≡GVP

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IMPACT
Series II

USER'S GUIDE

A530 *TURBO* ™

A High-Power Hard Disk Drive, Accelerator, and
RAM Subsystem for the Amiga® 500

A530
Turbo
Accelerator

for the

Amiga A500

This product does not require opening the Amiga A500's case or any other invasive procedure. It can be installed without jeapordizing Commodore's original factory warranty. Installation of this product does require some small degree of mechanical ability and precautions against electrostatic discharge. The user assumes all risks when this installation is performed by anyone other than a certified GVP dealer.

Workbench, Kickstart, Amiga, A500, AmigaDOS and Enhancer are all registered trademarks of Commodore International, Ltd. 68000, 68030, 68882 are trademarks of Motorola, Inc. All other product trade names and designations are used for illustrative purposes only and are in no way endorsements of those products or infringements on the copyrighted properties of their manufacturers.

Amiga A500 and A530 artwork included in this manual was drawn by Bradley N. Litwin.

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FCC STATEMENT

WARNING: This equipment has been designed to comply with the limits for a Class B computing device, pursuant to Part 15 of the Federal Communications Commissions rules. These rules and regulations are designed to provide reasonable protection against radio and television interference in a residential installation. If not installed properly, in strict accordance with the manufacturer's instructions, it may cause interference. If you suspect interference, you can test this equipment by turning it on and off. If you still experience interference with the equipment switched off, then the cause lies elsewhere. If this equipment does cause interference when switched on, any or all of the following suggestions may correct the problem.

· Reorient the antenna or plug on the radio or television receiver

· Change the relative positions of the GVP equipment and the radio or television receiver

· Plug the GVP equipment into a different outlet so that the peripheral and radio or television receiver are on different circuits.

CAUTION: Only equipment 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 grounded). If not, contact an electrician to install the proper receptacle. If a multi-receptacle switch box or "power strip" is used to connect the computer and GVP peripherals to AC, then all receptacles must share a common ground.

If necessary, contact your dealer or an experienced radio-TV 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, D.C. 20402, stock no. 004-000-00345-4.

CHAPTER 1.
INTRODUCTION [Ready...]

Thank you for purchasing the GVP A530 Turbo Combination subsystem for the Amiga A500. This product represents the most highly integrated system enhancement available for the A500. Its features include:

- Accelerator, SCSI controller, RAM expansion, and Hard Drive in an all-in-one, easy to install, modular subsystem

- "Plug and play" design gets you up and running in almost no time at all

- High performance 40 MHz Motorola 68EC030 Central Processing Unit and optional 40 MHz 68882 Floating Point Unit chips to maximize system throughput

- Up to 8 Megabytes of onboard 32-bit wide FAST RAM, using GVP's 60 nanosecond 1- or 4-Megabyte "SIMM-32" memory expansion modules for easy installation

- GVP's autobooting DMA SCSI controller with Faaast-ROM and FaaastPrep SCSI software technology

- GVP custom Mini-Slot provides future expansion possibilities through the addition of daughtercard subsystems

- GVP's custom designed Very Large Scale Integration *(VLSI)* DMA Peripheral and RAM Controller chip *(DPRC)* for lowest possible component count

- Surface Mount Technology for more reliable assembly and reduced cost to the user

- 6-layer Printed Circuit Board for maximum system integration

- Separate, external power supply provides for 100% of A530 requirements, placing no additional load on A500's original power supply

- Injection molded case matches exactly the color and contour of the Commodore A500's

NOTE: The GVP A530 Turbo accelerator requires version 1.3 or later of the Amiga Kickstart/Workbench ROM.

Product Line Identification

The GVP A530 Turbo accelerator for the Amiga A500 is the next logical enhancement to our existing line of A500 expansion products. Other products in this line include:

Series II A500 HD8+ – SCSI hard drive and RAM subsystem
PC/286 – 16 MHz MS/DOS emulator

Configurations Available

The GVP A530 Turbo accelerator is shipped with 1 Megabyte of 32-bit FAST RAM and various hard drive capacities.

Getting Started

The A530 Turbo accelerator is among the easiest to use products we have ever created. In most cases, the A530 system you purchase will arrive in ready-to-run condition. The first few pages of this manual will describe the simple procedures for getting this system up and running in the least amount of time.

In subsequent chapters, we will describe in detail how to add memory, a 68882 math chip, and optional Mini-Slot expansion board to your A530 subsystem. We also provide complete documentation on the included software utilities.

An accompanying FaaastPrep 2.0 manual contains everything you will need to know to add new hard drives to your system or to repartition, reformat or reprep existing drives.

So, without further delay, let's get started...

WARNING: The A530 Turbo generates a great deal of heat when running under normal loads. If not properly exhausted, this heat can damage your A530 unit and corrupt data on your hard drive. It is important to keep the A530's cooling fins open so that air can flow freely into the case.

DO NOT COVER THE COOLING FINS WITH PAPERS, FLOPPY DISKS OR OTHER OBSTRUCTIONS.

If you should ever disassemble your A530 Turbo accelerator — to add RAM, for instance — be sure that you replace the fan connector correctly. The RED lead goes to the pin on connector block CN14, indicated by a plus (+). THIS FAN MUST BE WORKING AT ALL TIMES.

CHAPTER 2.

ASSEMBLY [Set...]

Follow these simple steps to get your new A530 Turbo accelerator up and running in the quickest possible fashion.

Take all noted precautions to prevent damage to your equipment.

1) Remove all power and peripheral cables from your A500. There should be no cables connected to the A530 Turbo unit.

2) Remove the Expansion Bay cover plate from your A500. This is a press-fit plastic panel and can be pried loose with a medium-sized flat-bladed screwdriver.
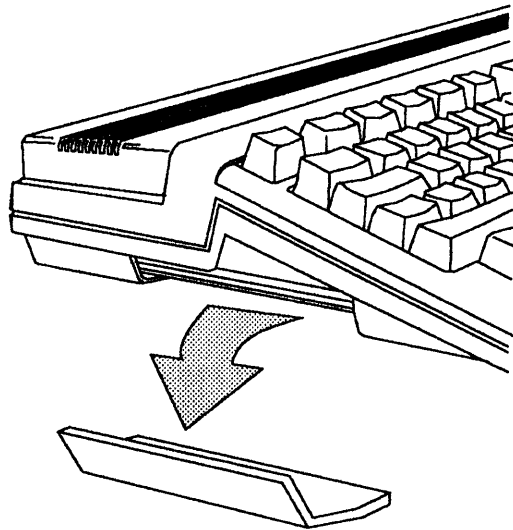

Figure 2.1 – Cover plate removal.
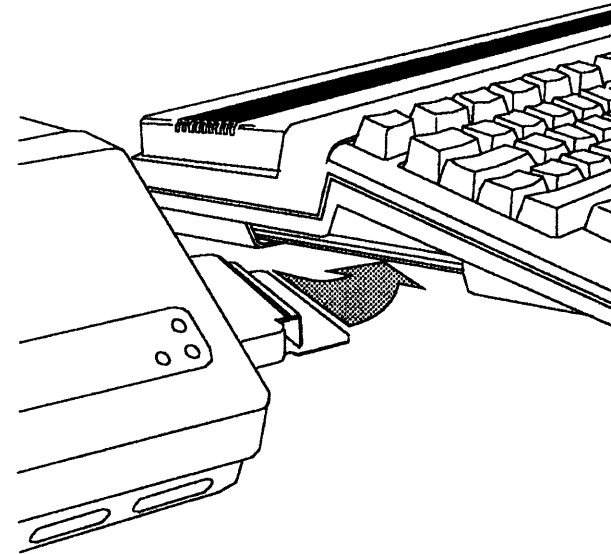
Figure 2.2 – A530 placement.

2) Set the A530 down next to the A500 and align its connector with the computer's expansion bay. Inside the Amiga is a motherboard "Bus" connector. This matches the socket-like "card-edge" connector on the A530.

3) Slide the A530 into the Amiga's expansion bay, taking care to correctly align the matching connectors. There is only one way this can be done and the components will press-fit snugly together.

4) Press the A530 firmly against the side of the A500. When correctly seated, the plastic cases of the two components will match very closely.
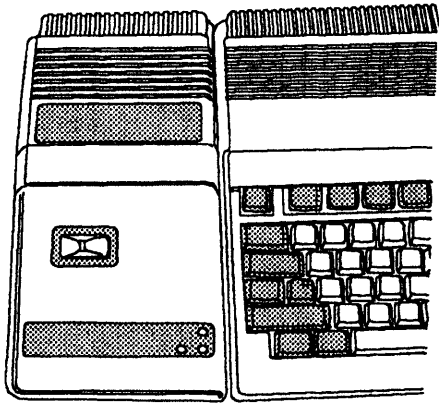
Figure 2.3 – Completed assembly.

5) Reconnect the power and peripheral device cables to your computer and attach the A530 Turbo's separate power supply cable.

Alignment Notch
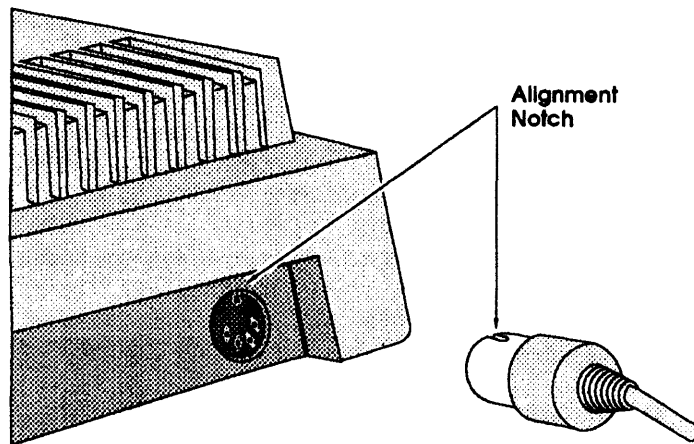
Figure 2.4 – Connecting A530 power supply.

WARNING: The A530 Turbo accelerator's power supply uses a three-pin grounded AC plug. This plug MUST be securely grounded to an appropriate line-current receptacle.

Attempting to operate the A530 Turbo without proper ground (as with a three-pin-to-two adapter) will result in an unstable electrical ground at the circuit board. This may cause severe damage to the A530 Turbo unit and/or the Amiga A500!

When these steps have been successfully completed, your Turbo accelerated Amiga is ready to run!

CHAPTER 3.

GO!

The A530 Turbo is intended as a complete, out-of-the-box solution to every A500 owner's needs. Once installed, you can literally power up and begin computing. The first time you do so, the A530 Turbo's hard drive will take several minutes to initialize. After that, you will probably want to begin by installing your favorite software titles.

A530 Self-configuring Hard Drive

The A530 Turbo comes complete with GVP's new self-configuring hard drive. This drive is shipped preformatted and ready to run. It is capable of determining whether your A500 system contains Workbench 1.3 or 2.0 ROMs and will configure itself appropriately. This process occurs once — the first time you power up following installation — and takes several minutes to complete.

WARNING: When you first power up your new A530 Turbo accelerator system the self-configuring hard drive will offer you one opportunity to abort the automatic initialization procedure. If you reply YES, you MUST allow the hard drive to complete its initialization. Trying to abort the procedure once it has begun WILL render your hard drive useless!

Installing Software

The A530 hard disk contains everything you need to run the Amiga's Workbench Operating System. It also includes several GVP support utilities for maintaining your A530 system. These utilities will be fully documented in the following chapter and in a ReadMe file on the accompanying GVP.Install floppy disk.

You will probably also want to install all of your favorite programs and important data onto the A530. Many programs will come with their own automatic installation routines. You should always let these programs do the work for you, since they will often automatically create new directories, make assignments and even edit your startup-

sequence. Allowing a program to install itself is the safest way to ensure that everything ends up in its correct destination.

Other programs can be copied even more simply. This can be accomplished through the Workbench interface by dragging program and project icons from their floppy disks into the A530 hard disk's icon.

Users who are familiar with the Command Line Interface and AmigaDOS Shell may prefer to install software using the appropriate AmigaDOS commands.

NOTE: Many commercial games are copy protected and cannot be installed on a hard disk. The manual that accompanies each program should state whether hard disk installation is supported.

In some cases, games will not run on an accelerated machine or in the presence of expansion memory. GVP ensures compatibility with such software by providing a physical "Turbo" switch on the top surface of the A530's case. If you encounter a program that will not run, try moving the Turbo switch to its OFF position. Doing so disables the entire A530 and restores your computer to its original, unen- hanced condition. When you are finished using the problem software, simply return the switch to its Turbo position and reboot.

GVP also provides a separate utility program to reboot under 68000 control: GVPCpuCtrl. This can be used instead of the Turbo switch. When either GVPCpuCtrl or the Turbo switch is used to disable the A530 Turbo accelerator, all expansion memory and hard disk resources will be switched off as well. In this mode, your A500 will be able to use only its own installed memory and floppy drives.

CHAPTER 4.

Software Reference

System Utilities

The A530 Turbo accelerator includes several programs created by GVP to maximize your system's performance. Most of them may be used from either the Workbench or AmigaDOS Shell interfaces.

FastPrep 2.0

Any time you wish to add hard drive resources to your A530 system *(or wish to change the configuration of the A530's internal hard drive)*, you will use the FastPrep 2.0 hard disk preparation utilities. These are completely documented in an accompanying manual. Refer to that manual before attempting to use this program.

GVPCpuCtrl

GVPCpuCtrl is a new standard utility for controlling all GVP accelerators. It has user specifiable flags that condition it to work with the A530 Turbo, our line of '030 Combo boards, the G-Force '040 boards, and other peripherals.

GVPCpuCtrl functions primarily to enable or disable accelerated processing and to map the Amiga system ROM into 32-bit memory *(if enough is available)*. It can be executed at startup, as part of the *s:startup-sequence* script, run from the Shell, or launched from Workbench.

NOTE: You must have a minimum of 2 Megabytes of expansion RAM to support ROM remapping.

When clicked from the Workbench, GVPCpuCtrl reboots the computer in its native processor mode. In this case, it performs essentially the same function as the hardware Turbo switch: It disables the A530 accelerator and returns your A500 to 68000 processor control.

NOTE: When GVPCpuCtrl is used to disable the A530 Turbo accelerator, all expansion memory and hard disk resources will be switched off as well. In this mode, your A500 will be able to use only its own installed memory and floppy drives.

GVPCpuCtrl, when run from the CLI or Shell, performs different operations, depending on the *parameter* supplied. Each time the program is run, it will accept any of four possible arguments. These may be appended singly or as a command string with a space character separating arguments:

Template:

> GVPCpuCtrl (argument) <return>

Arguments:

> FASTROM – Copies the contents of system ROM into 32-bit FAST memory and resets ROM vectors to point to this new copy *(2 MB minimum required)*.
>
> When the FASTROM option is enabled, GVPCpuCtrl reserves 512k of A530 Turbo RAM for ROM remapping. This memory is then unavailable for other uses.
>
> NOFASTROM – Resets ROM vectors to point to the Amiga's ROM chips and frees any FAST memory previously reserved for FASTROM.
>
> BOOT68000 – Attempts to reboot the computer into native 68000 operation.

Examples:

> GVPCpuCtrl FASTROM

This command tells the A530 Turbo accelerator to copy the Amiga's Operating System ROM into 32-bit FAST RAM. Doing so allows the

accelerator to execute system library calls many times faster than normal. More information on how this works is provided in *Chapter 6 – Theory of Operation*. This command may already be present in the *s:startup-sequence* file on your A530's Hard Drive.

The instruction:

```
GVPCpuCtrl  BOOT68000  <return>
```

reboots the Amiga with the A530 disabled.

GVPScsiCtrl

This program is important for several applications. You will probably need this program if you use removable media disk drives *(such as the Ricoh, Bernoulli or SyQuest cartridge systems)*, and wish the computer to recognize a cartridge you insert after the computer is running.
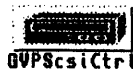
You will also need this program if you are using SCSI devices *(such as Wangtek tape drives)* that require their "disconnect" flag to be turned off. Such devices cannot have this flag set by FaaastPrep.

There are four options for using GVPScsiCtrl from the CLI. There is one option for using this program from the WorkBench.

Workbench:
When the GVPScsiCtrl icon is double clicked using the Workbench interface, a command is sent to the GVP SCSI controller that causes it to search for any changed volumes *(such as SyQuest cartridges)* to mount. This functions essentially the same as using the -m CLI option described below.

CLI Template:

```
GVPScsiCtrl  (option)  <return>
```

Variants:

```
GVPScsiCtrl  -m
```

The argument -m, in this case, stands for *"mount."* This form of the command will poll all known devices connected to the SCSI bus and attempt to mount any new or changed volumes it finds. Such a case might occur when inserting a new SyQuest cartridge into a previously empty drive.

```
GVPScsiCtrl  -r
```

This form of the command differs from the above in that it is able to recognize hard drives or other devices that were not present at startup. An example might be a large-capacity or older drive that takes an appreciable amount of time to "spin up." In such a case, the -m option would not recognize any drives that had not reached operating speed when the system booted.

The -r option, by contrast, forces the SCSI controller to reexamine all possible unit IDs for mountable drives. In this case, the -r argument stands for *"rescan."* If the controller encounters a valid device with no mountable volume *(an empty SyQuest drive, for instance)*, it will skip to the next available device.

```
GVPScsiCtrl  -s
```

This form of the command functions similar to the -m option described above. It differs from the previous form in that it will wait until all devices return successfully mounted. If it should find an empty SyQuest drive, for instance, the program will halt and wait until a valid cartridge is inserted. The argument -s, in this case, stands for *"sticky mount."*

This command may be used in the *startup-sequence* to ensure that a removable media cartridge will be recognized as soon as it is inserted. In this case, the -s argument should be prevented from hanging up your boot sequence by using the AmigaDOS *Run* command:

```
RUN  >NIL:  GVPScsiCtrl  -s
```

This will spawn a separate task that runs until all units are mounted; at which point it will terminate. In the meantime, the original calling process will continue to execute.

Disconnect/Reconnect

Part of the SCSI standard provides for sharing the SCSI bus among competing drives by periodically disconnecting and then reconnecting them. In this way, the SCSI controller can access one drive while another is busy filling or emptying its internal buffers. Most hard drives can be disconnected without any unfortunate results.

Under certain circumstances, however, the SCSI bus may not operate properly with disconnect enabled for every device. The usual symptoms are that the Amiga will issue "phase-error" warnings or simply hang up during a SCSI transfer.

Although hard disks can be easily prepped to automatically disable this feature, devices without a Rigid Disk Block — tape drives, for example — must be treated differently. In such instances, you can use GVPScsiCtrl to disable disconnect for individual devices.

```
GVPScsiCtrl  <Unit ID>  DCOFF | DCON
```

Issue the above form of the command, replacing <Unit ID> with the SCSI ID of the device in question. For instance, if a tape drive is connected as ID #6, typing the command:

```
GVPScsiCtrl  006  DCOFF  <return>
```

will disable disconnect for that device. Then, whenever the tape drive is being read from or written to, no other SCSI operations will be allowed to compete. A corresponding argument:

```
GVPScsiCtrl  006  DCON  <return>
```

will reenable Disconnect/Reconnect for the specified device.

Using GVPScsiCtrl

To maximize the efficiency of your GVP SCSI system, we recommend adding the following lines to your computer's startup script for execution every time you reboot. If you are using version 2.04 or later of Kickstart/Workbench, then we recommend placing them toward the end of the file *s:User-Startup*. If you are still using KS/WB 1.3, they should be added toward the end of the file *s:startup-sequence*, just before the LoadWB instruction.

Startup Instruction	Meaning
GVPScsiCtrl -r	;rescans the SCSI bus for slow drives
GVPScsiCtrl 006 DCOFF	;disables DC/RC for a tape drive
Run >NIL: GVPScsiCtrl -s	;wait for cartridge insertion

NOTE: The GVPScsiCtrl command must be present in your current command path for these instructions to work. You may, alternately, provide a full path before each GVPScsiCtrl command.

The second instruction (GVPScsiCtrl 006 DCOFF) assumes the presence of a tape drive unit as ID 6. If you have a tape drive with some other Unit ID designation, use that one, instead. If you have no tape drive, omit the command altogether.

CPU

You can dynamically control the A530 Turbo's instruction and data caches using the AmigaDOS 2.0 comand CPU. This CLI instruction is documented in the Commodore AmigaDOS manual 3rd. Edition. *(Those still using AmigaDOS 1.3 will find a functionally equivalent, 1.3 compatible utility, SetCPU, in the GVP/68030 subdirectory of the GVP.Install distribution floppy disk. Be sure to read the accompanying SetCPU.txt file for complete documentation.)*

Note that some CPU and SetCPU options (*e.g.: FASTROM*) will not work on the A530 Turbo. Use the FASTROM option of GVP-CpuCtrl, instead.

Example:

CPU CACHE <return>

turns instruction and data caches on.

CPU NOCACHE <return>

turns both instruction and data caches off.

CPU INSTCACHE <return>

turns on just the instruction cache.

GVPInfo

Another included utility is GVP's standard *GVPInfo*. This point-and-click program opens a window that lets you examine many different facets of your entire system.
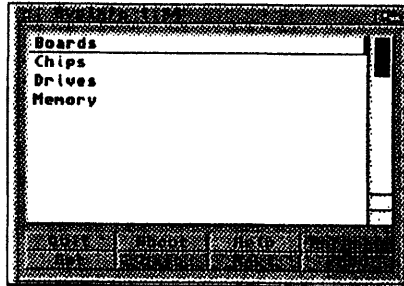
GVPInfo

Figure 4.1 – GVPInfo window.

In the main window, you will see listed *Boards, Chips, Drives* and *Memory.* Clicking twice on any of these items will produce a new window displaying relevant information about the selected items. Each item in the new list can, in turn, be double-clicked, to produce still more information about the selected item.
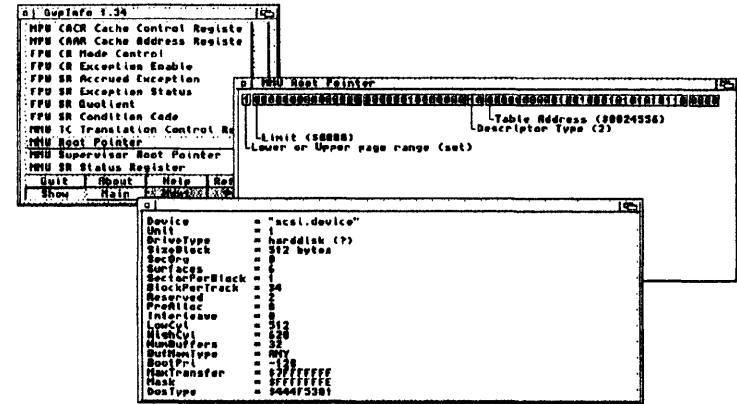
Figure 4.2 – GVPinfo displays.

GVPInfo has a special flag for CLI use. When launched from Shell or CLI as:

GVPInfo SPEED <return>

the *Speed* option will run a performance test on your main processor chips and display the result.

Upgrading to Kickstart/Workbench 2.0

The GVP A530 supports AmigaDOS operating system software versions 1.3 and 2.0. If you are still using Kickstart/Workbench 1.3 when you install the A530 system, you can always upgrade to version 2.0 at any time thereafter.

Everything you will need to know about upgrading to 2.0 should be included in the AmigaDOS Enhancer kit that accompanies the 2.0 ROM chip upgrade. You can treat the A530's hard drive just the same as any hard drive described in the Enhancer documentation.

CHAPTER 5.

SYSTEM EXPANSION

Disassembly

This chapter will discuss enhancing your A530 Turbo accelerator by adding RAM, a 68882 floating point math coprocessor, and a Mini-Slot expansion board, such as the GVP PC/286. All three of these operations require that the A530 be disassembled to some degree. Complete procedures will be described below. We will also discuss how to add external hard drives to your A530's SCSI controller. This operation does not require any disassembly at all.

WARNING: **Read the following procedures in their entirety before attempting to perform the installations. The A530 was designed to be easily upgraded, but it does contain delicate components that are susceptable to damage from electrostatic or physical shock.**

Before you can make any enhancements to your A530, you will need to remove the top cover. This is accomplished as follows:

1) Unplug all power and peripheral cables from your A500/A530 system.

2) Gently unseat the A530 subsystem from the A500's expansion bay and move it to a clear working surface.

3) If you have one, be sure to use an anti-static wrist strap to prevent damaging the A530's sensitive internal components. If you do not have an anti-static wrist strap, be sure to ground yourself by first touching a metal surface.

   WARNING: **A single electrostatic spark can permanently damage your equipment!**

4) Gently, turn the A530 upside down. The bottom will look like Figure 5.1.
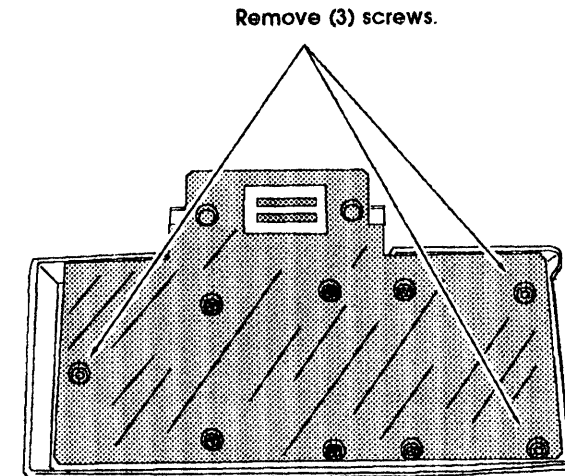
Remove (3) screws.

Figure 5.1 – A530 Case securing screws.

5) Using a cross-point screwdriver, remove the three screws indicated in Figure 5.1. Remove only the indicated screws!

6) Taking care to hold the A530 securely together, turn it right-side-up.

   The cover remains attached to the A530's base by two sets of electrical leads: The Turbo switch connection and the Cooling Fan connection.

7) Carefully lift the A530's cover straight up *(see Figure 5.2)*. The FCC Shield will come off inside the cover.

8) Remove the Cooling Fan and Turbo Switch connectors and set the cover and shield aside.

FCC Shield
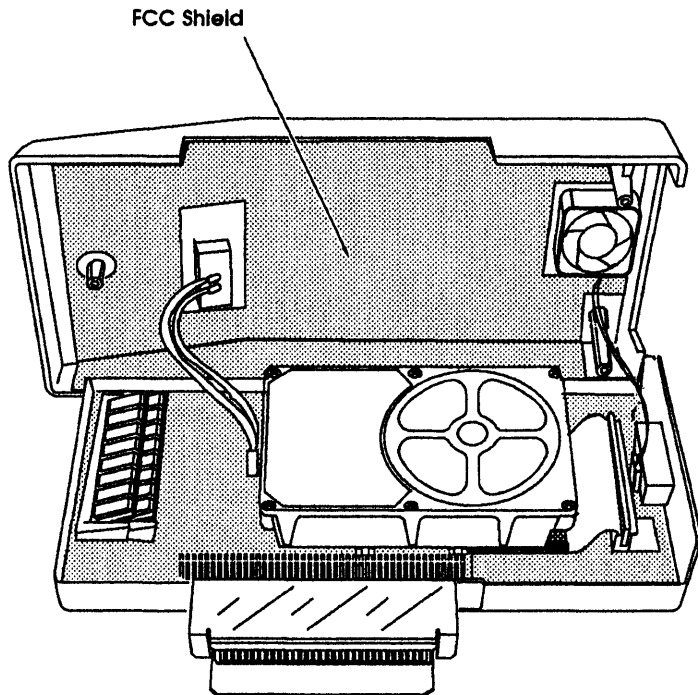
Figure 5.2 – A530 with cover removed.

At this point, you are now able to install memory SIMMs and/or a Mini-Slot expansion board. If you wish to install a 68882 floating point math coprocessor chip, you will need to perform additional disassembly steps. These will be detailed in the section describing math chip installation.

Adding RAM

Every A530 Turbo accelerator is shipped with at least 1 Megabyte of 32-bit FAST RAM. This can be expanded by the user to two, four or 8 Megabytes. A530 memory is configured in 1 or 4 Megabyte *Single Inline Memory Modules (SIMMs)*.

Figure 5.3 – Typical GVP SIMM.

SIMMs

The SIMM package is a convenient, cost-effective, relatively rugged component with a very high degree of reliability. They are much easier to install than most single-chip arrangements.

A GVP SIMM32 consists of eight tiny memory chips mounted on a single small printed circuit board. All of the connection points for the memory chips are arrayed along one edge of the SIMM and mate with the contacts of a matching SIMM socket on the A530 circuit board. The A530 has two sockets and can hold two 1 Megabyte SIMMs or two 4 Megabyte SIMMs.

If you are adding a second 1 MB SIMM, it will go into the remaining socket and bring your configuration up to 2 MB total. If you are installing one or more 4 MB SIMMs, you must remove the existing 1 MB SIMM and install the first 4 MB SIMM in its place *(you cannot mix 1 and 4 Megabyte SIMMs)*.

Installing SIMMs

SIMMs are designed to fit into the SIMM sockets one way only. They slide in easily and, when rotated toward the board, snap into place. Figure 5.4 shows the SIMM and socket in detail.

SIMM

Lower edge of SIMM (with contacts) seats into groove of SIMM socket. SIMM is then pivoted back and snapped behind locking tabs on SIMM socket.

Tension Spring (with Locator tab)

Locking Tab

SIMM Socket

Locator tab fits into hole in SIMM

SIMM behind locking tab

SIMM correctly installed.
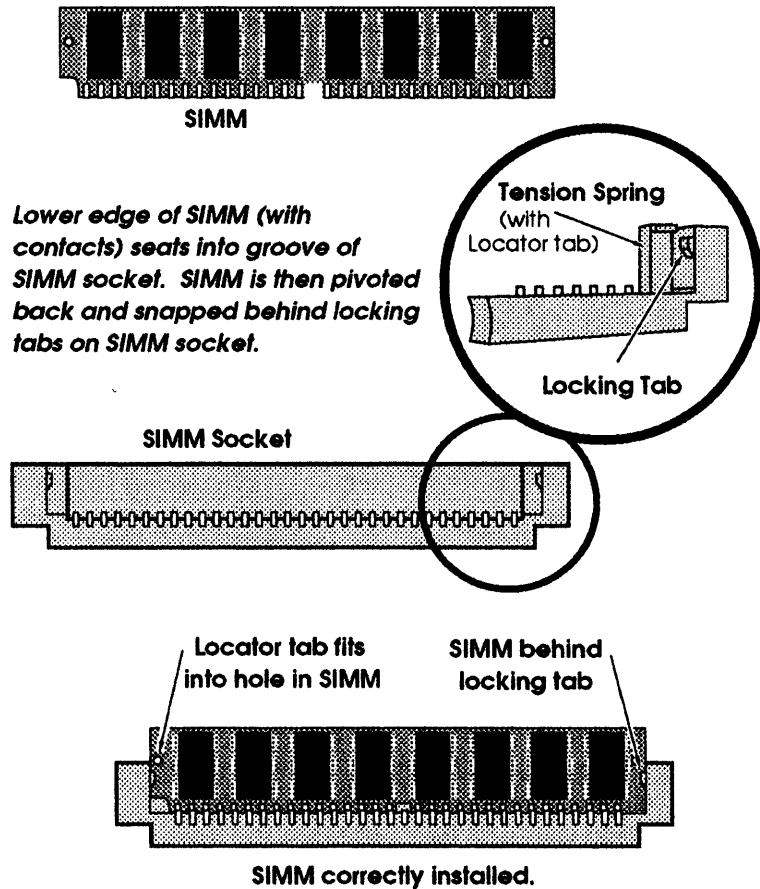
Figure 5.4 – SIMMs, Sockets and installation.

Installation procedure:

1) If you are not using an anti-static wrist strap, be sure to ground yourself before touching the A530 circuit board or any of its components.

2) Note the location of the two SIMM sockets at the front of the A530 chassis.

   The sockets — CN19 and CN20 — are used in order from rearmost to foremost.

RAM configuration jumpers

J13   J11

CN19

CN20
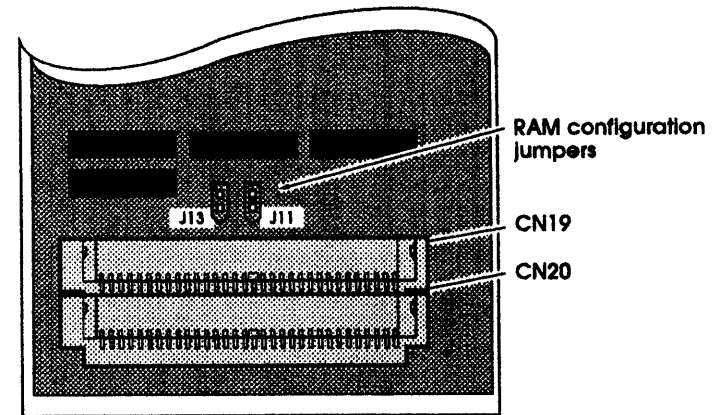
Figure 5.5 – Socket arrangement on A530.

3) Orient the first SIMM such that the memory chips are facing you and the edge with the silver contacts is pointing down. These contacts will mate with the corresponding connectors inside the socket. Insert the SIMM into the groove of the socket.

Insert into groove
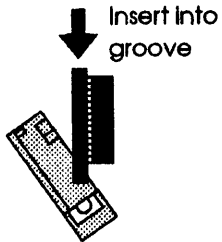
**Step 4.
(Side View)**

4) With the SIMM correctly seated, rotate it toward the circuit board *(back and down)*.

**Rotate back
toward circuit board**
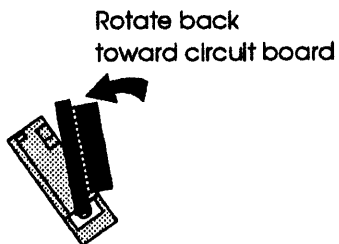
**Step 5a.
(Side View)**

The SIMM will move only a few degrees before the retaining tabs snap into place.

**SIMM snaps
into place.**
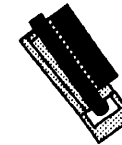
**Step 5b.
(Side View)**

These tabs secure the SIMM into position and ensure proper contact between the SIMM and socket connectors.

5) Repeat this procedure for any other SIMMs you wish to install at this time.

6) You must now set the memory configuration jumpers as described in Table 5.1. These tell the A530 whether RAM is installed and what type of SIMM is in use.

Table 5.1 – Memory configuration jumper settings.

Jumper Setting	Meaning
J11	RAM Enable Jumper
Closed Open	No RAM present RAM installed in one or both sockets
J13	SIMM Size Jumper
Closed Open	4 Megabyte SIMMs in use 1 Megabyte SIMMs in use

Jumpers

Immediately behind the SIMM sockets is a pair of upright metal pins. These are connection points for open electrical circuits on the board. By installing a shorting block onto a pair of pins, you are completing the circuit. The circuit created by the memory configuration jumpers connects the RAM chips to the A530's processor.
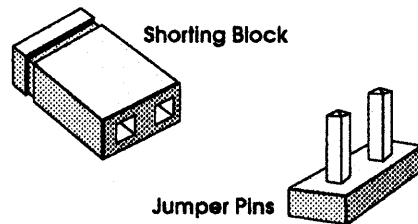
Figure 5.6 – Jumper block and pins.

NOTE: All jumpers have polarity which is indicated either by a pointed end on the jumper pin mount, itself, or in white ink on the surface of the circuit board. On both two and three pin jumpers, Pin One is the pin closest to the pointed end (see Figure 5.8).

CAUTION: Be sure to short only the two pins on a single jumper block. Serious damage could result from shorting pins from two adjacent jumpers (see Figure 5.7).
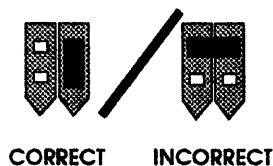
CORRECT   INCORRECT

Figure 5.7 – Correct and incorrect jumper installation.

Pin 3
Pin 2   OR
Pin 1
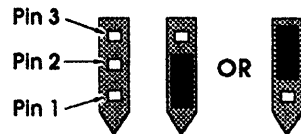
Figure 5.8 – Correct 3-pin jumper installations.

Adding Mini-Slot Expansion Cards

The A530 Turbo accelerator includes GVP's custom "Mini-Slot" for additional internal expansion possibilities. It is extremely easy to install a Mini-Slot expansion card:

1) With the case open, locate the two rows of upright pins directly adjacent the A530's bus connector.

Mini Slot pins
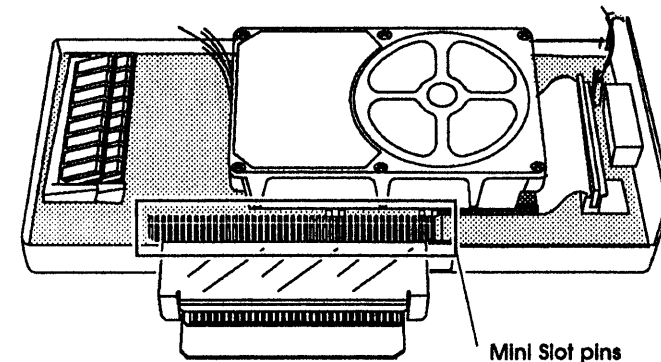
Figure 5.9 – Mini-Slot location.

2) All products compatible with the GVP Mini-Slot will have their electrical components facing toward the inside of the A530. The circuit board is tapered to the contour of the A530's outer case.

Align the Mini-Slot expansion card as shown in Figure 5.10.

3) Align each of the Mini-Slot connector pins with its respective hole in the expansion card's connector. Take care that none is bent or broken.

4) Press the expansion card firmly into place. Do not overstress the A530 Turbo's circuit board.
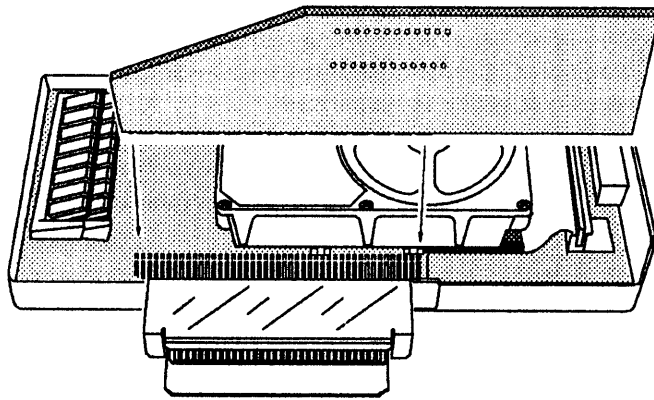
Figure 5.10 – Expansion card installation.
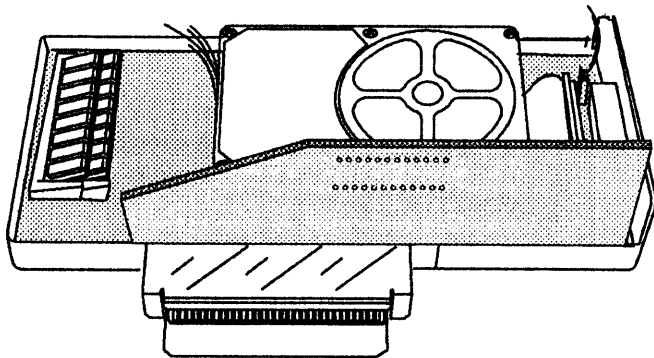
Figure 5.11 – Expansion card installed.

5) Reassemble the A530 and reattach it to the A500's expansion bus. Refer to the expansion card's manual for further information.

Adding External Hard Drives

You can add up to 6 hard drives or other devices to the A530 by connecting them to the 25-pin external SCSI bus connector at the back of the A530 chassis. External SCSI devices must have their own power supplies.

SCSI stands for *Small Computer Standard Interface* and is the general term for an industry-wide specification governing how certain devices should be connected to one another. The SCSI standard specifies a 50-wire data bus that can connect up to a maximum of 8 separate individual devices. The controller, itself, is always counted as one of these 8 devices.

By far, the most common type of SCSI device is a hard disk drive. Hard disks make available to computer users far greater amounts of data storage than conventional floppy disks. They are also much faster at finding and relaying data than floppy drives. SCSI is not limited to hard disks, however. Equipment manufacturers have produced SCSI document scanners, printers, CD-ROM drives, and tape backup units.

Bus dynamics

The SCSI bus is a high-speed, two-way communications channel between the controller and the other connected devices. The A530's SCSI controller manages the selection and transfer of data to or from each device and feeds it to the Amiga through the expansion bus connector. Any or all of the 7 attached units may be active and communicating at once, with the controller determining which one gets the bus at what time.

The A530 Turbo has connections for both an internal SCSI data bus *(using a 50-pin ribbon cable)* to connect the hard drive inside the case, and a 25-pin DB-style connector for the addition of external SCSI devices. The 25-pin connector uses a subset of the full 50-pin SCSI specification, but has become something of an industry standard for SCSI on other computer platforms.

Unit IDs

In order to keep track of all the devices attached to the SCSI bus, each one must have a unique ID number. Usually, this ID number corresponds with its position in the chain of devices, but not necessarily. Acceptable SCSI ID numbers are 0–7. The A530 Turbo's SCSI controller, itself, will always be designated as ID #7. The remaining available ID numbers are 0–6, with the internal hard drive set as ID #0. Most users will start numbering their additional SCSI drives from 1 (*e.g.: DH1:, DH2:, CD3:, etc.*).

Jumpers & Terminators

Every device designed to meet the SCSI specification must provide some way of changing the ID number of the device. Hard drives usually employ a set of jumper pins for this purpose. There are a number of different jumper configurations employed by the different hard drive manufacturers, so we will not attempt to describe a standard method here. Refer to the document supplied with your particular brand of hard drive, or consult with your GVP dealer.

Another requirement of the SCSI bus is that it must be electrically terminated on each end. Most SCSI devices will have some means of installing or applying resistors to electrically terminate the bus connectors. If several devices are attached together in "daisy chain" fashion, then both the first and last units in the chain must be terminated, but any terminating resistors on any intermediate devices must be removed or disabled.

Again, there is no industry standard method for installing termination resistors. Most hard drives employ a series of socketed, comb-like components called "resistor packs." These are usually found directly adjacent to the 50-pin SCSI bus connector on the drive, itself. Refer to the document supplied with your drive for further details.

NOTE: The A530's SCSI controller, itself, provides termination for the head end of the bus. If several devices are attached to the external 25-pin connector, only the last device on the bus should be terminated (see Figure 5.12).

Typical Terminating
Resistor Pack
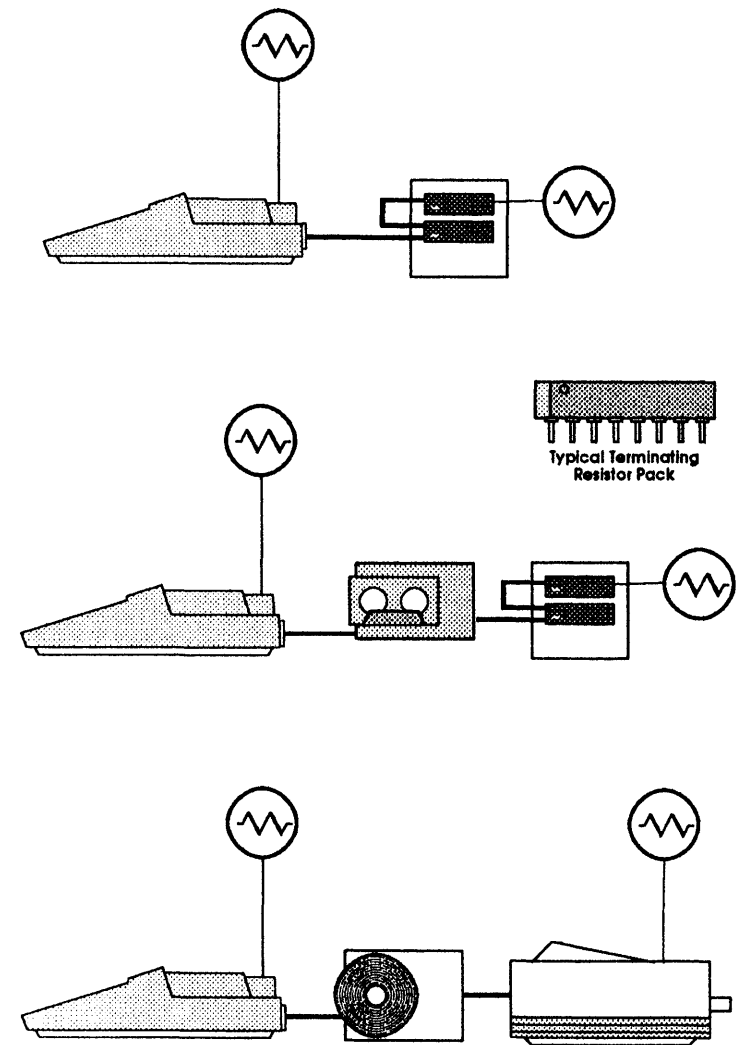
Figure 5.12 – SCSI bus connections and termination.

Rigid Disk Block and Autoboot

When a SCSI drive has been properly prepped and formatted, certain details will be written directly on the drive in a sector called the *Rigid Disk Block (RDB)*. When the A530 Turbo's EPROM chip begins the boot process, it polls all the devices it finds attached to the SCSI bus. Each time it finds a device at one of the SCSI addresses, it tries to read the RDB to find out what the device looks like. In this way, the A530 Turbo accelerator is able to bring up your system quickly with all its attached devices properly recognized and ready for use.

Kickstart 1.2

Versions of the Amiga Operating system earlier than 1.3 did not allow for Autobooting from hard drives. The A530 Turbo accelerator, therefore, requires a version 1.3 or later Kickstart/Workbench ROM in order to be fully functional. This may be obtained from any authorized Commodore dealer.

A530 Turbo Switch

Whenever you move the A530 accelerator's Turbo switch to its OFF position, you are disabling the 68EC030 processor and high-speed 32-bit data bus. When this is done, you also disconnect any RAM resources that may be present and disable the hard drive.

Adding a 68882 Math Coprocessor

In the interest of economy, A530 Turbo accelerators do not include a MC68882 floating point coprocessor. As mentioned in Chapter 1, a 68882 rated at 40 MHz or more can be added at any time. In order to do so, however, it is necessary to remove the hard drive and metal shielding from your A530.

Disassembly

1) If you have not already done so, remove the A530 Turbo accelerator's upper case as described at the start of this chapter.

2) Carefully turn the entire A530 Turbo subsystem upside down and, using a cross-point screwdriver, remove the four screws indicated in Figure 5.13.
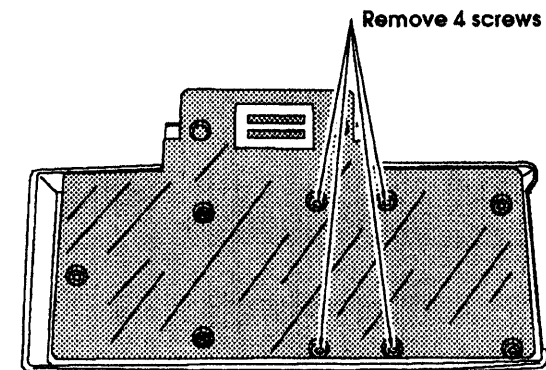
Figure 5.13 – Hard Drive securing screws.

WARNING: Do NOT remove the forward pair of screws. These secure the A530 Turbo accelerator's circuit board to the case bottom.

3) Taking care to hold the A530 Turbo system securely together, turn it right-side-up again.

4) Unplug the SCSI ribbon cable and power connectors from the rear of the hard drive.

5) Lift the hard drive up and away.
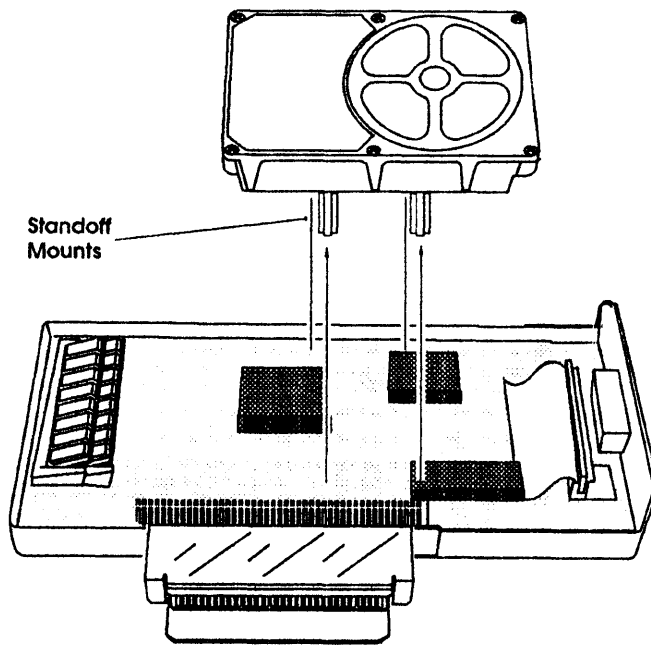
Figure 5.14 – Hard drive removal.

Math Chip Installation

The 68882 is a *Pin Grid Array* chip; a flat ceramic package with many short pins jutting out the bottom. The A530 circuit board has a square plastic socket perforated with holes into which the 68882 can be set. This is located about two-thirds back from the SIMM sockets, toward the outboard edge of the A530 *(Outboard is determined by orienting the A530 chassis such that the expansion bus connector is closest to you. The Mini-Slot is directly inboard and the processor chips, power connector and clock oscillator crystal are all outboard).*
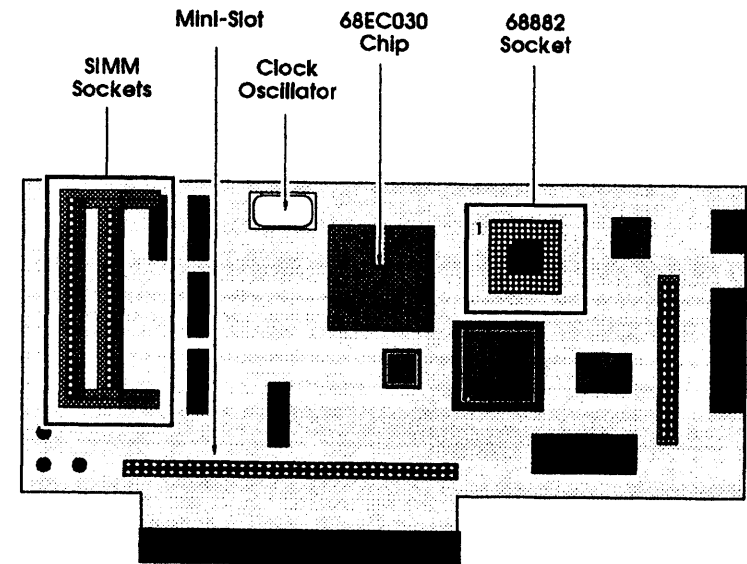
Figure 5.15 – A530 circuit board layout.

NOTE: You MUST provide a 68882 floating point math chip rated for 40 MHz or faster operation (part # MC68882RC40A or MC68882RC50A) to match the clock speed of the 68EC030 processor. Attempting to use lower rated parts risks irreparable damage to the math chip and, possibly, the A530 Turbo accelerator, itself.

There is an index numeral 1 on the board at one corner of the 68882 math chip socket and this matches one corner of the chip which is "keyed" with a gold marker. It is extremely important to inspect the chip for bent pins, since they all must be perfectly straight for the chip to fit the socket correctly.

Installation Procedure

1) Locate the components identified in Figure 5.15.

2) Orient the 68882 chip so that its key aligns with the key on the socket *(as indicated by a number 1 silkscreened in white ink on the board, itself)*.

3) Take care that all the pins on the 68882 FPU are straight and fit them into the holes in the FPU socket.

4) Press evenly, stopping periodically to inspect your work and make sure that no pins are bent or missed their holes. Continue pressing until the chip is fully seated.
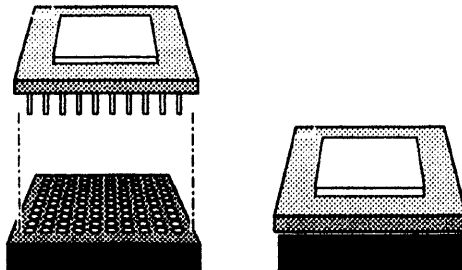
Figure 5.16 – 68882 math chip installation.

5) The 68882 math chip installation is now complete. Reassemble the hard drive assembly using the reverse of the described procedure.

Reassembly Procedure

1) Remove the FCC Shield from the top cover. Squeezing the sides of the shield slightly will allow it to come away freely. The shield must be replaced on the lower section of the A530 unit.
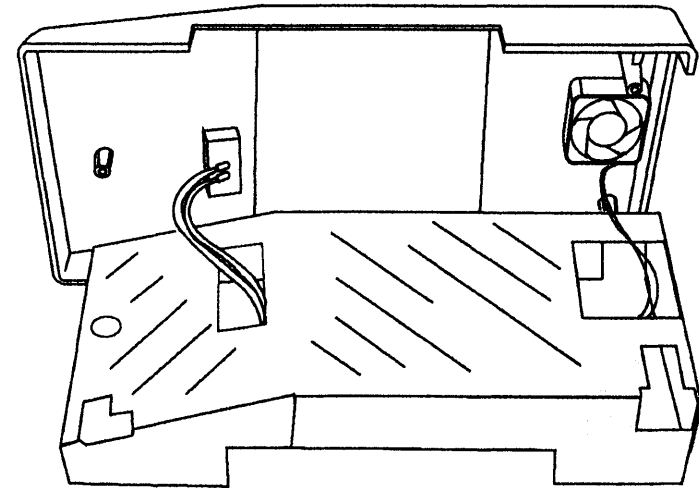
Figure 5.17 – Top cover with FCC Shield removed.

2) Take the FCC Shield and line it up with the inside surfaces of the lower section. While squeezing the sides in, fit the shield in place.
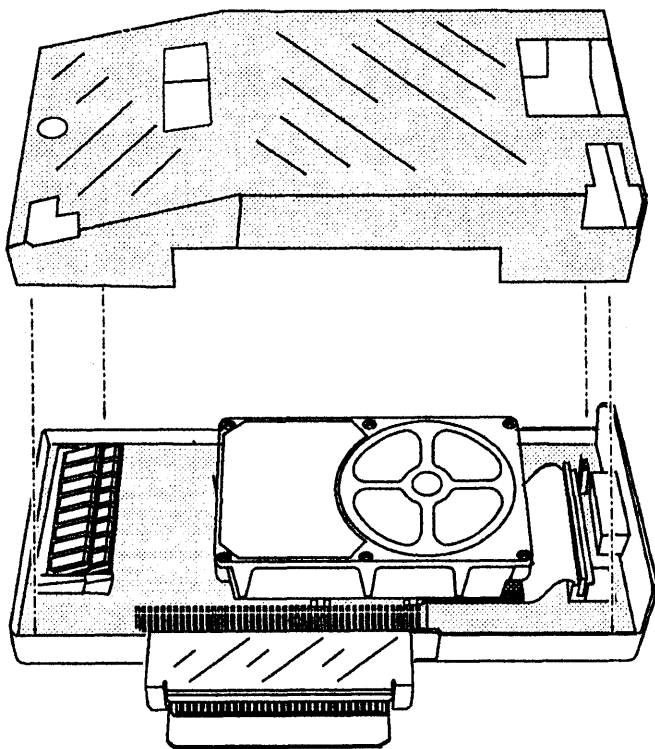
Figure 5.18 – FCC Shield installation.

3) While holding the top cover above the lower assembly, take the game switch connector and put it through the forward rectangular hole in the FCC shield; then reattach it to jumper J2.

4) Take the fan power connector and place it through the rear rectangular hole in the FCC shield; reattach it to connector CN14.

WARNING: Remember to make sure that the fan is correctly connected. The RED lead goes to the pin on connector CN14 marked with a plus (+). SERIOUS DAMAGE WILL RESULT IF THE A530 IS RUN WITHOUT A FUNCTIONING COOLING FAN.

5) Lower the top cover straight down into place. If the cover does not fit correctly, make sure that the cooling fan and reinforcement ribs are aligned exactly with their corresponding cutouts on the FCC shield.
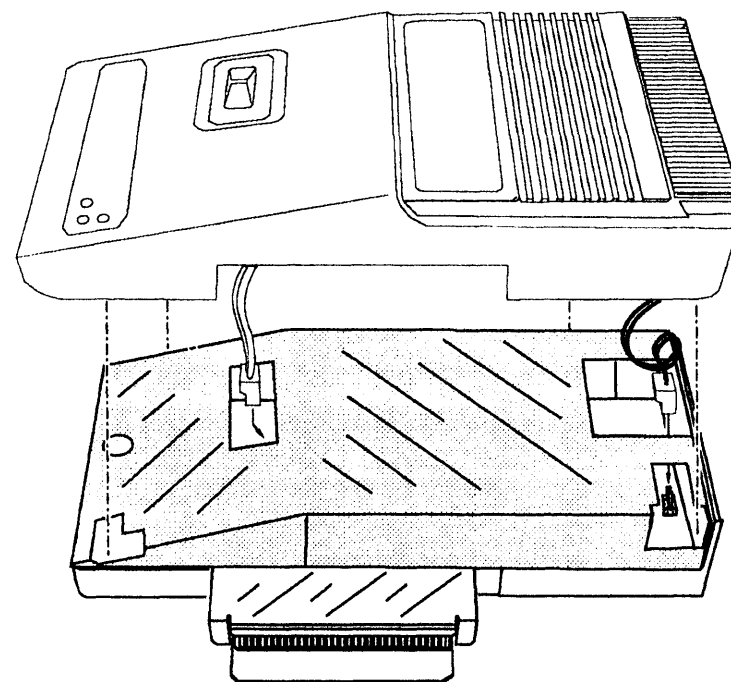
Figure 5.19 – Lead connections and top cover replacement.

Note: The cover should close with a minimum of pressure. If it fails to close easily, remove the cover, make sure that the fan and turbo switch leads are not caught and recheck the cover's alignment.

6) Flip the entire unit over, and replace the three screws that were removed during disassembly.

CHAPTER 6.

THEORY OF OPERATION

68000 vs 68030

The Amiga A500, as designed, uses a Motorola 68000 16/32-bit microprocessor running at a 7.14 MHz clock speed. This powerful computer chip provides basic control over all the Amiga's components. While the 68000 chip uses 32-bit "registers" internally for the representation of data, it is connected to the circuit board *(and all other external devices)* by a 16-bit wide "bus." This narrow bus architecture results in a performance bottleneck, as all 32-bit data values must be broken in half and sent out on the bus as two 16-bit "words."

The A530 Turbo accelerator's processor is a full 32-bit microprocessor. Its internal data representation uses 32-bit registers and it is connected to the other components in the A530 Turbo via a 32-bit wide bus. Data that can be exchanged between the 68030 and any A530 components *(like the Floating Point coprocessor, and 32-bit wide RAM)* can be moved in full 32-bit words providing a 2-to-1 increase in throughput.

Clock Speed

In addition, the A530 Turbo employs its own clock, running at much greater rates than a stock Amiga's. A computer's system clock determines the rate at which data can be transferred. Each time the clock crystal "beats," the processor's registers can be changed. On a stock Amiga, with a 7.14 MHz clock, that provides a maximum of 3,580,000 data movements per second. The A530 Turbo, clocked at 40 MHz, by contrast, can achieve up to 20 Million data movements per second.

Key to this performance is the "asynchronous" nature of the A530 Turbo's design. A synchronous accelerator must run at some even multiple of the Amiga's base 7.14 MHz clock rate *(e.g.: 21.42, 35.7)*,

interleaving its operations with the slower cycling of the Amiga bus. Asynchronous designs, like GVP's, permit the use of faster, and more commonly available, processors. These are then free to execute their operations independently of the main Amiga bus.

Memory Addressing

The original Amiga A500's Motorola 68000 has a 24-bit address register. A 24-bit register can hold any numeric value from 0 through 16,777,216, and that means a maximum of 16 Megabytes of address space. 7 Megabytes are reserved by Commodore for various hardware-specific uses, leaving 9 Megabytes for use by programs and data *(1 Megabyte of this is so-called CHIP RAM)*. All 9 Megabytes, by design, must be reached through the 16-bit wide expansion bus.

The A530 Turbo accelerator can be configured to add up to 8 Megabytes into this base "Auto-config" address space. Any memory physically mounted on the A530 Turbo board will be addressable by the processor as a full 32-bits wide and can be used for program execution and for data storage.
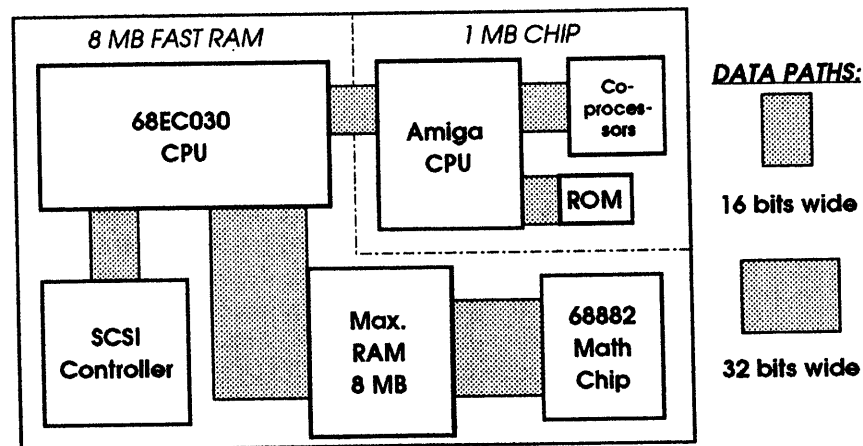
Figure 6.1 – A530 Turbo accelerator block diagram.

SCSI Controller

The A530 Turbo accelerator employs Direct Memory Access *(DMA)* technology to read and write data directly from and to RAM. The SCSI controller built into the A530 Turbo has a 16-bit wide data path to the unit's 32-bit memory resources.

68030 features

In addition to its basic processing "machinery," the Motorola 68030 chip contains two temporary storage areas called "caches." The most frequently used Instruction and Data memory locations are retained in these caches, reducing the amount of time required to "fetch" their contents from external RAM.

The A530 Turbo uses Motorola's 68EC030, a special version of the chip which does not include the standard 68030 Memory Management Unit. GVP has provided its own circuitry on the A530 Turbo circuit board to replace many of the functions usually associated with a Memory Management Unit. Most notably, this includes copying the Amiga's Operating System ROM into much faster 32-bit RAM.

68882 Math Coprocessor

The 68030 central processor is designed to perform integer arithmetic internally. Motorola provides a companion chip, the 68882 Floating Point Unit *(FPU)*, to take over fractional calculations, thereby freeing the 68030 to do other things. Math intensive operations *(like recalculating a spreadsheet or graphics scaling and ray tracing)* can execute many times faster when they are written to take advantage of a 68882.

In the A530 Turbo, the 68882 is an optional component. Users who have no immediate need for one will enjoy the savings of not having to pay for a math chip at the time of purchase. All A530 Turbos can be upgraded to include a 68882 math coprocessor at any time.

NOTE: You MUST supply a 68882 rated at 40 MHz or higher or serious damage could result.

Relocating System ROM

Most of the key instructions that the Amiga Operating System uses to process data reside in a set of Read Only Memory *(ROM)* chips on the Motherboard. When a program makes a library call, the computer looks up the proper piece of code in the system ROM. Unfortunately for most operations, ROM calls are not terribly efficient. The ROM chips, themselves, are much slower than Random Access Memory *(RAM)*.

Fortunately for A530 Turbo accelerator users, The entire contents of the System ROM can be copied into 32-bit RAM dataspace. Then, when a program calls on ROM for a key operation, the entire 32-bit value can be retrieved with a single access.

NOTE: You must have a minimum 2 Megabytes of expansion RAM to support ROM remapping. ROM remapping reserves 512 kilobytes of your RAM resources, making them unavailable for use by other programs.

Copying the System ROM is easily accomplished using the *GVPCpuCtrl* utility *(included on the A530 hard disk)*. The procedure for using this program is described in *Chapter 4 – Software Reference*.

A530 Turbo Operation

Upon power-up or system reset, the 68030 acquires control of the Amiga's processor bus by requesting bus access from the 68000. Once in control, the A530 Turbo accelerator is free to run the machine, fetching instructions and data at its own clock rate, and making use of its internal caches and 32-bit data path. Since the A530 never surrenders bus control, the 68000 is prevented from reclaiming mastery over the machine.

In order for the A530 Turbo to replace the 68000 without conflict, it must be able to emulate 68000 control signals and timing, and to disable 68030 instruction and data caches where necessary. [You will recall that the A530 Turbo accelerator uses an asynchronous clock rate.]

GVP provides a custom circuit to synchronize all accesses to the Amiga's processor bus. Operations that needn't interface with the main Amiga bus *(e.g.: calculations and fast RAM transfers)* can be performed at the maximum speed of the processor. Operations that require cooperation from the Amiga's system bus *(e.g.: printing through the parallel port or display of graphic imagery)* will be synchronized to the Amiga's bus speed.

Similarly, it is sometimes necessary to switch off the 68030's internal caches when working in conjunction with the Amiga's custom graphics chips. These chips have the ability to directly modify the contents of CHIP RAM. Consequently, any information that may have been cached by the 68030 may no longer be correct if the custom chips have modified the contents of those addresses. The A530 Turbo contains another custom circuit to monitor and control caches under these circumstances.

Backward Compatibility

Finally, the A530 Turbo can be disabled altogether whenever a particular program requires true 68000 functionality. While most current software is flexible enough to make use of more sophisticated processors, some games still assume that they are running on a stock 68000. For such instances, the Turbo switch on the A530's top cover should be set to its OFF position. When this is done, the accelerator effectively disappears, taking with it any memory and hard drive resources. Returning the Turbo switch to its ON position will restore your A530 accelerator, memory and hard drive resources at the next reboot.

If you choose, you can also revert to 68000 operation by running the GVPCpuCtrl software utility instead of using the Turbo switch. Refer to *Chapter 4 – Software Reference* for more information on the use of GVPCpuCtrl.

APPENDIX A.
SETTINGS REFERENCE

This appendix provides a comprehensive reference to all jumper settings on the A530 Turbo accelerator board. Only a few of these need ever be changed by the user. This information is provided for technical reference only. GVP assumes no responsibility to repair or replace any A530 Turbo rendered inoperative by unauthorized tampering with jumper settings.

CAUTION: A530 Turbo accelerators use CMOS technology electronic components. They are extremely sensitive to static discharge or physical shock. Always be sure to ground yourself by touching a metal surface prior to handling the board or its components. Do not drop or physically jar the board or its components. Failure to observe these precautions may result in irreparable damage to the A530 Turbo.

Jumpers

The A530 Turbo accelerator can be configured by the user in a number of different ways. These include different populations of memory modules, automatic booting from Hard Disk, etc. All these settings are accomplished through the use of *jumper pins* and *shorting blocks*.
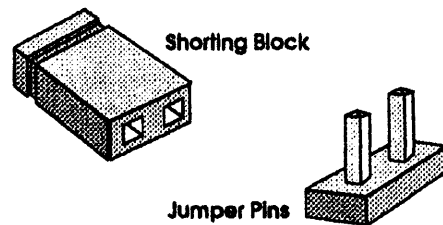
Figure A.1 – Jumper block and pins.

Scattered around the board are a number of upright metal pins. These are connection points for various open electrical circuits on the board. To configure certain options, you can install a shorting block onto a pair of pins, completing the circuit. The user configurable jumper settings on the A530 Turbo are J9, J11, J13, J8, and J2. All other jumpers noted are reserved by GVP.

Jumper Locations
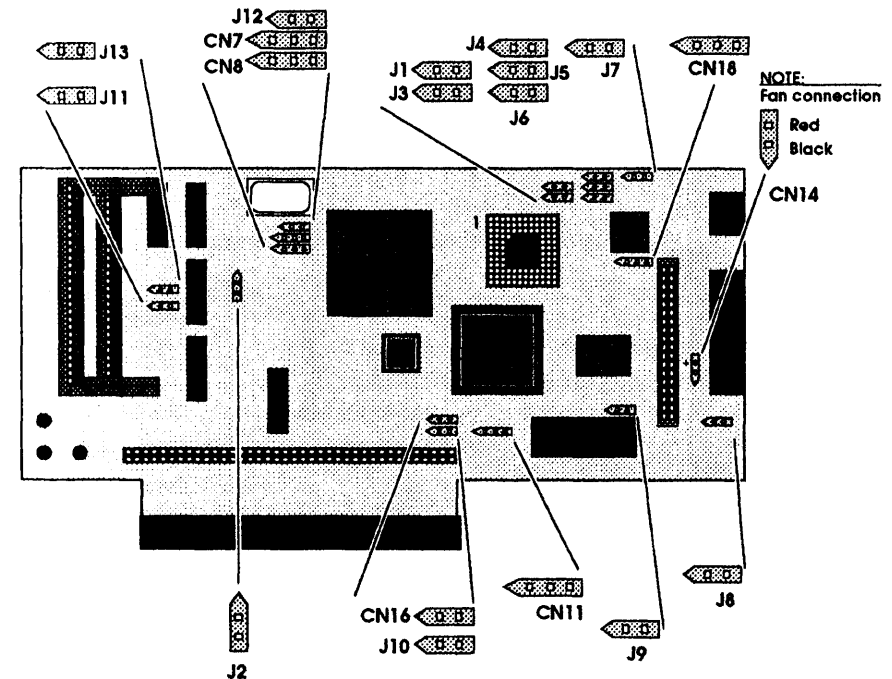
Figure A.2 – A530 Turbo jumper locations.

NOTE: All jumpers have polarity which is indicated either by a pointed end on the jumper pin mount, itself, or in white ink on the surface of the circuit board. On both two and three pin jumpers, Pin one is the pin closest to the pointed end.

User Settings

CAUTION: When changing jumper settings, be sure to short only the two pins on a single jumper block. Serious damage could result from shorting pins from two adjacent jumpers (see Figure A.3).
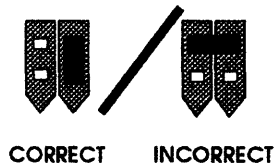
CORRECT   INCORRECT

Figure A.3 – Correct and incorrect jumper installation.

Pin 3
Pin 2   OR
Pin 1
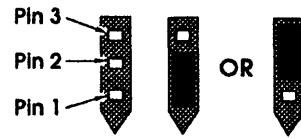
Figure A.4 – Correct 3-pin jumper installations.

Table A.1 – A530 Turbo User Settings

Jumper	Open Position	Closed Position	Factory Default
J9	Non-Autoboot	HD Autoboot	Closed
J2	Turbo OFF	Turbo ON	Turbo Switch*
J8	SCSI ROM	N/A	Open
J11	RAM installed	No RAM installed	Open
J13	1MB SIMMs installed	4 MB SIMMs installed	Open

* – The case-mounted Turbo switch connects to this position. In its ON position, this switch acts as a jumper block shorting these pins. In its OFF position, the circuit remains open.

NOTE: In the future, it may become necessary for GVP to alter the assignment and definition of one or all of the configuration jumpers used on the A500 HD8+. Any time such a change is made, it will be duly noted in a separate addendum to this manual or in a text file on the accompanying GVP.Install floppy disk.

Factory Settings

The remaining jumper and CN connectors on the A530 Turbo board perform reserved functions. The following table is for technical reference only.

Table A.2 – Factory Jumper Settings

Jumper	Open Position	Closed Position	Factory Default
J1	MMU Enabled*	MMU Disabled	Open
J3	Cache Enabled	Cache Disabled	Open
J4	Reserved	Reserved	Closed
J5	Reserved	Reserved	Open
J6	Reserved	Reserved	Closed
J7	Reserved	Reserved	Open
J10	Reserved	Reserved	Open
J12	Reserved	Reserved	Open
CN16	Reserved	Reserved	Open

Three Pin Jumper Connectors (CN-type)			
Jumper	Pins 1 & 2 shorted	Pins 2 & 3 shorted	Default
CN7	Reserved	Reserved	Pins 1 & 2
CN8	Reserved	Reserved	Pins 2 & 3
CN11	Reserved	Reserved	Pins 2 & 3
CN18	Reserved	Reserved	Pins 1 & 2

* – The 68EC030 chip used with most A530 Turbo accelerators does not have a Memory Management Unit. Instead, GVP provides alternate memory mapping technology. If a 68030 with MMU is substituted for the 68EC030, this jumper provides a means of disabling that chip's MMU. This feature may be of interest to software developers who require a machine without MMU.

SCSI CONNECTOR PIN ASSIGNMENTS

External SCSI Connector (DB-25 Female)

Accepts standard shielded DB-25–50-pin Centronics-type SCSI cables.
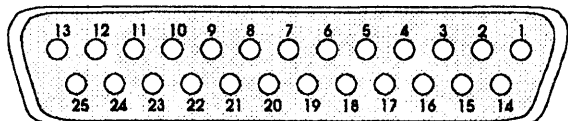
PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
1	REQ	9	GND	18	GND
2	MSG	10	DB(3)	19	SEL
3	I/O	11	DB(5)	20	DB(P)
4	RST	12	DB(6)	21	DB(1)
5	ACK	13	DB(7)	22	DB(2)
6	BSY	14	GND	23	DB(4)
7	GND	15	C/D	24	GND
8	DB(0)	16	GND	25	TPWR
		17	ATN		

Internal SCSI Connector (50-pin Header)

Accepts standard SCSI ribbon cables.
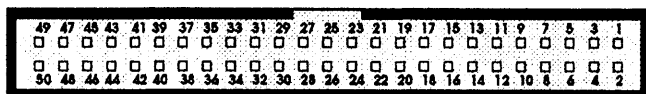
All odd pins, except pin 25, are Ground (GND). Pin 25 is not used.

PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
2	DB90)	18	DB(P)	36	BSY
4	DB(1)	20	GND	38	ACK
6	DB(2)	22	GND	40	RST
8	DB(3)	24	GND	42	MSG
10	DB(4)	26	not used	44	SEL
12	DB(5)	28	GND	46	C/D
14	DB(6)	30	GND	48	REQ
16	DB(7)	32	ATN	50	I/O
		34	NC		

APPENDIX B.

CUSTOMER SERVICE

GVP provides customer support for its hardware and software products through its network of authorized dealers. In most cases, your dealer may offer the fastest and most convenient solution when repair or replacement of equipment is necessary.

GVP also maintains a telephone Technical Support line, Monday, Wednesday, Thursday, and Friday, from 9:15 a.m. to 6:00 p.m. Eastern Time in the United States at (215) 354-9495. On Tuesdays, the Tech Support line opens at 10:30 a.m. Wherever possible, callers should determine that the problem they are reporting is repeatable (*i.e.: it happens more than once*), and be able to describe in detail the particular symptoms and system configuration in use.

CAUTION: Because the A530 Turbo contains delicate components that are subject to damage from shock or short circuits, use care when attempting to repeat a failed operation. Under no circumstance should a machine be powered up if it has shown evidence of electrical short circuiting. Doing so can cause irreparable damage to the A530 Turbo, your Amiga, or both.

GVP can also be reached via FAX, at (215) 337-9922 or by post at our U.S. mailing address:

> Great Valley Products, Inc.
> 600 Clark Ave.
> King of Prussia, PA 19406

Customer Number: _____

APPENDIX C.
PROBLEM REPORTING FORM

When calling GVP Customer Service, please take the time to complete this form. Telephone support personnel will be better able to assist you if you can provide this detailed information. Users may, alternately, FAX a copy of this form to GVP at **(215) 337-9922.**

Name: _____

Date: _____ Cust. Number_____

Address: _____

_____

City: _____ State: _____

Country: _____ Postal Code:_____

Telephone Number:_____

Product: _____

Serial Number: _____

Revision: _____

Describe the problem in terms of symptoms and the conditions under which it occurs: _____

_____

_____

_____

_____

_____

Machine Configuration

Amiga Model: _____

Motherboard Revision: _____

Kickstart (ROM) Version: _____

Workbench Version: _____

Chip Set Version: _____

Amiga CPU Installed: _____

Amiga clock speed: _____

Hard Drives Attached:

List the Unit ID numbers, manufacturers and capacities of all hard drives attached to your system; also any floppy, tape or other devices:

_____

_____

_____

_____

_____

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