CMI Processor Accelerator

for the
Amiga Personal Computer

Note: This product comes with a full factory warranty of six months from the date of purchase against any and all defects in parts, material or workmanship. However, Creative Microsystems Incorporated assumes no liability whatsoever for damage incurred during the installation of this product, and said damage is the sole responsibility of the installer

Direct inquiries regarding factory servicing of this unit to:

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attn: Mark D. Hannaford
10110 SW Nimbus #B1
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(503) 684-9300

CONTENTS

Short Form Instructions:

[The following instructions are meant for those of you who did not intend on reading this manual anyway. The rest of you are encouraged to skip ahead to the detailed instructions.]

1. Dismantle your Amiga 500/1000/2000.

2. Note the orientation of the 68000 processor. Remove it.

3. For use with the MC68881 math co-processor, remove the small jumper in the pin-grid array socket and install your MC68881 and the appropriate crystal oscillator in the Processor Accelerator, oriented as shown in Fig. 1.

4. Install your Processor Accelerator in the processor socket, oriented such that the new 68000 or the accelerator points the same direction as the original processor.

5. Reassemble your computer.

6. Boot with a standard workbench. Run the program "ps" on the provided disk to switch to 14Mhz operation. Copy "ps" and "FPUInstall" to the c directory of your favorite boot disk, and call these programs from the startup-sequence. FPUInstall enables the multitasking library for the math chip, FPU.library.

7. The program "ps" automatically checks to see if a math chip is installed, and will then tell the operating system that it is present. In order to use the math chip, the math libraries from a 1.3 Workbench must be on your boot disk. The needed libraries can also be found on the Processor Accelerator Utilities disk, in the "libs" directory, and can be copied to your boot disk if necessary. FPU.library is the multitasking handler for the math chip, and this file must also be placed in the libs directory.

Installing Your Optional MC68881 Math Coprocessor

Note: In handling your very expensive new math chip, and with your Processor Accelerator in general, reasonable care must be taken to avoid potential damage to the chip and board from ESD (static discharge). Do's: Keep your parts and board in their static resistant packaging until you are ready to install them, and try to make sure that you have dissipated any static charge you may have built up by touching a grounded metal object before handling these components. Don'ts: Don't go shuffling across the carpeting while wearing polyester socks in mid-winter and grab your unpackaged math chip or Accelerator board.

1. Once you have obtained a math coprocessor and an appropriate crystal oscillator (refer to Appendix 1 for information on ordering these components), refer to figure 1A or 1B, which shows each version of the Processor Accelerator with the math coprocessor installed.

2. Locate the pin grid array socket on your board that is provided for the math coprocessor. Remove the small wire jumper between the third and fourth holes on the bottom row of the socket.

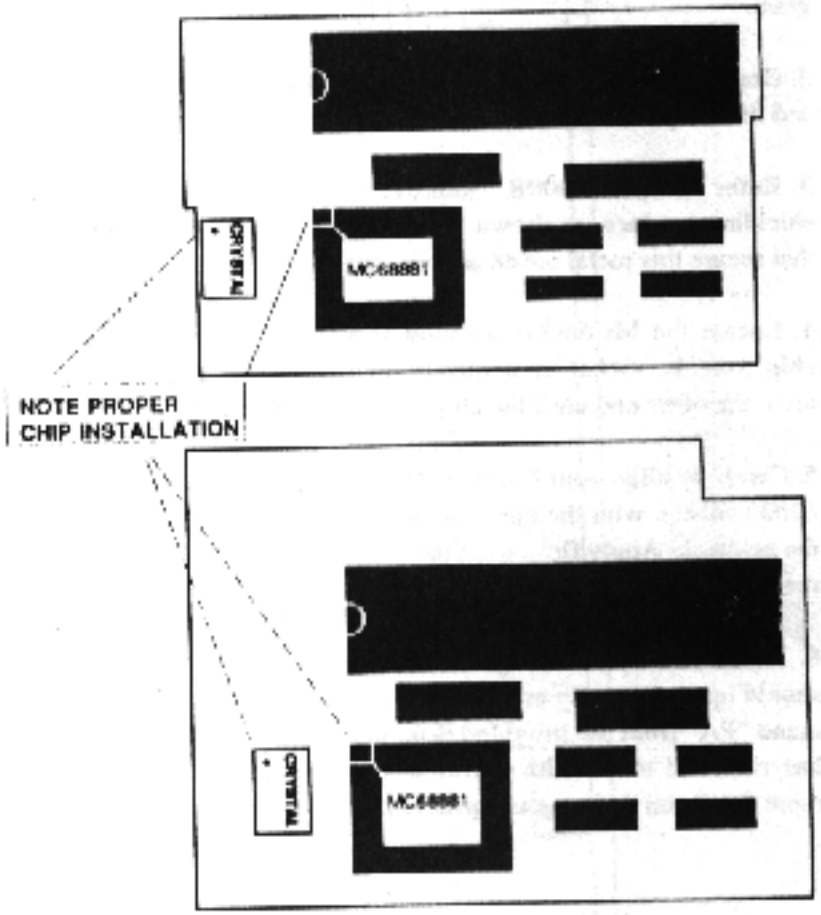
3. Examine your MC68881 very carefully, checking for any bent pins. If there are any pins that are not perpendicular to the surface of the chip, VERY, VERY carefully straighten them with a pair of needle-nose pliers (observe cautions regarding static discharge noted above).

4. Orient the math chip as shown in figure 1, and carefully place the part in its socket. Firmly but gently apply pressure to the center of the chip until it is seated in the socket. A small air gap will remain between the bottom of the chip and its socket, even when the part is fully seated.

5. Install your four pin crystal oscillator in the socket shown in figure 1A. The lettering on the package and/or the dot on the corner should be oriented as shown in the diagram.

6. You are now ready to install your Processor Accelerator in your Amiga.

1000 VERSION



500/2000 VERSION

FIG 1

Installing Your Processor Accelerator in the Amiga 1000:

1. Refer to figure 1000A. Remove the five screws shown in the diagram.

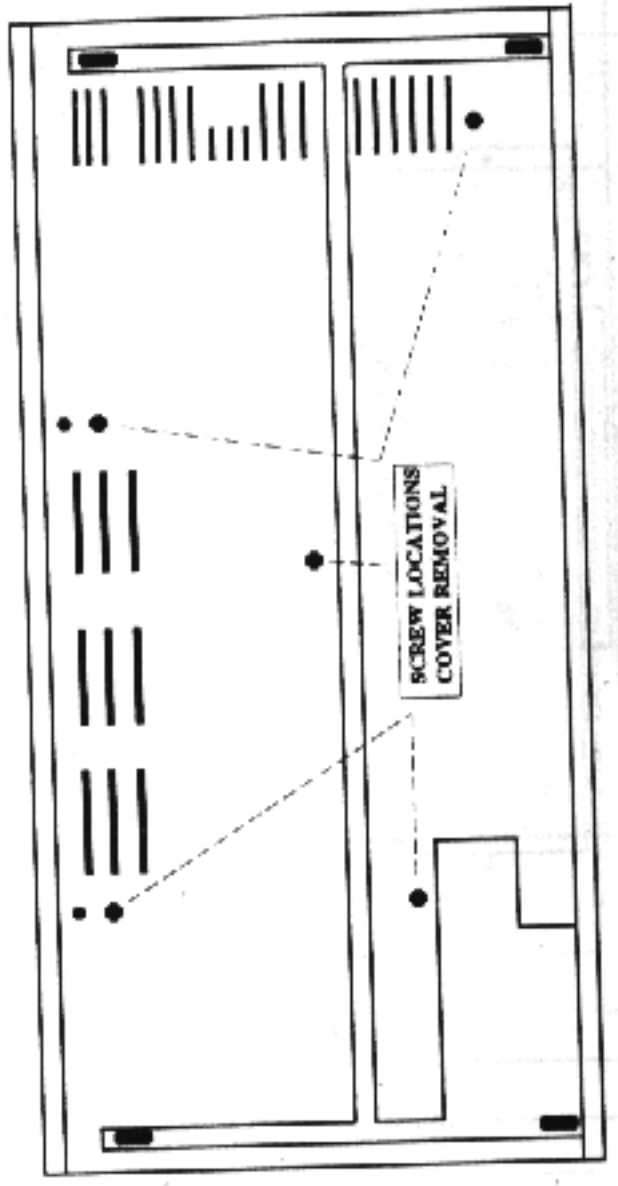
2. Gently pry the Amiga's top cover away from the side of machine, and lift away.

3. Refer to figure 1000B. Remove the screws that hold the metal shielding in place, as shown in the diagram. Unbend the metal tabs that secure this metal cover, and remove.

4. Locate the MC68000, as shown in figure 1000C. Remove this chip from its socket by gently prying up on one end of the device, then the other end until the chip is free of the socket.

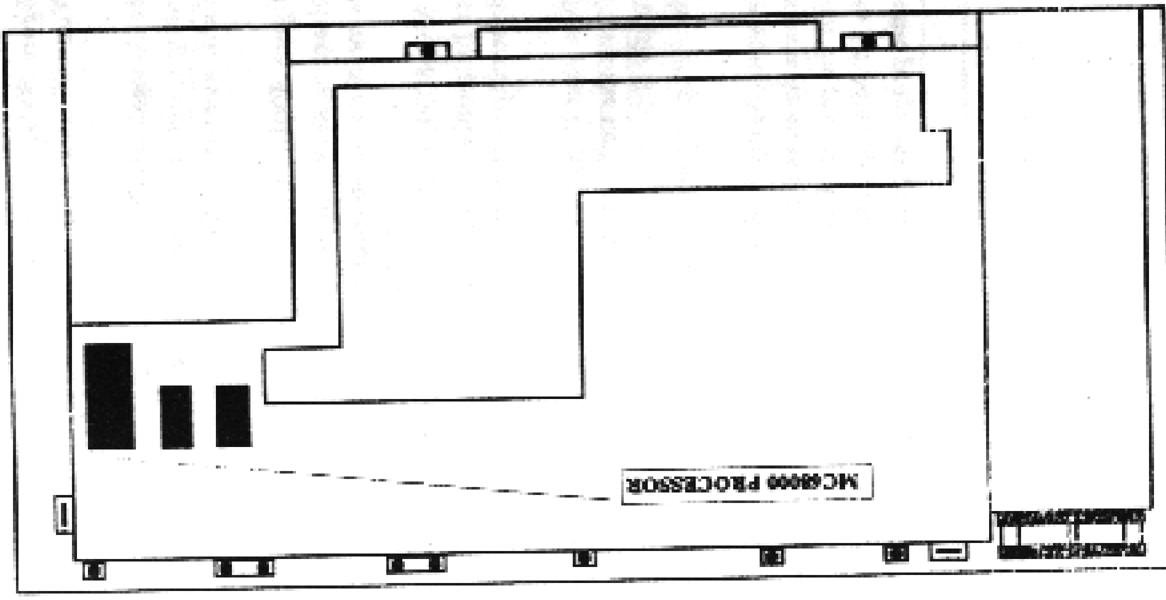
5. Carefully align your Processor Accelerator's stand-off pins over the 68000 socket, with the new 68000 pointing the same direction as did the original. Apply firm, even pressure to the Accelerator to fully seat these pins in the Amiga's 68000 socket.

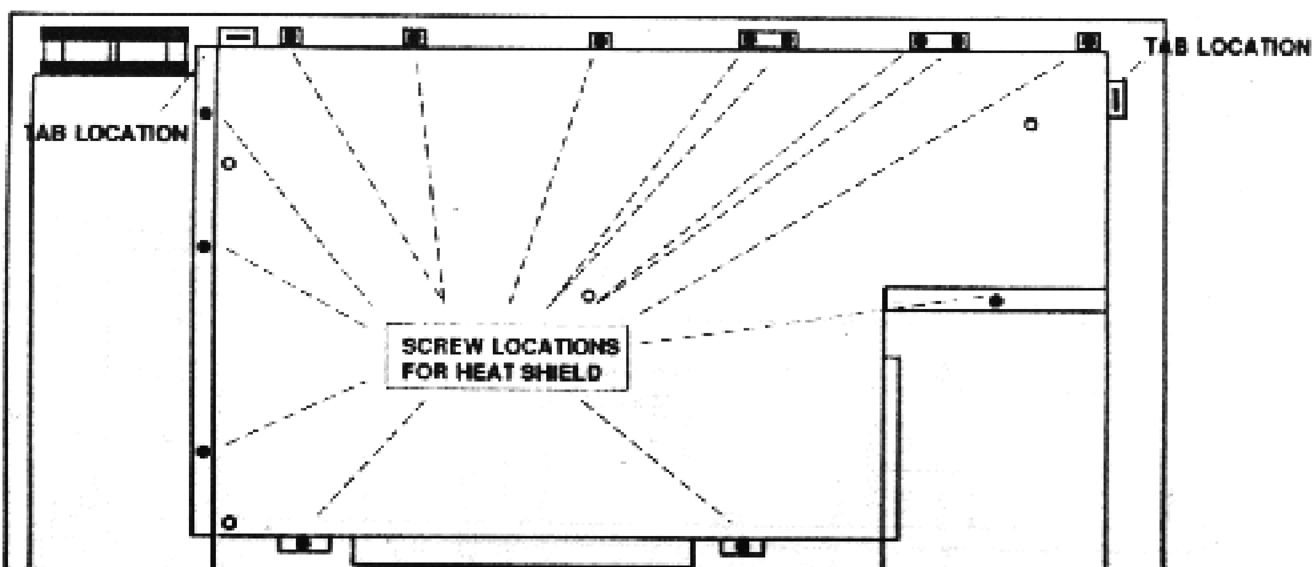
6. Reassemble your Amiga. When you turn on the computer, it should operate exactly as it did before. When you execute the command "PA" from the provided disk, the Amiga should tell you that it has switched to 14 Mhz operation (see the section on Software for more details on the programs provided with the Accelerator).



1000A

1000C


MC68000 PROCESSOR


TAB LOCATION
TAB LOCATION
SCREW LOCATIONS
FOR HEAT SHIELD

1000B

Installing Your Processor Accelerator in the Amiga 500:

1. Refer to figure 500A. Remove the six screws shown in the diagram. Note: You will need a number 10 Torx Tip screwdriver.

2. Remove the Amiga's plastic top cover. Remove the keyboard assembly by sliding it out of the plastic brackets at the bottom and unplugging the cable assembly from the motherboard. Set it aside.

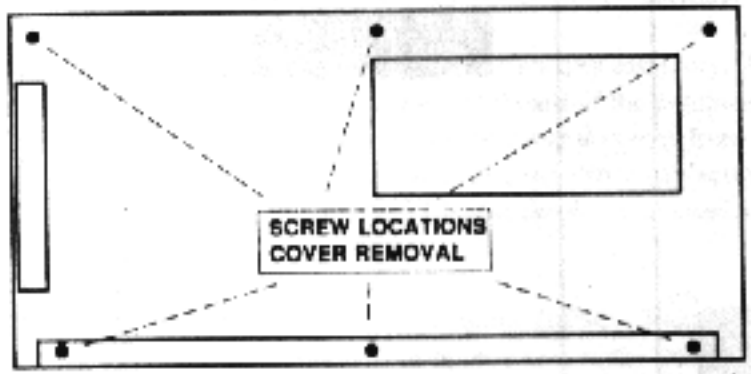
3. Refer to figure 500B. Remove the screws that hold the metal shielding in place, as shown in the diagram. Unbend the metal tabs that secure this metal cover, and remove.

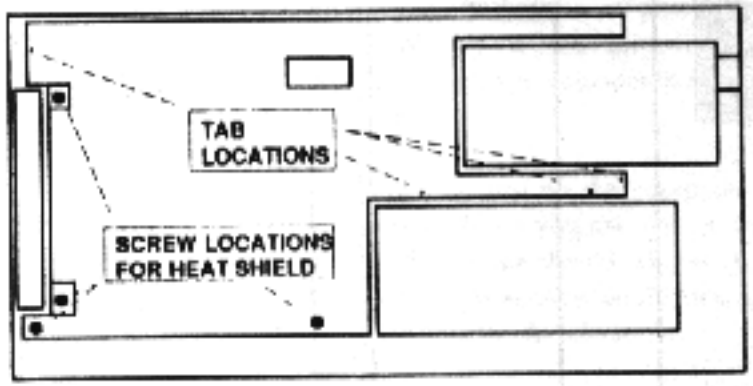
4. Locate the MC68000, as shown in figure 500C. Remove this chip from its socket by gently prying up one end of the device, then the other end until the chip is free of the socket.

5. Carefully align your Processor Accelerator's stand-off pins over the 68000 socket, with the new 68000 pointing the same direction as did the original. Apply firm, even pressure to the Accelerator to fully seat these pins in the Amiga's 68000 socket.

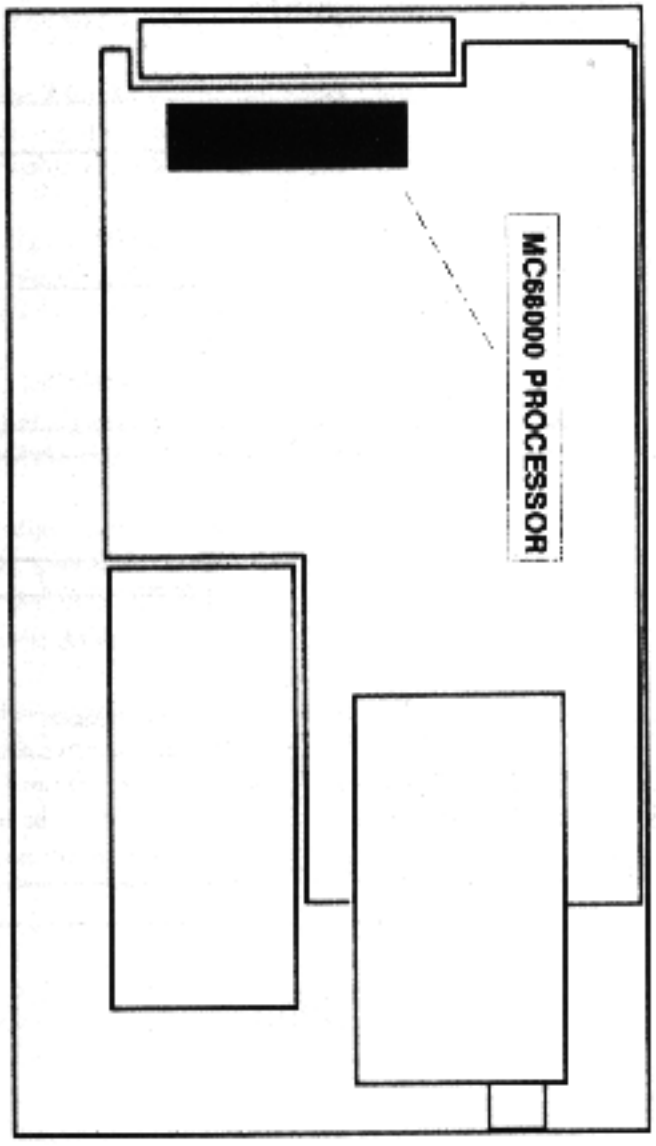
6. Reassemble your Amiga. When you turn on the computer, it should operate exactly as it did before. When you execute the command "PA" from the provided disk, the Amiga should tell you that it has switched to 14 Mhz operation (see the section on Software for more details on the programs provided with the Accelerator).

500A





500B



2000C

Installing Your Processor Accelerator in the Amiga 2000:

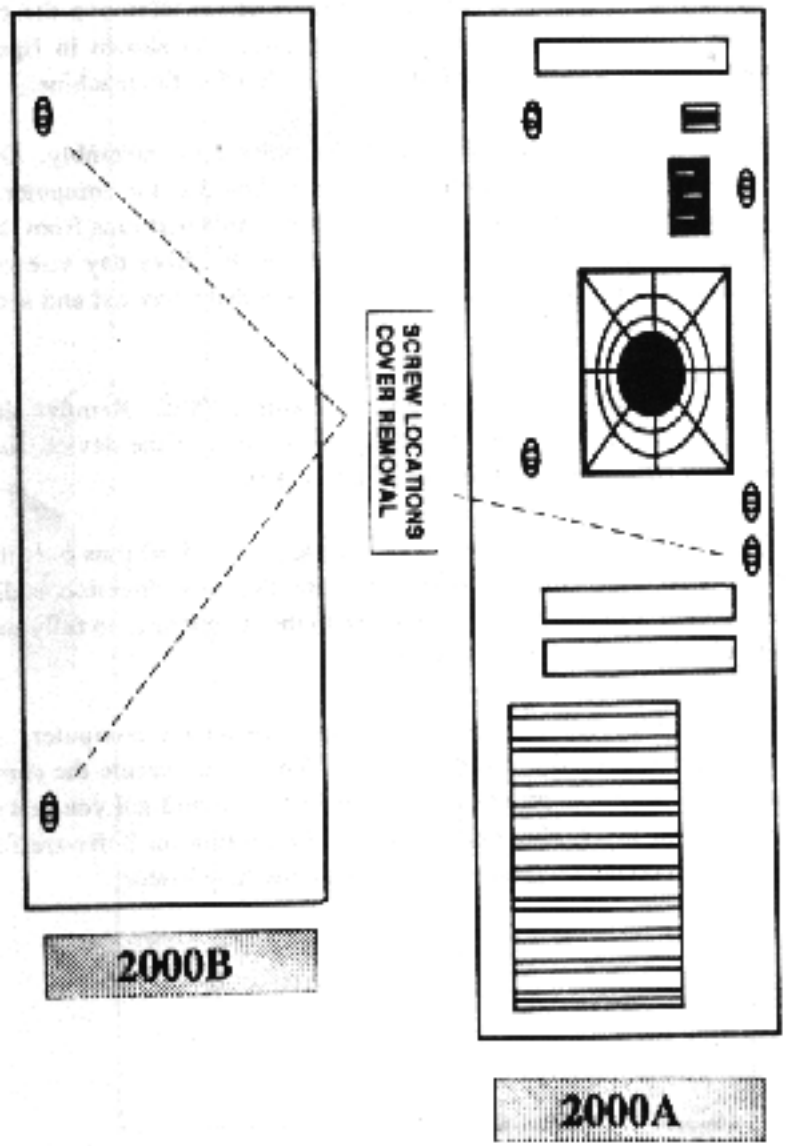
1. Refer to figure 2000A. Remove the single top cover screw on the back of the computer, as shown in the diagram. Remove the two screws found on either side of the top cover, as shown in figure 2000B. Slide the top cover forward, and lift off of the machine.

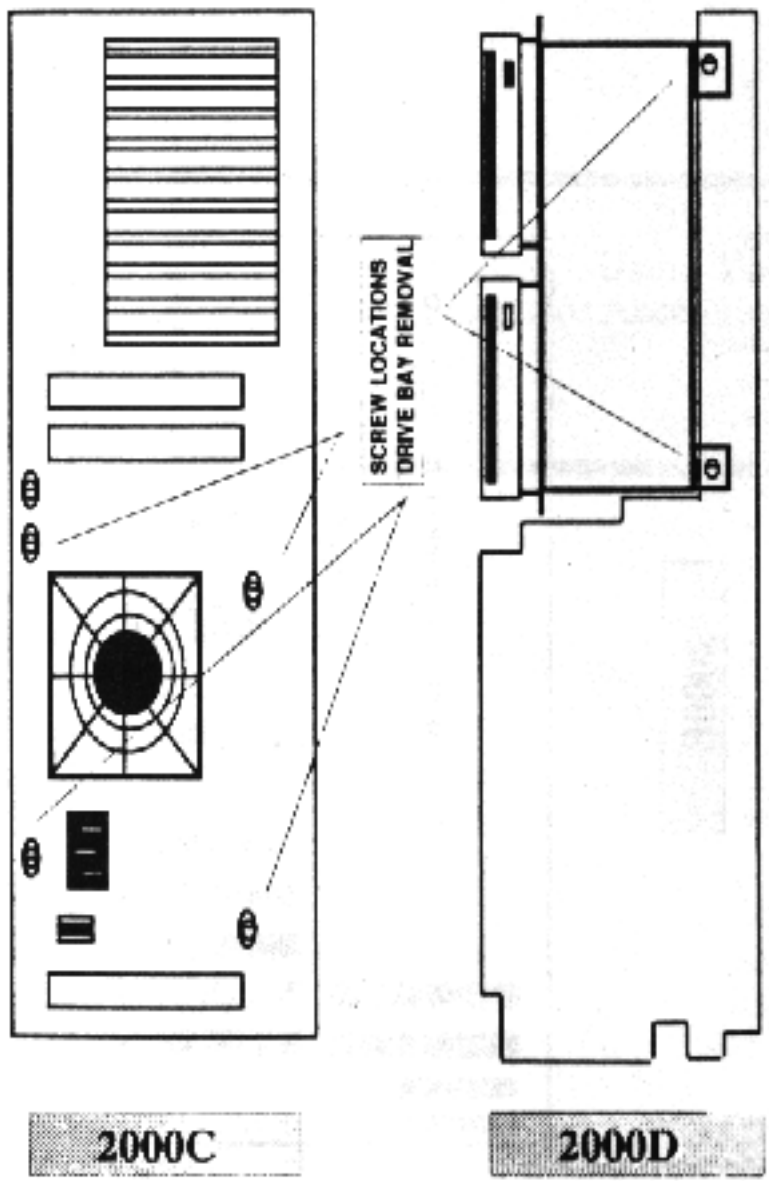
2. Next, we need to remove the computer's drive bay assembly. Disconnect the cables that lead from the motherboard of the computer to the internal floppy drive(s). Disconnect the cable that runs from the power supply to the motherboard. Remove the drive bay screws, shown in figures 2000C and 2000D. Lift the drive bay out and set it aside.

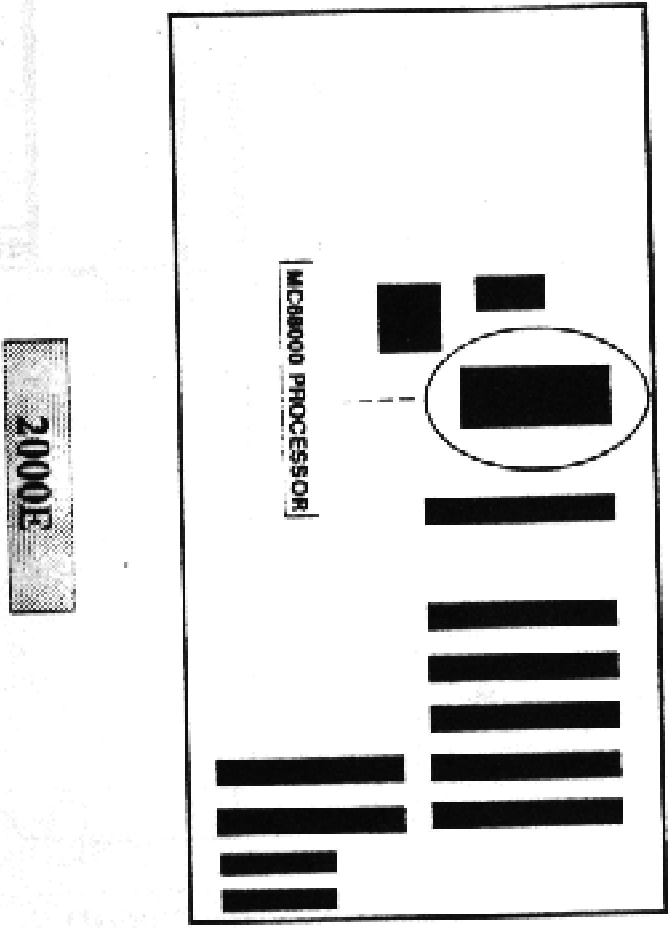
3. Locate the MC68000, as shown in figure 2000C. Remove this chip from its socket by gently prying up one end of the device, then the other end until the chip is free of the socket.

4. Carefully align your Processor Accelerator's stand-off pins over the 68000 socket, with the new 68000 pointing the same direction as did the original. Apply firm, even pressure to the Accelerator to fully seat these pins in the Amiga's 68000 socket.

5. Reassemble your Amiga. When you turn on the computer, it should operate exactly as it did before. When you execute the command "PA" from the provided disk, the Amiga should tell you that it has switched to 14 Mhz operation (see the section on Software for more details on the programs provided with the Accelerator).


SCREW LOCATIONS
COVER REMOVAL
2000B
2000A


SCREW LOCATIONS
DRIVE BAY REMOVAL
2000C
2000D


MC68000 PROCESSOR
2000E

Using Your Processor Accelerator

On initial power-up, or after re-booting your computer (performing the Ctrl-A-A key combination) the Processor Accelerator always resets to the standard 7.16 Mhz clock speed. When you run "PA" (with no arguments), the Accelerator shifts into 14.32 Mhz mode, tests the processor speed to verify, and prints a status message reporting the actual current processor clock rate. In addition, "PA" will check for the presence of a math coprocessor chip, informing the operating system if one is found, and will report this information in the status message. If PA is run from the CLI, this status message will appear on the command line, and if it is executed from an icon the information will temporarily appear in the title bar. Running PA again (with no arguments) simply resets the clock to the original 7.16Mhz. This offers a simple means of accommodating those software programs that do not run properly at the faster clock speeds.

With the processor speed increased to 14.32 Mhz, you should notice subtle but significant improvement in the overall speed of operation of the computer. Workbench oriented operations such as window sizing and redraw, task switching, and cursor movement will be noticeably smoother in execution. Programs that are math or graphics intensive will perform up to 40% faster, at the faster clock rate.

Using Your Processor Accelerator with an MC68881 Math Co-processor

As mentioned previously, you will need some of the math libraries from a version 1.3 Workbench disk in order to use your math co-processor. Specifically, the files "mathieeedoubtrans.library" and "mathieeedoubbas.library" are required for operation of the MC68881. In addition, you need the library file FPU.library to insure that the math chip will multitask properly.

It is important to remember that if you are not using a version 1.3 Workbench boot disk, it is necessary to copy the math libraries from the "libs" directory of the Processor Accelerator Utilities Disk to the libs directory of the currently recognized "libs:" directory of your system. In either case, you need FPU.library from the Utilities disk.

Once the Workbench version 1.3 libraries are copied to the libs directory of your boot disk, you need only run "PA" to allow the system access to the math co-processor, and "FPUInstall" to load the multitasking library. Software programs that are capable of utilizing the math chip will automatically do so, resulting in substantial improvements in performance.

It is also worth noting here that if a program has accessed the IEEE math libraries prior to your adding the math chip as a system resource (running "PA"), it will not recognize the math chip the next time the program is run, and it will be necessary to re-boot your machine and install the math chip before the program will recognize it again.

Description of Software Provided on Processor Accelerator Utilities Disk

PA

As described earlier, PA is the utility that allows you to configure your Processor Accelerator to 7 or 14MHz, and install your optional math coprocessor chip. This is the utility that you will probably want to copy to your usual boot disk, and run in the startup-sequence. PA has a number of options, and your boot disk has several smaller variations of PA for use on boot disks that have little available free space. For more information on the current version of "PA", consult the documentation file on your Processor Accelerator Utilities disk "PA_Read_Me!".

FPUInstall

This program loads the FPU.library file, to permits the math chip to function properly in a multi-tasking environment when it is accessed by multiple programs.

Demos

There are a number of demo programs on your Processor Accelerator Utilities disk. These are useful for observing the improvements in performance that result from the installation of a Processor Accelerator. In particular, several programs are included that will make use of the math coprocessor if it is installed, with dramatic improvements in performance. For more information on the demos included on your Utilities disk, consult the file "Demo_Read_Me!".

Benchmarks

This directory contains a number of benchmark tests that are used to quantitatively measure the performance of you processor. In addition, there are text files that describe each of these test, and list tables of results obtained from different system configurations.

libs

This directory contains the Workbench 1.3 math libraries required to access the math chip, if it is installed. In addition, the multitasking library "FPU.library" is located in this directory. See the previous section on "Using Your Processor Accelerator with an MC68881 Math Co-processor".

Description of Hardware Option Jumpers (refer to diagrams for jumper locations)

J1- "Fast ROM Jumper"

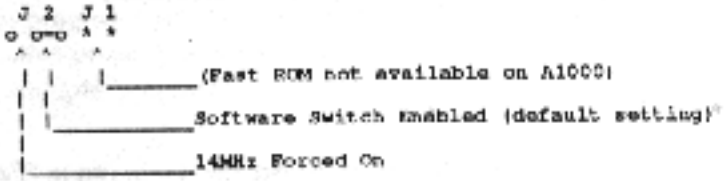
Option jumper J1 allows for the Processor Accelerator to run in "Fast ROM" mode, where accesses to the computers Read-Only-Memory occur with a reduced number of wait-states when the accelerator is running at 14MHz. This provides additional speed-up of the overall operation of the computer.

When the shunt is installed across the two pins of J1, the "Fast ROM" mode is enabled. When it is removed, it is disabled. "Fast ROM" mode is not available on the Amiga 1000.

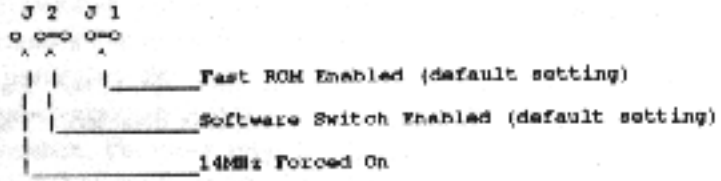
J2- "Forced 14 Jumper"

Some software programs, notably games, don't execute a startup-sequence prior to loading. In addition, some users may simply want to run their Processor Accelerator at 14MHz all the time, rather than use the PA utility. In order to permit this, jumper J2 has positions that allow for the 7/14MHz software-switchable mode, and a "Forced 14" mode that will defeat the software switch, and cause the Processor Accelerator power-up and run at 14MHz. The diagrams below show shunt positions for each setting.

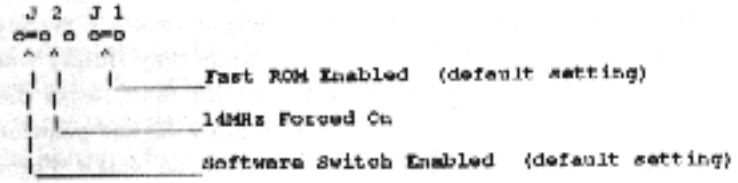
PAMC1000:



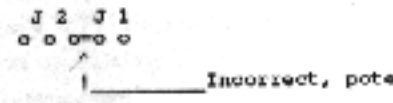
PAMC500:



PAMC2000:



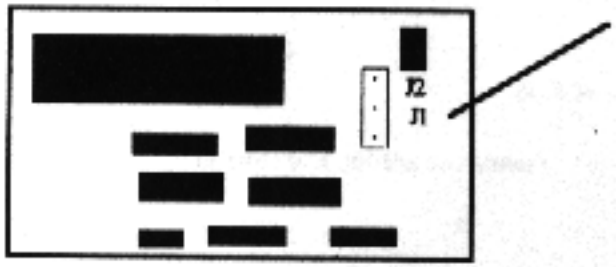
CAUTION-- Due to a design error, incorrectly setting the jumpers to the setting shown below will prevent your computer from operating, and can potentially cause power supply damage.



Option Jumper Locations

PAMC500

PAMC1000



PAMC2000

Appendix 1: Sources for the MC68881 Math Co-processor and Crystal Oscillator

Any speed math coprocessor may be used, as long as you provide the appropriate value of crystal oscillator. For a 12.5 Mhz math chip (MC68881RC12A), you can use either a 12 or 12.5 Mhz oscillator. The 16.67 Mhz version (MC68881RC16A) will run fine with either a 16 or 16.67 Mhz crystal.

The Motorola MC68881 math co-processor chip can be obtained from the following supplier:

Jameco Electronics
1355 Shoreway Road
Belmont, California 94002 (415) 592-8097

Part Number: MC68881RC12A or XC68881RC12A
(These parts are the 12.5 Mhz version)

Crystal Oscillators for use with the appropriate math chip can be obtained from the following suppliers:

DigiKey Corporation
701 Brooks Ave. South
P.O. Box 677 Thief River Falls, MN
56701-0677 1-800-344-4539

Part Number: X116 (this is a 16Mhz oscillator)

JDR Microdevices
110 Knowles Drive,
Los Gatos, Ca 95030 1-800-538-5000

JDR stocks both the 12.0 and the 16.0 Mhz crystal oscillators.