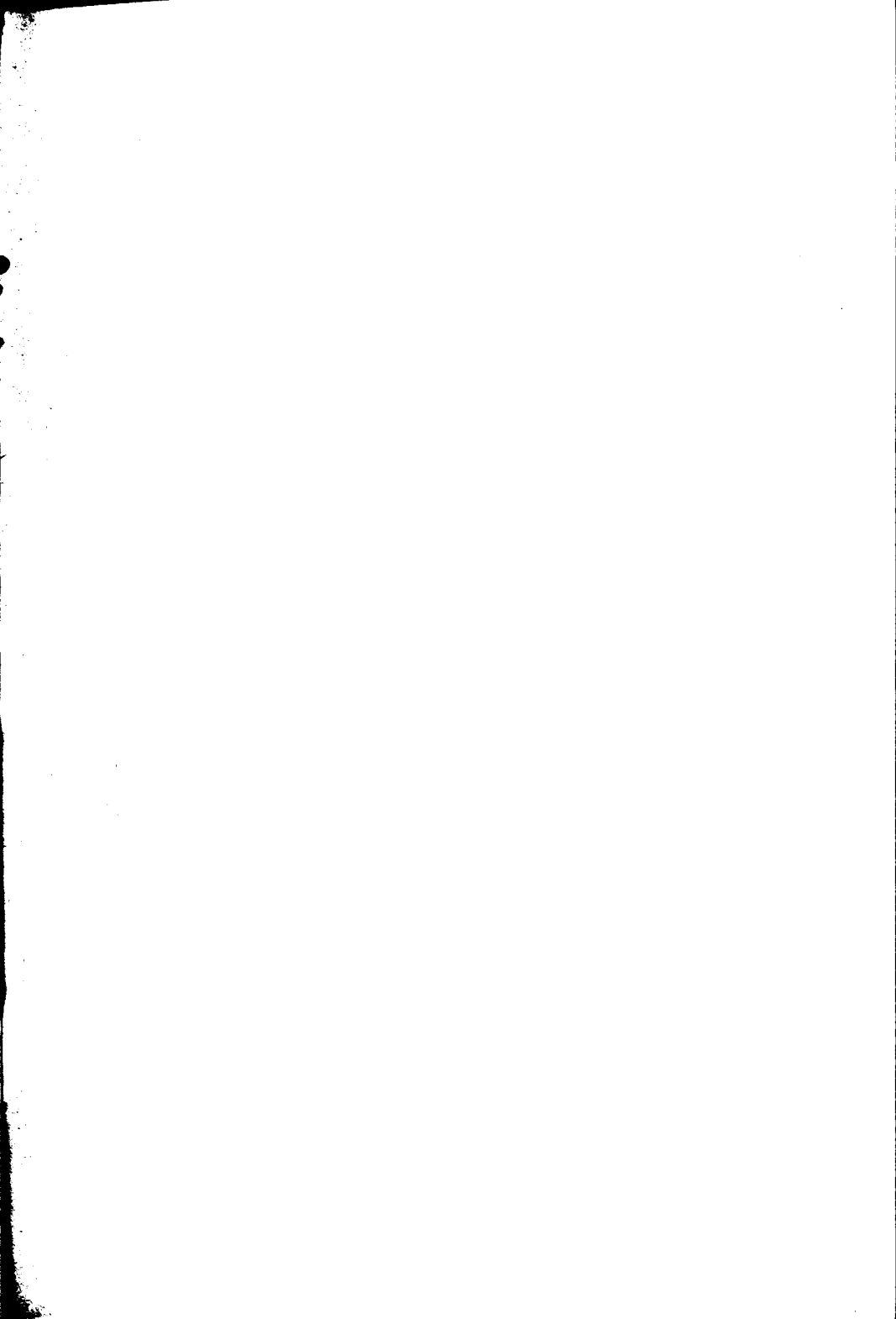
**Installation of these chips should be performed by qualified service personnel. Improper installation may void your warranty. If you are not familiar with soldering chips, please do not attempt this procedure yourself.**

To expand the accelerator card from 2 MB to 4 MB of memory, you need the additional memory chips (memory type is 414256-10 ZIP-style package 100ns) and a soldering iron.

Please note that the chips are sensitive to static electricity. Contact with a chip when high static levels are present could ruin a chip. Touching the surrounding surfaces before touching a chip can help reduce static.

Orient the chips so that the square edge aligns with pin 1. Solder the chips in place. After the chips are installed, set a jumper at location J301 to inform the system that the additional memory is in place.







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