The Third Generation Accelerator

USER'S GUIDE

INTERACTIVE VIDEO SYSTEMS

THE THIRD GENERATION '030
PROCESSOR ACCLERATOR

ADDENDUM SHEET

The Vector User's Guide refers to a jumper labelled DISFASTROM on jumper block A. This jumper is described as being used to disable the FastRom option that remaps Kickstart ROM into 32 bit Vector RAM. This jumper is not functional and should not be installed (it is not a factory installed jumper). If desired, FastRom may still be disabled in the Vector Boot Options Menu.

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USER'S GUIDE

TABLE OF CONTENTS

TABLE OF CONTENTS

CHAPTER 1 - INTRODUCTION

Congratulations on your selection of the Vector processor accelerator. With a suite of features unmatched by any other product, Vector is the most advanced processor accelerator available for the Amiga. When installed in your Amiga computer, Vector will increase the speed of every aspect of your computing environment. In addition to speed enhancement, Vector adds a 68882 floating point math coprocessor, a high speed SCSI hard disk interface and up to 32 megabytes of 32 bit wide RAM to the basic Amiga system.

IVS CONTACTS

IVS is located in the Pacific Standard Time Zone. Normal business hours are 9:00 AM - 5:00 PM PST.

For general questions or comments the IVS telephone number is (714) 890-7040. Call this number for sales information or for technical support.

IVS has a technical support BBS at (714) 890-2022. This BBS is online 24 hours a day except for occasional down time for routine maintenance. Questions or comments may be posted for any purpose. There are a number of conferences online relating to the entire IVS product line.

ABOUT THIS MANUAL

While the Vector is an extremely sophisticated piece of equipment it is relatively simple to install. If you are new to the world of computers and Amigas in particular it is strongly advised that you go through this manual in its entirety prior to installing the Vector in your computer. There are a number of options that directly affect the operation (or lack thereof) of the system and you will save yourself a lot of headaches and telephone time if you take the time to get it right. If you simply cannot wait to get going go directly to Appendix B for a quick reference guide to Vector options and their settings. In either case, refer to the chapter titled PRE-INSTALLATION CONSIDERATIONS. It contains valuable information relating to optimized system performance.

WHAT IS PRO-PLEX?

To maximize the flexibility of Vector, IVS has introduced a totally new and unique concept in processor enhancements...PRO-PLEX. PRO-PLEX is short for PROcessor multiPLEXing and represents a real savings of hundreds of dollars. PRO-PLEX allows the native Amiga 68000 processor to access the resources on the Vector. When the system is run in 68000 mode, Vector makes 4 or 8 megabytes of its 32 bit RAM available to the system as standard 16 bit autoconfig RAM. The RAM is actually presented to the system as two 4 meg memory boards to accomodate Bridgeboard users. In addition to RAM, PRO-PLEX makes the SCSI hard drive available to the 68000 as a fully

autobooting autoconfig hard drive. Whereas other products force you to buy an extra RAM board and hard drive & controller, Vector with PRO-PLEX saves you the cost of a fully populated 8 meg RAM board and an extra hard drive and controller! Best of all, the same memory and hard drive are used by the 68030 processor but with the f power and speed of the enhanced processor. PRO-PLEX is the feature that mo makes Vector the Third Generation Accelerator.

CHAPTER 2 - PRE-INSTALLATION CONSIDERATIONS

While the Vector is relatively simple to install, there are a number of considerations that need to be made prior to installing it in the computer. Making these considerations in advance will save you a great deal of time in trying to fine tune the system and optimize its performance.

SYSTEM CONSIDERATIONS

Take a careful stock of your system's overall configuration. Do you have any RAM boards already installed? If so, how much RAM is there and does it autoconfig? Do you already have a hard drive and if so, is it SCSI or IDE? Will you be using the Vector's hard disk controller with a separate hard disk from the one currently installed? Do you want to move your current hard drive over to the Vector's controller and remove the old controller? Do you have a bridgeboard? These are some of the questions that will affect how you configure the Vector prior to its installation in the computer. This chapter is designed to help you sort through these and other questions so that you can set the system up exactly as you wish with a minimum amount of difficulty.

16 BIT RAM CONSIDERATIONS

The Amiga system is built around a 16 bit data bus. All memory cards that plug into the Amiga use this 16 bit wide data bus to transfer data among the different parts of the computer. The width of the data bus is a function of the processor used in the computer. The 68000 has a 16 bit wide data bus. The 68030 has a 32 bit wide data bus but when it transfers data to or from the Amiga bus it must do so 16 bits at a time. This process of funneling 32 bits into 16 bits takes time and accelerator designers hate to lose time. After all, the inverse of time is speed and speed is what its all about. That is the reason that Vector has its own local 32 bit wide memory.

Data transferred between the Vector's 68030 and its local 32 bit memory can move at a much higher speed that data transferred between the '030 and the Amiga's 16 bit memory. For this reason, it is best to use only the Vector's 32 bit local RAM and remove any 16 bit RAM from the system. The only exception to this would be if you absolutely must have the most RAM possible.

Vector has the capability to expand its local 32 bit RAM to 32 megabytes. The A2630 compatible expansion connector allows third party 32 bit memory boards to be added with up to 112 megabytes for a total of 144 megabytes of 32 bit wide RAM. It is very unlikely that anybody would require more than this amount of RAM and if they do, the additional maximum of 8 megs of 16 bit RAM probably won't make much of a difference. However, you will suffer a performance degradation if the 68030 is forced to use the slower 16 bit RAM on a board plugged into an Amiga expansion slot.

The general rule is to optimize for the '030 by removing all of the 16 bit RAM from the system. This is where PRO-PLEX comes into play. When in the '030 mode, the system will use Vector's 32 bit RAM exclusively. When in the 68000 mode, PRO-PLEX makes the 32 bit wide RAM look just like a 16 bit autoconfig RAM card with no performance loss in either case.

Vector's PRO-PLEX makes RAM available to the 68000. Now the question is how much RAM? If you do nothing, the amount of RAM available is a function of the amount of RAM installed on the Vector. If you have 4 megs of 32 bit RAM, the 68000 will see 4 megs of PRO-PLEX'ed 16 bit RAM. If you have 8, 16 or 32 megs on the Vector, the 68000 will see 8 megs of PRO-PLEX'ed 16 bit RAM. This may cause problems if you haven't removed other 16 bit RAM from the expansion bus of the Amiga since the Amiga allows for a maximum of 8 megabytes of autoconfig'ed 16 bit expansion RAM.

The Vector's PRO-PLEX'ed RAM actually appears to the 68000 as two 4 meg RAM boards that get configured independently. There is a jumper named DISHIMEM that, when installed, disables the second 4 meg RAM board from configuring under the 68000. Both RAM boards can be disabled by installing the jumper labelled DIS68KRAM. Neither jumper has any effect when operating in the '030 mode. See Figure 2-1 for the location of the DIS68KRAM jumper.

If the Vector's RAM is to be used under PRO-PLEX by the 68000 you may have an addressing conflict with other 16 bit RAM installed in an expansion slot. As mentioned above, it is best to remove all 16 bit expansion RAM from the system and use Vector's RAM under PRO-PLEX for the 68000. If you choose not to remove 16 bit expansion RAM boards, remember that the Amiga allows for a maximum of 8 megs of expansion RAM. If you have a full 8 megs of 16 bit expansion RAM, disable all Vector RAM from the 68000 by installing the DIS68KRAM jumper. If you have 2 or 4 megs of 16 bit expansion RAM disable the second 4 meg RAM board on the Vector by installing the DISHIMEM jumper.

If you have a Bridgeboard and wish to make Vector RAM available to the 68000 under PRO-PLEX you must install the DISHIMEM jumper. The Bridgeboard gets mapped into the middle of the Amiga's autoconfig space and will cause an addressing conflict if 8 megs of 16 bit RAM are installed. Set this jumper regardless of the amount of RAM installed on the Vector.

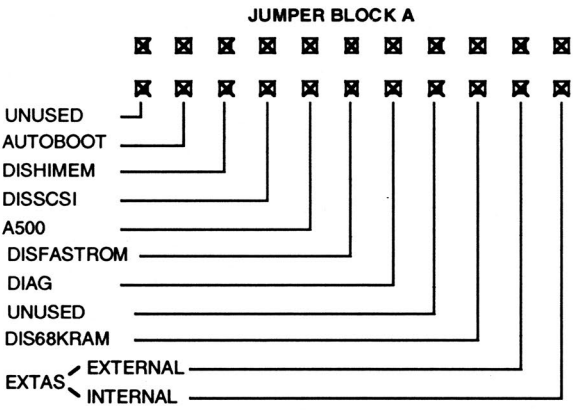


FIGURE 2-1: Jumper Block A pin definitions

32 BIT RAM CONSIDERATIONS

To get the most out of your system you should make 32 bit RAM available to the Vector. To accomplish this, Vector has a facility for adding 32 bit RAM using industry standard SIMMs. SIMM (Single In-line Memory Module) memory has the benefit of ease of installation and device independence. Unlike other accelerator products, Vector can use any manufacturer's 8 bit wide SIMM module. The only restriction is that it must have an access time of 60ns (ns stands for nanosecond, 1 billionth of a second) or less. Due to its extremely fast memory architecture Vector will not work with SIMMs whose access time is greater than 60ns.

Since the Vector data bus is 32 bits wide, SIMM modules must be added 4 at a time (4 8 bit SIMMs = 32 bits total width). Note that 8 bits = 1 byte so the SIMMs that are used with Vector are a single byte wide. Thus a 1 megabyte SIMM is 1 meg deep and 8 bits wide. 4 of these SIMMs provide 4 megabytes of RAM oriented 1 meg deep and 4 bytes (32 bits) wide. It follows that 8 1 meg SIMMs provide 8 megs of RAM. In addition to 1 megabyte SIMMs the Vector can use 4 megabyte SIMMs that are 4 megs deep and 8 bits wide. 4 of these SIMMs provides 16 megabytes of RAM to the system. 8 of them provides 32 megabytes of RAM to the system. Note that 1 and 4 meg SIMMs may not be mixed on the Vector. Use all 1 meg or all 4 meg SIMMs.

Part of the speed of the '030 stems from its use of on board caches for instructions and data. A deep discussion of cache operation is beyond the scope of this manual but suffice it to say that the use of caches greatly reduces instruction execution time and so increases performance. When the '030 loads one of its caches it may request that 4 32 bit words be read consecutively. This is called a burst request. If the memory architecture supports burst mode operation as the Vector does, then the first 32 bit word will take 5 clock cycles to load. The next three 32 bit words will take 2 clock cycles each to load for a total of 11 clock cycles for 4 32 bit words. This burst cycle is called a 5:2:2:2 burst for the number of clock cycles per 32 bit word read.

Due to its superior design, Vector is able to burst the 3 words following the first word in a single clock cycle rather than 2 clock cycles. This burst cycle is called a 5:1:1:1 cycle. Note that a 5:1:1:1 cycle takes only 8 clock cycles rather than the 11 clock cycles of a 5:2:2:2 burst. This represents a speed increase of over 25% in burst mode. In order to run 5:1:1:1 bursts all 8 SIMM sockets must be occupied with memory. Thus, only the 8 meg and the 32 meg memory increments will run 5:1:1:1 burst cycles. The 4 and 16 meg increments are constrained to running 5:2:2:2 burst cycles. Burst is not operational in the 68000 mode.

HARD DRIVE CONSIDERATIONS

The Amiga does not include an integral hard drive interface on its motherboard. Hard drives must be connected to the system using third party hard disk controllers. These controllers are usually of two types; SCSI or IDE. SCSI controllers are by far the most prevalent due to their flexibility. Vector includes a high speed SCSI interface as a part of its design. While use of a hard drive is not a requirement it marks such a drastic improvement in the systems performance and storage capacity that it makes no sense to accelerate a machine without the mass storage of a hard drive. If you already have a hard drive on your machine and are adding the Vector for speed you must decide how to configure the hard drive system.

VECTOR USER'S GUIDE — PRE-INSTALLATION CONSIDERATIONS

There is no inherent system restriction on how many hard drive controllers and/or hard drives may be connected to the computer although there may be restrictions imposed by the disk controller's manufacturer and there are practical limitations imposed by power requirements and physical constraints. The system's performance will be greatly affected by your decisions in this area so weigh them carefully.

As with memory, any hard disk controller card plugged into the expansion bus can transfer a maximum of 16 data bits in one bus cycle. Some controllers only transfer half that much since the data path width of the hard drive's SCSI bus is only 8 bits. For this reason, it is most desireable to use the SCSI interface on the Vector to control your hard drive. If you do this on other accelerators' hard drive controllers the Amiga's native 68000 processor loses access to the hard drive. Naturally, the Vector's PRO-PLEX feature gets around this limitation by making the Vector's hard drive accessible in 68000 mode as a normal 16 bit hard drive controller that is plugged into the expansion bus.

If the only hard disk controller in the system is the controller on the Vector then the only consideration that needs to be made is whether or not to autoboot the system from the hard drive connected to Vector. Install the Vector's Autoboot jumper to enable autobooting from the Vector's hard drive (see Fig. 2-1).

If you choose to keep one or more hard drive controllers plugged into the Amiga's expansion bus in addition to the VECTOR's SCSI interface then you must decide which controller is to be the autobooting controller and enable its autoboot feature with all other controllers' autoboot feature disabled. Remove the AUTOBOOT jumper on Vector to keep from booting the system from hard drives connected to Vector.

Note that only one disk controller should be designated as the autoboot controller. Configuring multiple disk controllers as the autobooting device may produce unpredictable results. Disabling the autoboot feature of a controller does not make the drives attached to it inaccessible it just makes them unbootable. They will still appear to the system as useable hard drives. If you wish to disable the Vector's SCSI interface completely, install the DISSCSI jumper (fig. 2-1). DISSCSI is only applicable in the 68000 mode; it has no effect in '030 mode.

If you choose to remove your hard drive controller card from the system and use only the Vector's controller you must determine whether or not the old controller supported Commodore's RDB (Rigid Disk Block) specification. If it did, you can simply connect the hard drive directly to the Vector's SCSI interface and the Vector will recognize and use the drive. If the controller did not support RDB's (correctly) you will need to back up the hard drive and use the Vector's disk formatting software to reformat the hard drive then restore the hard drive's contents from your backup.

Vector includes two SCSI connectors that are connected in parallel; one internal connector and one external connector. Due to the extremely high data transfer rates the external connector is a 50 pin Centronics style connector. This connector alternates pins between signal and ground to provide maximum noise immunity and impedance control. The ad-hoc but more common DB-25 connector found on other products has

only 7 grounds for 18 signals and cannot be used reliably. Use only 50 conductor cables to connect external SCSI devices to the Vector. Be wary of cables that seem to be too low priced. Often these cables are cost reduced by running a single ground wire between the cable's two connectors. These cables will cause more grief than the small amount of money that they save.

CHAPTER 3 - ACCELERATOR CONFIGURATION

Figure 3-1 illustrates the main features of the Vector accelerator board. Note that there are a number of jumper blocks shown in the figure. These jumper blocks represent th hardware options that are used to configure the board for your specific requirement. Some of these options may be overridden with the Vector boot options menu firmware but you should go through this chapter in detail to ensure that the Vector is configured correctly each time you boot the system.

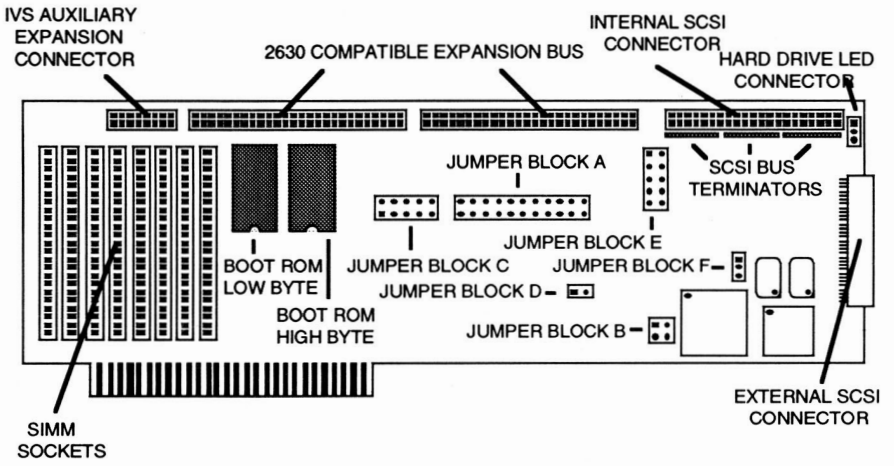


FIGURE 3-1: Vector board features and option jumper locations

ADDING RAM TO VECTOR

RAM is added to Vector using either 1M x 8 or 4M x 8 SIMMs. SIMMs must be added 4 at a time and mixing 4M and 1M SIMMs is not permitted. There are 8 SIMM sockets on the Vector so the following are legal memory configurations:

4 1M x 8 SIMMs = 4 megabytes
8 1M x 8 SIMMs = 8 megabytes
4 4M x 8 SIMMs = 16 megabytes
8 4M x 8 SIMMs = 32 megabytes

SIMMs are added to the Vector 4 at a time. 4 and 16 Mbyte increments are added to the 4 leftmost SIMM sockets. 8 and 32 Mbyte increments are added to all 8 SIMM

sockets. After adding the SIMMs to Vector you must set Jumper Block B to indicate the amount of RAM you have installed. Figure 3-2 illustrates the correct jumper settings for each of the legal 32 bit RAM configurations:

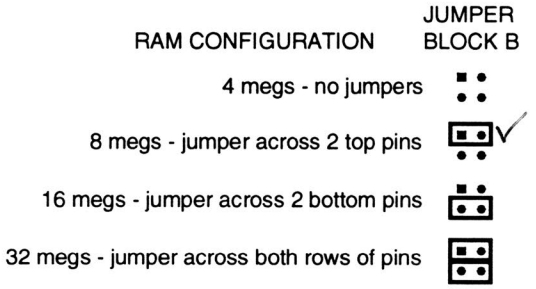


FIGURE 3-2: Vector 32 bit RAM configuration jumpers

In addition to configuring the RAM for operation with the 68030, Vector RAM must be configured for operation in 16 bit 68000 mode under PRO-PLEX. This configuration entails telling the 68000 how much of the Vector's RAM (if any) is to be made available. Figure 3-3 shows the pinout of Jumper Block A. To limit the amount of Vector Ram available to the 68000 to 4 megabytes install the DISHIMEM jumper. To make 0k of the Vector Ram available to the 68000 install the DIS68KRAM jumper. Neither jumper affects RAM operation in '030 mode.

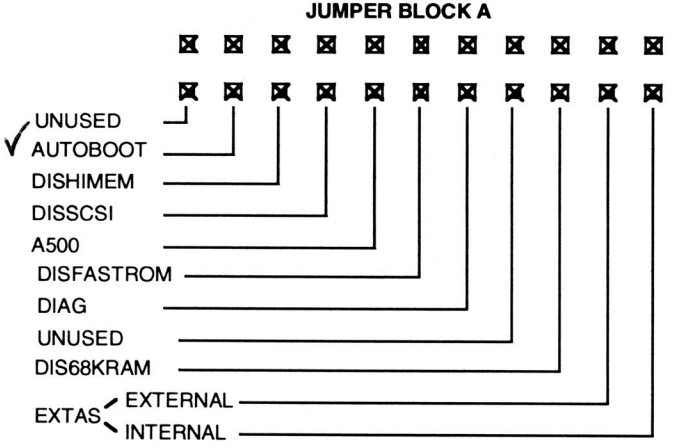
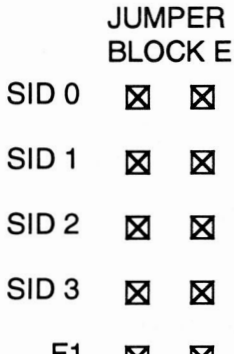


FIGURE 3-3: Jumper Block A configures Vector RAM for the 68000

In addition to the local Vector 32 bit RAM expansion Vector includes an A2630 compatible expansion bus that can be used with other third party memory expansion boards. Currently available boards are capable of expanding memory to well beyond 100 Mbytes.

ADDING A HARD DISK TO VECTOR

The Vector accelerator includes a high speed SCSI hard disk interface as well as mounting holes to allow a 3.5" hard drive to be mounted directly onto the circuit board. The SCSI interface is identical to that of the Trumpcard Professional and Grand Slam except that it is faster. Vector's SCSI interface includes the IVS SCSI-SHARE SCSI networking capability. SCSI networking allows multiple computers to share SCSI peripherals such as hard disks, tape drives, etc. If you are using the Vector in a SCSI-SHARE network you must set a SCSI ID for the Vector. Jumper Block E is used to set the SCSI ID as illustrated in Figure 3-4. Disregard the SCSI ID if you are not using the Vector in a SCSI-SHARE network.



SID 3	SID 2	SID 1	SID 0	SCSI ID
OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	ON	1
OFF	OFF	ON	OFF	2
OFF	OFF	ON	ON	3
OFF	ON	OFF	OFF	4
OFF	ON	OFF	ON	5
OFF	ON	ON	OFF	6
OFF	ON	ON	ON	7
ON	OFF	OFF	OFF	8
ON	OFF	OFF	ON	9
ON	OFF	ON	OFF	10
ON	OFF	ON	ON	11
ON	ON	OFF	OFF	12
ON	ON	OFF	ON	13
ON	ON	ON	OFF	14
ON	ON	ON	ON	15

FIGURE 3-4: Jumper Block E sets the Vector's SCSI ID

The Vector SCSI interface is capable of autobooting the system directly from the hard disk drive. Install the autoboot jumper on Jumper Block A to default the system to autobooting from Vector's hard drive. If this jumper is not installed you may still autoboot from the Vector's hard drive by entering the Vector boot options menu (hold down the right mouse button immediately after power up or reset) and pressing the autoboot option button. Refer to Figure 3-3 for the location of the Autoboot jumper.

NOTE: The F1 jumper and SCSI ID's 8 - 15 are not currently used.

There are 4 mounting holes for mounting a 3.5" hard disk drive directly to the Vector circuit board. The drive should be mounted on the backside of the circuit board.

WARNING: Use the long nylon standoffs to set the drive off from the circuit board and the flat nylon washers to insulate the mounting screw heads from circuitry on the component side of the board. Failure to use the nylon insulating components will void your warranty!

CLOCKING OPTIONS

The Vector uses crystal oscillators that run at twice the desired frequency. For example, if you want to run the Vector at 40 MHz, use an 80 MHz crystal oscillator. Similarly, if you want to run the FPU at 16 MHz, use a 32 MHz oscillator.

There are two crystal oscillator sockets on the Vector circuit board; one for the CPU and one for the FPU. The FPU can be run from the CPU clock or from its own separate clock source. Jumper Block F is used to select the clock source for the FPU. Refer to Figure 3-1 for the location of Jumper Block F. Install a jumper between the center and top posts to clock the FPU at a frequency different than that of the CPU. This requires that a separate clock oscillator of twice the desired frequency be installed in the rightmost crystal socket. Install a jumper between the center and bottom posts to run the FPU at the same frequency as that of the CPU.

Note that the FPU and CPU must be rated at or above the rates at which they are being clocked. For example, a 16 MHz 68882 FPU will not operate properly with a 50 MHz crystal running it since the real clock frequency, 25 MHz (50 MHz ÷ 2), is above the 16 MHz rating of the FPU. In this case your options would be to clock the FPU with a 32 MHz or lower clock oscillator or to use a 25 MHz or faster FPU.

NOTE: Due to design constraints IVS cannot guarantee that a 25 MHz Vector board will run at 40 MHz even with a faster CPU and clock oscillator.

SYSTEM OPTIONS

There are two other jumpers that must be considered before installing the Vector into your computer.

Referring to Figure 3-1 there is a jumper called A500. This jumper must be installed if the Vector is being used in an Amiga 500.

Figure 3-1 also shows a jumper position labelled Jumper Block D. Remove this jumper to force the data and instruction caches to be enabled when the system boots. This jumper setting may be overridden using the Vector boot options menu software. Removing the jumper eliminates the need to use the SETCPU command in your startup sequence and results in a faster boot process.

The EXTAS jumper is used in conjunction with boards plugged onto the 2630 compatible expansion bus. Jumper across the EXTERNAL position if you have a board such as the DKB 2632 RAM expansion connected to the Vector. This jumper is irrelevant if there is nothing connected to the expansion bus.

CHAPTER 4 - INSTALLING VECTOR IN THE A2000

Once the Vector's options have been selected and the jumpers have been installed to your satisfaction it is time to install the Vector in the computer. This operation requires that you remove the A2000 cover and install the Vector into the coprocessor slot of the A2000. Figure 4-1 illustrates the screws that must be removed in order to open the computer. Be sure to turn the computer off and remove the AC power cord prior to opening the computer.

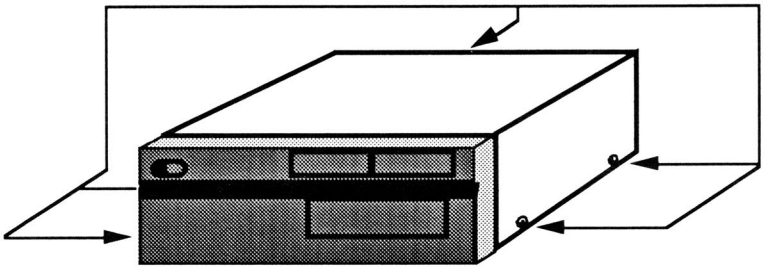


FIGURE 4-1: Remove these 5 screws to open the A2000 computer

With the cover off, locate the 86 pin coprocessor slot adjacent to the power supply/ floppy drive bay assembly. The Vector is installed in this slot. Prior to insertion, you must remove the flat coprocessor connector plate on the rear wall of the computer chassis. Figure 4-2 shows a rear view of the computer and the location of the coprocessor slot connector plate. Remove the two screws at the top and bottom of the plate and take the plate out of the computer. Due to the extending face of the Vector's external SCSI connector you may need to loosen the four screws that hold the chassis back wall to the power supply in order to provide clearance for the connector and circuit board.

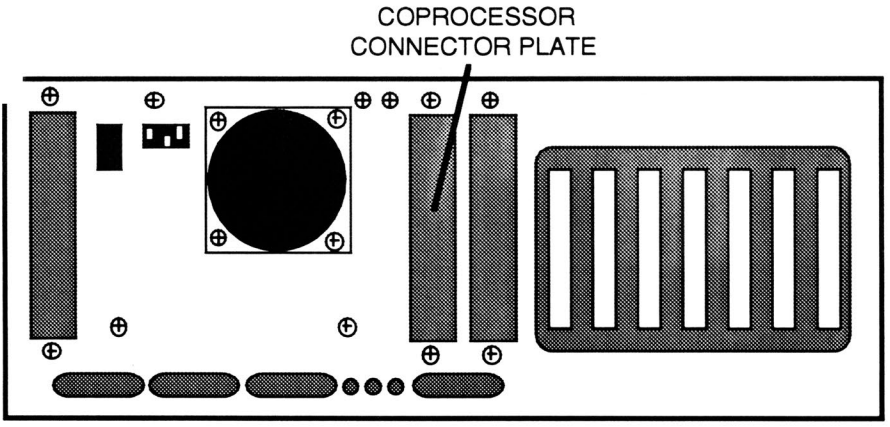


FIGURE 4-2: Remove the Coprocessor Connector Plate to make room for Vector

Insert the gold fingers of the Vector into the 86 pin coprocessor slot and press the Vector firmly into the socket until it is fully seated. Replace the two screws from the coprocessor connector plate to anchor the Vector securely to the rear wall of the computer chassis. Reassemble the computer and prepare to enjoy the world of spee and flexibility that only Vector can provide.

CHAPTER 5 - PREPARING THE HARD DRIVE FOR USE

This chapter goes into great detail regarding the formatting and preparation of a hard disk drive for use with the Vector. To aid in this process IVS has designed the best and most comprehensive set of disk configuration tools available today. IVS' acclaimed TCUtils 2.0 hard disk formatting software will get you up and running in no time. There are two levels of users for TCUtils 2.0; those who need a single partition formatted with AmigaDOS and don't need or want to spend time considering all the different parameters associated with hard drives are referred to the section titled One Drive, First Time. Chapter 6 may be skipped Those users who have special configuration needs are referred to the section titled Non-Standard and should go through Chapter 6 in detail.

WARNING: Because of TCUTILS 2.0 advanced support of removable media and multiple volumes, you must read Chapter 7 titled 'USING THE HARD DISK SYSTEM' and familiarize yourself with TCUTILS 2.0 dynamic naming conventions. If you choose not to follow the naming conventions outlined in this section you may inadvertently overwrite files.

CONFIGURING THE HARD DISK

Once the Vector has been installed in your computer, you must configure your hard disk. This process involves formatting the hard disk, checking it for bad sectors, and installing the Workbench software to allow auto-booting from the hard disk. These processes are performed using the TCUTILS 2.0 program found on your VecTools diskette. The procedure for this software is the same no matter which Amiga model you are using.

To configure the hard disk, boot the Amiga with a Workbench disk, and then make a COPY of the Vector Boot disk. The Vector disk is self modifying, and the original disk should never be used except to create backup copies. Again, before you proceed, make a copy of the Vector Hard Disk Formatting Utilities diskette. If you're not sure how to copy disks, consult the documentation that came with the Amiga.

After making the backup, reboot the system, using the new Vector BACKUP diskette instead of the normal Workbench disk.

ONE DRIVE, FIRST TIME

If you have only one hard drive connected to the Vector, and this is the first time you are setting it up, the software will show you the easy setup screen. This screen consists of 3 buttons labelled 'STANDARD', 'NON-STANDARD', and 'QUIT'. The screen also shows the type of drive connected to your system and its size in Megabytes.

STANDARD

To configure the hard drive with a single partition and formatted normally, click on the button marked STANDARD. TCUTILS 2.0 will go through all setup procedures automatically. If you desire to setup the drive in some other manner, click on the button marked NON-STANDARD. Most first time hard disk users will probably want to go with the standard configuration, so we have supplied this option to make it as simple as possible to configure the hard drive. When the procedure is finished, the drive will be ready for use. If you're not sure how you want to configure the drive, and you want to read the manual some more, select QUIT.

NON-STANDARD

If you select non-standard, have more than one drive connected to the system, or have formatted the drive in the past, you will be sent to the main screen of the TCUTILS 2.0 software.

The TCUTILS 2.0 software defaults to configure the hard disk in the most common manner (one partition, auto-booting). To configure the drive in this manner, select the drive from the Drive List by clicking on the drive name. Then click on the SETUP DRIVE button in the lower left portion of the display. The TCUTILS 2.0 program will then go through all of the operations necessary to configure the drive, displaying information about each operation in the Instruction Window. If user input is needed during these operations (such as inserting a Workbench disk), the program will prompt you to do so. The program will tell you when the process is complete, so that you can select the QUIT button and exit the TCUTILS 2.0 software.

There are three sections on the main screen: The Drive Selection area, the Partition Sizing Area, and the Information Area.

DRIVE SELECTION AREA

The Drive Selection area shows the Device Number, Drive Name, and Logical Unit Number, if applicable, for each drive connected to the system. Logical Unit Numbers (LUN) are only applicable if the hard drive requires use of an Adaptec controller. It should be left set to 0 for all other applications.

You must select a drive to perform any operations, and only one drive can be selected at any time. When you select or reselect a drive, its current configuration will be reflected in the state of the utilities software.

After entering the TCUTILS 2.0 software, if no drive is shown on the list, check all connections. If TCUTILS 2.0 cannot determine the type of drive connected, it will assign the drive the name UNKNOWN. If you have an embedded SCSI drive and it is shown as UNKNOWN, call IVS Technical Support.

THE PARTITION SIZER

Some people prefer to divide their drive up into different sections, called partitions. Each partition acts as if it were a separate drive, with each partition having its own name. If you want to divide the drive into various partitions, use the Partition Sizer.

The Sizer is a vertical column, representing the free space available on the hard disk. The software defaults to a single partition the size of the entire drive. If you wish to divide the drive into multiple partitions, you must remove the single partition by double clicking in that partition. A new window, the Detailed Partition Information Window, will appear, overlaying the Drive Selection Area. Click on the REMOVE button to remove the selected partition. The detailed partition window will disappear. To create a partition, click and hold in the free space area of the partition sizer. To determine the size of the partition, drag the mouse in the partition area and move the mouse downward to increase the size, or upward to decrease the size. A horizontal line will follow the mouse movement, showing the size of the partition. Create as many partitions as you like, by repeating this click and drag operation in the remaining free space. Partition sizes are shown graphically; the size of a partition as shown in the sizer is rounded to the 1st significant digit. For more exact sizes, see the section on the Detailed Partition Information Area in Chapter 6, Advanced Hard Disk Formatting.

Be warned that each partition consumes between 25 and 60k of RAM, depending on the file system used and the buffer size. Using subdirectories instead of partitions saves memory, and allows you to do all of the things you can do with partitions, except reformatting sections of the drive.

THE INFORMATION AREA

The Information Area is used during hard disk operations, displaying the current operation, the estimated amount of time the operation will take (if applicable), and user prompts (such as insert a Workbench disk). The Information area is also used as a Help window. As you move the mouse pointer around the display, you'll notice that the message in the window changes to give instructions or reminders about the area at which you're currently pointing.

CHAPTER 6 - ADVANCED HARD DISK FORMATTING

This chapter contains information about TCUtils 2.0's Detailed Partition Information Area, and information about the various commands and operations along the men bar. It is not necessary to read this section in order to configure the hard drive. This information is included for the curious and for those who have special needs.

DETAILED PARTITION INFORMATION WINDOW

If you double click in a partition's space in the sizer, the Detailed Partition Information Window will appear. This window shows information about the partition and allows you to customize all aspects of the selected partition as desired. Each of the items in the window is explained below.

DEVICE

The Device field holds the Physical Device Name of the partition you are currently working with. The Device Name defaults to AUTO, but can be changed. If it is left on AUTO, the TCUTILS 2.0 software will dynamically name partitions as they appear on the system, starting with DH0 (naming the next DH1, then DH2, etc.). Since the Physical Device name is assigned by the system, the Physical Device name may or may not stay the same, depending on the system configuration (adding and/or removing devices or removable media, for example). Because of this feature it is imperative that you use Volume names, not Physical Device names, to refer to drives and partitions. For more information on using this feature, see the section titled 'USING THE HARD DISK SYSTEM' in Chapter 7.

VOLUME NAME

Volume names default to being blank. The user must define the Volume name for eac partition. Keep the names short (WORD for Word Processing files and data, fo example), and make sure there are no spaces in the name. There is a one to one corellation between the volume name and the partition. Unlike Device Names, Volume names will not be changed by the system. It is imperative that you refer to the Volume names, not the Device names, when working with hard disks and partitions.

SIZE

The Size parameter shows the current size of the partition in Kilobytes. To change the size, type in a new value. Note that the size is rounded to the cylinder boundaries of the partition. This parameter is used to set partition sizes that are too difficult to set graphically in the Partition Sizer. When the size field is altered the high cylinder value for the partition will be altered automatically after the 'ACCEPT' button is pressed.

DOS TYPE

The DOS type allows you to format a partition using the Fast File System (FFS), the Old File System (OFS), or Max. FFS is the default, and should always be used over OFS, unless you have a specific reason to use OFS. The Max option can be used to set aside a partition to use with a Mac emulator. This partition will need to be formatted from within the Mac emulator. To select which DOS you want to use, click the DOS button until the desired DOS is shown.

BUFFERS

The Buffers option allocates FFS buffers. Each increment in the Buffer field represents 512 bytes of system memory. The default buffer size is 20, which is determined to be optimum. You can change the number, but numbers higher than 20 will have no noticeable effect.

MOUNT

Mount selects whether the partition mounts automatically. It is used to turn the partition on and off. Note that if Mount is set to OFF, it cannot be mounted by using the Mount command from the CLI.

MASK

The Mask option is a bitwise address mask that establishes areas of memory that can or cannot be used for disk data transfers. This information has been set for optimum performance, and should not be changed.

MAXIMUM TRANSFER

The Maximum Transfer represents the maximum number of bytes that can be transferred in a single operation. This information should not be changed, as it has already been set at the maximum value, and lowering it can cause degraded hard disk performance.

BOOT PRIORITY

The Boot Priority allows you to set the priority of which device will boot. Using this parameter establishes which partition will boot if there are multiple bootable partitions, and is mainly used when the system is using more than one hard disk controller. The acceptable range for this parameter is -127 to +127 (the higher the number, the higher the priority). Do not set the number higher than 4, as 5 is the priority number for floppy drives.

BOOTABLE

Bootable options control whether a partition is bootable, and in conjunction with boot priority determines the order in which order partitions will boot.

LOW AND HIGH CYLINDER

The Low and High Cylinder parameters are set when you first set the size of a partition. Low and high cylinders are used to control the upper and lower boundaries of a partition. Partitions cannot overlap, so the low cylinder of a partition must start at least one cylinder above the high cylinder of the previous partition. These parameters are presented here for reference and although they can be changed by typing in a new value, it is recommended that you alter a partition's size from the graphic display of the partition window. Never use cylinders 0 and 1, as these are reserved for Rigid Disk Blocks and Autobooting.

The remaining portion of the screen is only used when the drive is going to be used in a SCSI-Share network.

WINDOW GADGETS

There are 3 gadgets at the bottom of the Detailed Partition Information Window; 'REMOVE', 'ACCEPT', and 'CANCEL'.

REMOVE removes the partition from the drive and returns you to the main screen. Use 'REMOVE' to re-partition a drive or to easily change the size of a partition.

CANCEL allows you to exit to the main screen ignoring any parameter changes made in the window.

ACCEPT makes all parameter changes take effect and exits to the main screen.

Once you've set up the partition(s) you're ready to configure the hard drive. To configure the drive, click on the SETUP DRIVE box in the main screen. The system tells you which operation is being performed, and an estimation of how long each operation will take where applicable. When all operations are complete, the hard disk will be ready for use. Press QUIT to exit the software.

THE MENU BAR

If you need to alter a sequence of events, or perform individual utility commands, use commands and options along the menu bar. There are four menus along the menu bar at the top of the screen: Project, Setup, Commands, and Options. In the sections below, each menu, and each item on the menu, will be explained.

THE PROJECT MENU

ABOUT

Selecting this command will show you the current TCUTILS 2.0 software revision, as well as the current ROM version of the Vector.

THE SETUP OPERATIONS MENU

The Setup Operations Menu contains the operations that are performed when the 'SETUP DRIVE' button is pressed. The TCUTILS 2.0 software is capable of deciding which operations need to be performed on a drive, and then only running those operations. For example, if you have previously formatted the drive, and then decide to change the partition information, the software will only perform the necessary operations to change that information. If you're unsure whether or not a particular operation will be performed, check the menu. If an operation has a checkmark next to it, it will be performed. For a definition of each command see the section on the Command Menu.

THE COMMAND MENU

The Command Menu contains all of the options available on the Setup Operations menu, plus some commands only found on this menu. The difference between this menu and the Setup Operations Menu is that any item selected from the Command Menu will be performed immediately, while commands selected on the Setup Operations Menu will only be performed after the Setup Drive button is clicked. The menu items that are shared between the two menus perform their functions in the same way, and are detailed below.

LOW LEVEL FORMAT

Formatting causes the disk to be broken up into small storage units called blocks. Since drives are shipped from the factory unformatted, you must format the drive, which takes about 10 minutes to complete. Extremely large drives can take a half hour or more to format (the larger the drive, the longer the format time). Note that a Low Level format only sets up the blocks, and is not the same as the Format command found in Amiga DOS.

CERTIFY DRIVE

Certify scans through the drive looking for soft or hard errors. Hard errors are automatically reassigned, although this can be changed under Certify on the Options Menu. Soft errors can be caused by bad cables, bad power supplies etc, and will not be reassigned because they are not actually hard errors. The easiest way to tell the difference between hard and soft errors is that hard errors are always repeatable, while soft errors are not. Options associated with the Certify Drive command are found under Certify on the Options menu, and are covered in that section.

ADD TO THE MOUNTLIST

Selecting this item will have the TCUTILS 2.0 software write the partition information in a mountlist style and save this information in the current DEVS directory. While the Vector does not need this information, the option is provided in case another piece of hardware or software being used does need it. This command defaults to OFF, and must be selected if you want this information created during drive configuration.

PERFORM AMIGA DOS FORMAT

An Amiga DOS format allows the hard drive to be used with the Amiga computer. The TCUTILS 2.0 software performs its own Amiga DOS format, which is faster but identical to a standard system DOS format.

WRITE PARTITION INFORMATION

This operation writes the RDB (Rigid Disk Blocks) data to the hard disk drive. This is the information that was created in the partition window.

COPY WORKBENCH

This command is used when you want to boot from a partition or drive. TCUTILS 2.0 will prompt you to insert a Workbench disk into the floppy drive. When asked, make sure you use an ORIGINAL Workbench disk. This is because Vector needs certain files which might have been removed or altered in a Workbench copy. Use the original Workbench disk and then make any desired changes to the Workbench on the hard disk later.

CREATE BOOT DISK

This command alters the copy of the Hard Disk Formatting Utilities diskette to allow access to the hard disk on systems that do not support autobooting. Remember to use a COPY of the Vector diskette, not the original. If for some reason you later need an unaltered version of the Hard Disk Formatting Utilities diskette, and you cannot use the original disk, the boot diskette can be returned to its original state by clicking on the Make Original Boot icon on the boot diskette.

NOTE: The following commands are not available on the Setup Commands Menu: Clear Drive, Self Test, and Park Drive Heads.

CLEAR DRIVE

If you've previously configured the hard drive with partition information, and later decide to change the configuration of the drive, use this command. It will remove all partition info and return the TCUTILS 2.0 software to its default state. Note that this command only removes the partition info within the TCUTILS 2.0 software. To actually change the information on the drive, press the Setup Drive button. To undo Clear Drive, reselect the drive from the drive list on the main screen. Remember to back up any important files that were on the drive before selecting Clear Drive, as the files will be lost in the process.

SELF TEST

This command will run an internal diagnostic test on the hard disk. After selecting this command, the test will be run, and you will be given either a PASS or FAIL message. If you get a FAIL message, consult the hard disk documentation or contact the hard disk's manufacturer to correct the problem.

PARK DRIVE HEADS

This command parks the heads of the selected drive. Generally, you will have to turn the drive off and then back on in order to use it after issuing this command. Most newer drives automatically park their heads at power down.

THE OPTIONS MENU

The items found on this menu interact with items found on the Command menu, or control how the hard disk works with the computer.

CERTIFY

The four options here interact with the Certify Drive command. The Non Destructive test scans the entire drive and reassigns all hard errors. The Destructive Write test tests the drive cabling and controller for possible read/write errors. It does not check the entire drive. The Verify test indicates that the computer will use the Verify SCSI command to certify the drive.

The next two items control what happens to any bad blocks found during certification. Reassign blocks tells the computer to use the SCSI Reassign Block method. Reformat Defects reformats the hard disk removing the bad blocks. You can choose neither option, or one or the other. If neither is selected, the software will not reassign any bad blocks it finds. Note that using these two items can wipe out data on the drive. A warning will be issued after selecting the Certify Drives command or when pressing the Setup Drive button, allowing you to abort these operations

DRIVER

There are two items associated with this option. The first, Handshake Reads and Writes, controls whether or not the Vector uses handshaking when communicating with the hard disk. Leave this option set to OFF, as the Vector performs handshaking in its hardware.

The other item associated with the Driver Option is Extended Read and Write, which controls whether or not the SCSI Extended Read and Write commands will be used. If you wish to use these commands, select the item so a checkmark appears next to it.

FORMAT

These two options interact with the Low Level Format command. The first, Interleave, defaults to a value determined by whether or not FFS was chosen while setting up Partitions. In general, the Interleave will be low (1-3) for FFS and high (5-15) for OFS. The Interleave rate is drive dependent and greatly affects drive performance. It should not be changed from the default value unless there is a specific reason, as the default values are optimized for the best possible performance.

CLEAR DEFECT LIST

This option will clear all user defined defects on the drive.

CACHING

The last two choices on the Options menu are Read Cache and Write Cache. Putting a check next to either of these will turn that particular cache on. These caches are completely independent of the 68030 data and instruction caches.

Using a cache can help speed up accesses to a hard drive that does not already have a cache built in (Quantum drives have built in caches, for instance). A cache is a special area of memory where the Vector stores the most recently used information read in om the hard drive. When you request data from the disk at a later time, the Vector hecks the cache first to see if the data is already there from the last time; if it is not, the hard drive must be accessed.

If the data is in the cache, it can be transferred straight to the user without accessing the disk at all. This can result in a significant gain in throughput, especially if the same data needs to be accessed frequently.

Another feature of the cache helps speed up accesses through AmigaDos. The Vector will never read a single block from the drive; it always reads groups of at least 16. AmigaDos, on the other hand, frequently makes single-block reads, even on groups of consecutive blocks. By reading in more data than required, the caching algorithm anticipates AmigaDos's requests in most cases, and has the data in memory when AmigaDos asks for it later. This cuts down on overhead.

The Read Cache defaults to ON and a size of 32K bytes, which has been determined to be optimum for most AmigaDos usage. However, you can experiment with various sizes and you may get better results. The cache eats up system memory, though, so you must balance the need for memory with the need for speed. This also applies to the Write Cache, which occupies a separate area of memory.

A similar scheme is used with the Write Cache. When AmiagDos writes a file, it may write many individual blocks to the drive, even though they are consecutive. With a write cache turned on, however, Vector accesses the disk much more efficiently. Instead of writing directly to the disk every time AmigaDos asks it to, Vector puts the data in a write cache. The cache is written to the disk all at once when needed. This results in a great increase in throughput, because writing large blocks of data to the drive reduces overhead, but unlike the read cache, it has a severe drawback.

The problem with write caching is that if, for some reason, you shut off the power, reset the Amiga, or have a "Guru", whatever is in the cache might not have been written to the disk. This could result in a loss of data and could possibly result in complete failure of the partition! The option of using the write cache is there if you want the speed.

VARNING: DO NOT USE WRITE CACHING unless you are absolutely sure you can afford to lose all data on the partition you are using! This is only a sensible precaution. In general, the time you might gain by using a write cache cannot make up for the security you will lose: it is like being on a high wire with no net. Read caching, on the other hand, is completely safe and cannot result in any loss of data from the hard drive.

A note on performance: caching helps to maintain a constant throughput close to the theoretical maximum of the drive. If you read or write large numbers of blocks at once (picture files, for instance), the improvement over non-caching will not be as great as if you were reading and writing groups of small files. Caching helps improve normal, everyday use of the hard drive (getting directories, using a database, etc.).

Both Read and Write Caching can be turned on and off at will from TCUTILS 2.0, so if you are not sure what to use, just ignore it; you can always change it later (it defaults to the safest configuration, read cache on, write cache off).

CHAPTER 7 - USING THE HARD DISK SYSTEM

AUTOBOOTING WITH THE VECTOR

Autobooting from the hard drive requires that you have a 1.3 or higher Kickstart ROM installed in your system. If you do not have Kickstart 1.3 or higher, you can purchase it from a Commodore dealer, NOT IVS. You must also make sure that the AUTOBOOT jumper on the Vector is set to work with the correct ROM version in your Amiga: remove the AUTOBOOT jumper for Kickstart1.2, install it for Kickstart1.3 and higher (See Figure 3-3). The Vector is shipped with the jumper in the ON position, so to disable autoboot remove the AUTOBOOT jumper.

When autobooting with an external hard drive or with an externally powered Vector 500, turn on the hard drive and then turn on the system (make sure there are no disks in the floppy drive). The hard drive will boot, and the Workbench will be displayed.

BOOTING FROM A FLOPPY

Some users may be concerned about the possibility of viruses. If you boot from a non-Vector Boot floppy, the hard drive will not be mounted, and will not be available for use. This allows you to check any new programs or something downloaded from a Bulletin Board System, before installing them on or using them with the hard disk.

GAME SWITCH

If you want to boot from any floppy and still be able to access the hard disk, hold down the Left mouse button on startup until the floppy drive light comes on. One note: if the floppy is not bootable, the hard drive will boot. If you want to boot into the Vector Boot Options Menu, hold down the right mouse button. When you are ready to boot the system per your options selections press the Continue screen button then hold down the Left mouse button to enable the hard drive when booting from a floppy.

DETAILS OF THE BOOT PROCESS

The main difference between autobooting and non-autobooting systems is the point at which the Vector starts its boot process. Non-autobooting systems (Kickstart 1.2 or before, and Vector systems that have the Autoboot jumper removed) begin the initialization process when the binddrivers command is executed; when the process is complete all partitions will be automounted and accessible by the system. Autobooting systems start the process at power up, automount all the partitions and boot from the first bootable one.

The first thing the Vector does is look for a bootable floppy. If there is one in DF0: the boot process is transferred to the system. If not, the hard drive autoboot process is continued.

At this time a task is spawned to continue the booting, and the boot process goes to sleep. If a bootable floppy is not found, the Vector looks at each address on the SCSI bus to see if there are any bootable hard drives ready. This happens very quickly. If there are no bootable hard drives ready, the Vector will continually check the SCSI bus until one appears. This goes on for about 50 seconds. If no drive appears after 50 seconds, the boot process is reawakened, control is transferred to the system and the Workbench requester is displayed.

If a bootable hard drive is found, the boot process is reawakened and the autoboot process completes. The task continues to check for new partitions, once every two seconds. It stops looking for new partitions 60 seconds after the boot process begins (60 seconds from the time the Amiga was booted or binddrivers was executed). If there are any partitions mounted from removable media drives, this fast and efficient task continues to check these drives for cartridge changes every two seconds.

EXTREMELY IMPORTANT !

Complications can arise when multiple hard drives with the same physical device name are connected to a SCSI hard disk controller. Furthermore, Workbench 2.0 does not support duplicate physical device names. To ensure unique physical device names, the Vector dynamically assigns physical device names to partitions as they are mounted. For example, your system has a single hard drive with two partitions whose physical device names are DH0: and DH1:. A second hard drive with the physical device name DH0: is added to the SCSI bus. After the system boots, the first hard drive will be named DH0: and DH1: as before. The second hard drive will now be assigned the name DH2: In general, the Vector will automatically rename the duplicate partition by numerically adding the value 1 to the device's name until an unused name is found. Therefore, the Vector looks at the existing device name , DH0: and adds 1 to get DH1:. That name is used so 1 is added again to get the name DH2:. This name is unused and so it it assigned to the second drive. This dynamic assignment of physical device names can cause problems for users who refer to hard drives and partitions by their physical device names. For this reason, it is imperative that you refer to hard drives and their partitions by their volume name. Volume names reference data, not the device on which the data is stored. This is the name that appears under the partition's icon in Workbench. Volume names can be used anytime in place of the physical device names. Using volume names is particularly important for users of removable media drives. If you set a drive up using the TCUTILS 2.0 STANDARD configuration, the volume will be named 'UNTITLED'. You may change the name using the Workbench Rename feature or the CLI RELABEL command. If the hard drive is configured using TCUTILS 2.0, the physical device name defaults to 'AUTO'. When the Vector mounts a partition with the physical device name 'AUTO', the name will be changed automatically at boot time to the first available physical device name, e.g., DH0:. If you change the default name of AUTO to something else, SYQ:, for example, the Vector will try to use this name when the partition is mounted. If another partition is already mounted using the name SYQ:, the Vector will rename the new partition SYQ1: as described above. Hard drives configured with TCUTILS 2.0 and used on SCSI controllers other than a Vector (or other IVS controller) will not appear with the name 'AUTO' when booted. Such a drive will appear with conventional partition names DH0:, DH1:, etc. This is a feature of TCUTILS 2.0.

REMOVABLE MEDIA SUPPORT

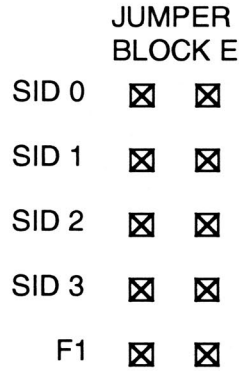
Users of removable media drives may use cartridges partitioned differently with th Vector. Vector has support for these drives built into its autoboot ROM so no diskchange commands have to be issued to detect cartridge changes. If different cartridges are configured exactly the same way, removal of one cartridge and replacement with another will result in the same physical device name being assigned to both cartridges. If cartridges are configured differently, a cartridge change results in the old cartridge name being reserved and the new cartridge is automatically assigned a new name in the manner described above.

CHAPTER EIGHT - SCSI-SHARE NETWORKS

SCSI NETWORK OVERVIEW

The Vector supports full arbitration and multiple hosts on the SCSI bus, allowing a limited form of networking. This means you can connect multiple computers (hosts) and multiple target devices (drives, CD ROMS, scanners) to the bus at once. This might be useful if you have several computers that need to share an expensive peripheral, or if you have the need to share common data.

Jumper Block E on the Vector (Fig. 3-1) sets its SCSI ID (see Fig. 8-1). The ANSI specification only allows eight devices on the bus at one time, so SID0-SID2 are used the standard way: they make up a 3 bit binary number that is the physical device number. SID0 is the least significant bit. If the F1 jumper is set, the Vector's arbitration protocol will no longer conform to the SCSI specification. This is to allow more hosts on the bus than the standard allows, and will be covered later. What follows is a description of a standard SCSI network scheme (jumper F1 not set).



SID 3	SID 2	SID 1	SID 0	SCSI ID
OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	ON	1
OFF	OFF	ON	OFF	2
OFF	OFF	ON	ON	3
OFF	ON	OFF	OFF	4
OFF	ON	OFF	ON	5
OFF	ON	ON	OFF	6
OFF	ON	ON	ON	7
ON	OFF	OFF	OFF	8
ON	OFF	OFF	ON	9
ON	OFF	ON	OFF	10
ON	OFF	ON	ON	11
ON	ON	OFF	OFF	12
ON	ON	OFF	ON	13
ON	ON	ON	OFF	14
ON	ON	ON	ON	15

FIGURE 8-1: Jumper Block E sets the Vector's SCSI ID

Every SCSI device attached to the bus must have an ID number, which is usually set with jumpers on the device, and each device has to have a different number. If multiple hosts are connected, you must make sure that just like other devices, they each have unique SCSI ID; otherwise the network will not work.

Connecting multiple computers to a single hard drive will allow them to share the use of the drive. However, only a single computer, determined in advance, can have write access to any given partition. This is to prevent file corruption associated with non-atomic file accesses in AmigaDos.

Because the SCSI bus is fully arbitrated, if two hosts want access to it at the same time a peaceable outcome is guaranteed. The host with the highest priority (highest SCSI ID) will get the bus. For this reason only host adapters that support full SCSI arbitration (like the Vector, Grand Slam or Trumpcard Professional) can be used.

When a host is finished with the bus, it will release it. The host with the next highest priority then takes over. It is possible for control of the bus to pass back and forth between two high priority hosts, locking out hosts of lower priority, but this is not likely to happen. The fact that it can happen is a result of the simple arbitration scheme in the SCSI standard, and it must be understood that a SCSI network will have limited uses and performance (the more hosts, the worse performance can get).

Up to six meters (about 18 feet) of 50 pin ribbon cable can be used in such a network. This is the maximum allowed by the standard and the longest that the Vector can support. If there are multiple hosts, they should be positioned at the physical ends of the cable, if possible to assure a properly terminated, noise free SCSI bus (the physical order of the ID's on the bus doesn't matter).

The two devices at the physical ends of the network cable must be terminated, and none of the devices between them may have termination resistors. Because the Vector has bus-powered termination as specified in the ANSI SCSI standard, the network will be properly terminated if any power is applied to the bus, as long as there are Vectors at both ends. Most SCSI drives also conform to the termination standard, but this is the best way to be sure everything is correct.

Care must be exercised in performing certain operations, as the SCSI network is a resource sharing network, and strange things can happen if this is not taken into consideration. First, NEVER do a SCSI bus reset without checking to see that everyone on the network is finished with their current operation. SCSI bus reset is nc issued when the Amigha is reset. Since commands are not atomic (i.e. they can be broken down into several non-consecutive bus accesses) a reset could destroy an operation, which could have catastrophic results for other hosts.

Second, take care in deciding to issue a low-level format command since this will tie up the bus until the target is done, which can take many minutes. Locking up the bus for so long locks up all the resources connected by the bus.

Resetting or turning off any target or host on the network will not cause any problems unless two of the devices were in communication with each other, in which case a bus reset WILL have to be issued. Otherwise rebooting one of the hosts, etc., won't cause any problems.

NON - STANDARD ARBITRATION

The current version of the Vector does not support using the F1 jumper to select non-standard arbitration. This may be supported in a future revision.

CHAPTER 9 - USING THE VECTOR

VECTOR BOOT OPTIONS

When you turn on a computer with a Vector installed the system defaults to using the '030 processor. Most of the time this mode of operation is desireable but there may come a time when you want to run the system in a different mode. Perhaps you want to play a game that only runs on a 68000. Maybe you want to turn off the PRO-PLEX'ed RAM without opening the computer and changing the jumper. Or with a 68EC030 you may wish to take advantage of the Vector's ability to run the Amiga Kickstart ROM code out of 32 bit RAM without the use of an MMU. These types of short term changes to the system are made using the Vector Boot Options Menu. This menu appears when you hold down the right mouse button immediately after the computer is turned on or rebooted.

The Vector Boot Options Menu screen is made up of 4 areas; a logo at the top of the screen, a status window, a memory options window, and a system options window.

The Vector status window reports the ROM revision of the Vector as well as the status of a cursory memory check that is performed on the Vector's local 32 bit RAM.

The memory Options window at the left side of the screen reports on the amount of RAM that is found during the memory check. The result is displayed in two areas, Vector memory and expansion memory. The amount reported in the Vector area reflects the amount of RAM found in the Vector's local 32 bit RAM SIMM sockets. The amount reported in the expansion memory area reflects the amount of RAM that has been detected on the A2630 compatible expansion bus. Below each RAM report is a screen button that can be used to disable or re-enable its RAM. No action is taken until the 'Continue' button at the bottom of the screen is pressed.

The System Options window at the right side of the screen is comprised of five screen buttons; Autoboot, FastRom, Burst, 68000, and 68030.

The Autoboot button defaults to the state of the Autoboot jumper on Jumper Block . The button can be pushed in or out by clicking the left mouse button once on the screen button. When the screen button is pressed in Autoboot is enabled and the system will autoboot from the hard drive attached to the Vector's SCSI interface unless there is a floppy disk in the system's floppy drive. When the screen button is out the system will not boot from the Vector's hard drive interface.

The FastRom button indicates whether or not the Vector remap logic will copy 16 bit Kickstart ROM into 32 bit RAM and execute the code from the RAM. This feature removes a 512k portion of 32 bit RAM and allocates it for Kickstart code execution. This feature allows a 68EC030 to execute Kickstart code out of 32 bit memory even though it doesn't have an MMU. This feature should also be used with a full 68030 because there is a small decrease in speed when using the 68030's MMU.

The Burst button defaults to the state of the Burst Jumper on Jumper Block A and indicates whether or not the Vector's on board RAM will operate in burst mode. Burst mode provides significant performance improvement and should be used at all times.

. he 68000 and 68030 buttons are mutually exclusive meaning that when one is pushed in the other is pushed out. These buttons are used to select which processor is to run the system after the Continue button is pressed.

SYSTEM RESTARTS

Once a processor is selected it stays selected until the system is powered down or until the processor is changed using the Vector Boot Options Menu again. This feature allows the selected processor to remain in control even through a warm boot (CTL-Amiga-Amiga). For example, if you choose the 68000 processor from the Vector Boot Options Menu and hit the Continue button, the system will run under the 68000 processor. If you then warm boot with a CTL-A-A keyboard sequence and let the system come up without holding down the mouse button, the system will continue to run from the 68000. The same would be true if you had selected the 68030 processor.

When you have made all your selections in the Vector Boot Options Menu, press the Continue button at the bottom of the screen. The system will then boot according to the parameters you have set and the system may be used normally.

USING THE CACHES

The 68030 processor has two on-board caches which, when enabled, greatly enhance the overall system performance. The default states of the data and instruction caches are set by the CACHDIS jumper on Jumper Block D. If the jumper is installed both caches default to the disabled state. If the jumper is not installed the caches default to the enabled state. In any event the caches may be enabled or disabled at any time during the computer's operation by issuing the SETCPU command. Refer to the Amiga Workbench documentation for instructions on how to use SETCPU.

APPENDIX A - HARD DISK PARTITIONING EXAMPLE

In this example, we're going to configure a Quantum LPS52 50 Megabyte Drive with 3 partitions of roughly 10 meg, 15 meg and 25 meg. The first and last partition will b Fast File System (FFS) and the second will be Old File System (OFS). IVS DOES NO RECOMMEND USING THE OLD FILE SYSTEM (OFS). This example is for illustrative purposes only.

1) Boot the system with a COPY of the Vector TCUTILS 2.0 diskette.

2) A Simple Setup Screen will appear giving you the option to set up this drive as a STANDARD drive using only one partition. Click on NON-STANDARD so that we may set up the drive in our own fashion.

3) Since this is the only drive available it is already selected, otherwise you would select the drive you want to use.

4) On the right side of the screen you will see the partition sizer labeled 'Partition(s)'. It contains one partition which is the size of the drive. Double Click inside of this partition.

5) You now have the 'Detailed Partition Information' window on the screen. There is a gadget at the bottom labeled 'REMOVE'. Press it now to remove the partition.

6) Now move the mouse into the partition sizer, anywhere it says FREE. Hold down the left mouse button. Keeping the button down move the mouse up and down. Note that you have created a new partition and you are changing the size of it. Move the mouse until the size is approximately 10 megabytes. Release the button.

7) Repeat the last step by clicking and holding the mouse in the Free area to create your second partition. Make this one approximately 15 megabytes.

8) All partitions default to using the Fast File System (FFS). For this partition w want to use the old file system (OFS). To do this you will need to Double Clic inside the second partition. This will bring up the 'Detailed Partition Information' window. In this window you will see a button that is titled 'Dos Type' and is set to 'FFS'. Use the mouse to click on this button. Every time you click on it, it will change to other types of DOS. You will note that there are 'FFS', 'OFS' and 'MAX'. 'MAX' is for a Macintosh Emulator and would designate that this partition is to be used with Mac OS. We would like to use the old file system so keep clicking until 'OFS' appears.

9) Now click on 'ACCEPT' to accept the changes.

10) Repeat step 6 to create the last partition but this time pull the mouse all the way to the bottom to use whatever space is left on the drive.

11) Now that you have the partitions set properly click on the 'Setup Drive' gadget. After asking three times if you are sure you want to do this it will completely set up the drive.

12) After some time you will be required to insert a WorkBench disk. When asked to insert it, do so and click 'Continue'.

13) After copying WorkBench to the hard drive TCUTILS 2.0 will ask for the Vector disk again.

14) When completed all you need to do is 'QUIT'.

15) If you have Kickstart 1.3 or later and the Vector Autoboot jumper is installed to enable autoboot, remove the floppy and reboot. Otherwise use this floppy as the system boot disk and reboot the system.

16) The Amiga will boot into Workbench with all three partitions showing. They are currently called 'Untitled'. Use the Workbench Rename feature to give the partitions your own volume name. It best to keep these name short with no spaces in them to make them easy to use in the CLI and other programs.

17) The hard drive installation is complete.

if adding a device to the SCSI buss, have to write the self booting HD partition again so the devices show up when after rebooting the system

APPENDIX B - QUICK START GUIDE

This quick start guide is intended for those users who need a quick reference to the jumper settings for configuring the Vector. Figure B-1 illustrates all jumper bloc locations.

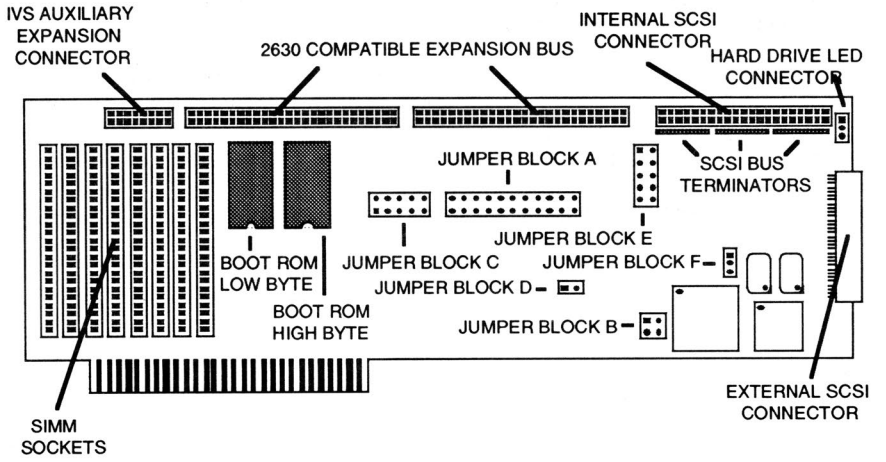


FIGURE B-1: Vector board features and option jumper locations

1) Jumper Block C is currently unused.

2) Jumper Block E sets the Vector's SCSI ID for use in SCSI-SHARE Networks. Refer to Chapter 8 for details.

3) Jumper Block D sets the BURST default. Leave the jumper off to default to memory burst mode enabled. Install the jumper to default to burst off. The state of the Burst flag can be changed at any time using the SETCPU command or by entering the Vector Boot Options Menu.

4) Jumper Block F selects the source of the FPU clock. Short the middle and top posts to select the clock source in the rightmost oscillator socket. Short the middle and bottom posts to clock the FPU from the CPU's oscillator.

5) Jumper Block B sets the amount of 32 bit RAM installed in the Vector's SIMM sockets. Refer to Fig. B-2 for details.

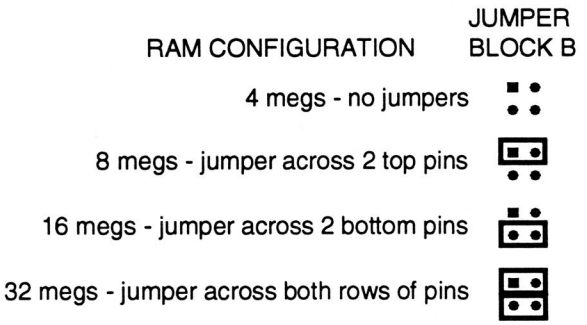
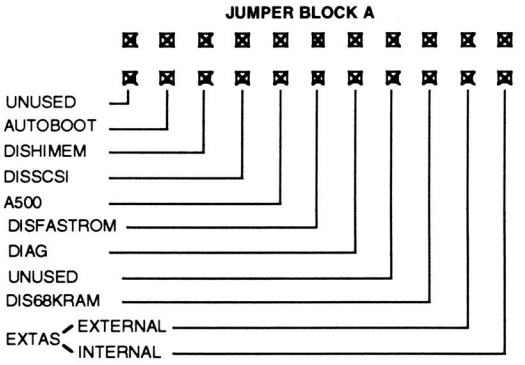


FIGURE B-2: Vector 32 bit RAM configuration jumpers

6) Jumper Block C has miscellaneous functions (fig. B-3).



AUTOBOOT: Install the Jumper to enable hard drive autobooting from Vector's SCSI port.

DISHIMEM: Install this jumper to disable the 2nd Pro-Plex'ed 4 Meg RAM board in 68000 mode. This jumper is useful for Bridgeboard users since Bridgeboard maps into the middle of autoconfig space and would not like a contiguous 8 meg ram board. Not applicable when running in the 68030 mode.

DISSCSI: Install this jumper to disable the Vector's SCSI interface configuration in 68000 mode. This jumper is ignored in 68030 mode.

A500:: Install this jumper if the Vector is running on an A500. Note that Vector needs 7 MHz on pin 9.

DISFASTROM: Install this jumper to default the FASTROM to a disabled stat FASTROM remaps 512k of the Vector's 32 bit RAM and copies Kickstart to the remapped area. The state of the DISFASTROM flag can be changed anytime using the Vector Boot Options Menu.

DIAG: Not currently used. This function allows the Vector to run in a standalone mode.

DIS68KRAM: Install this jumper to completely disable the Vector's RAM in 68000 mode. This jumper is ignored in 68030 mode.

EXTAS: EXTAS is the external Address Strobe that is fed to the A2630 expansion bus. When set to internal, the expansion bus sees an unqualified '030 AS. When set to external, the expansion bus sees '030 AS qualified with high order address bits. In general, set it to external when using DKB's 2632 board.

The Vector Boot Options Menu may be reached by holding down the right mouse button upon reset and until the Options screen appears. Options selected from this menu remain in effect through warm boot sequences and until the machine is either powered down or until a parameter is changed explicitly such as through the SETCPU command.

Add 4 or 16 Meg increments of RAM to the 4 leftmost SIMM sockets. These two increments require 4 SIMMs each.

Add 8 or 32 Meg increments of RAM to all 8 SIMM sockets. These two increments require 8 SIMMs each.

APPENDIX C - SCSI BUS CONFIGURATION

'f you are using multiple drives with the Vector, it is extremely important that you ,nderstand and implement a correct SCSI bus configuration. While such considerations are not critical for slower disk controllers, the Vector bursts data at rates approaching 4 megabytes per second. At these rates, improper bus impedance and/or termination will render the SCSI bus inoperative. The fundamental rule of proper SCSI bus configuration is that devices on the bus must be connected in a daisy chain fashion. A daisy chained bus ensures that there are no discontinuities in the bus impedance due to 'stubs'. Stubs are short lengths of cable that cause bus impedance mismatches. Bus impedance mismatches result in signal reflections that degrade noise margins and may cause erroneous interpretations of signal levels by devices on the bus. Figure C-1 illustrates a properly configured bus with 4 devices connected. Figure C-2 illustrates an improperly configured SCSI bus.

In addition to connecting devices properly, the bus must be terminated correctly. Every SCSI device has a bus terminator, usually three thin plastic packages with 8 metal pins to plug into a board or socket. Terminators ensure that the signal levels on the bus swing through the proper voltage range. Again, the faster the SCSI bus is run, the more critical proper termination becomes. Too many terminators can load the bus down and restrict the voltage swing of the SCSI bus signals. Too little termination can result in improper bus impedance, causing line reflections and their associated problems. The fundamental rule of proper termination is that only the physical ends of the bus may be terminated. All devices between the ends of the bus must have their terminators removed. Vector's terminators are labelled RP1, RP2, and RP3 and are located directly below the internal SCSI bus connector. Figure C-3 illustrates the correct termination of a properly daisy chained SCSI bus. Figure C-4 illustrates an incorrectly terminated SCSI bus that is properly daisy chained.

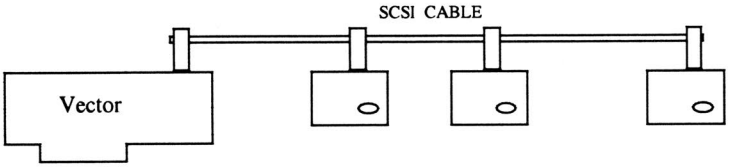


FIGURE C-1: CORRECT 'DAISY CHAIN' CONFIGURATION

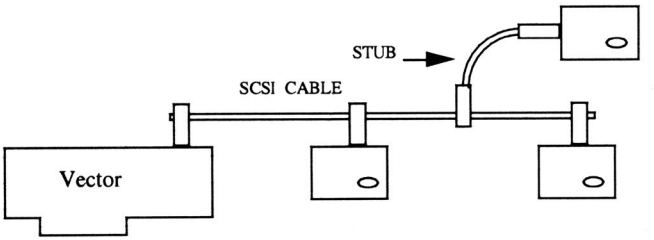


FIGURE C-2: INCORRECT CONFIGURATION WITH STUB

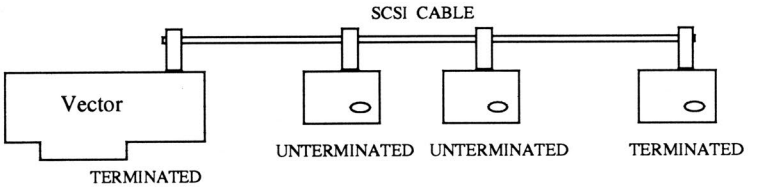


FIGURE C-3: CORRECT TERMINATION, PROPER DAISY CHAIN

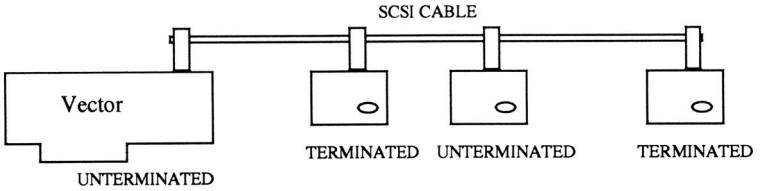


FIGURE C-4: INCORRECT TERMINATION, PROPER DAISY CHAIN