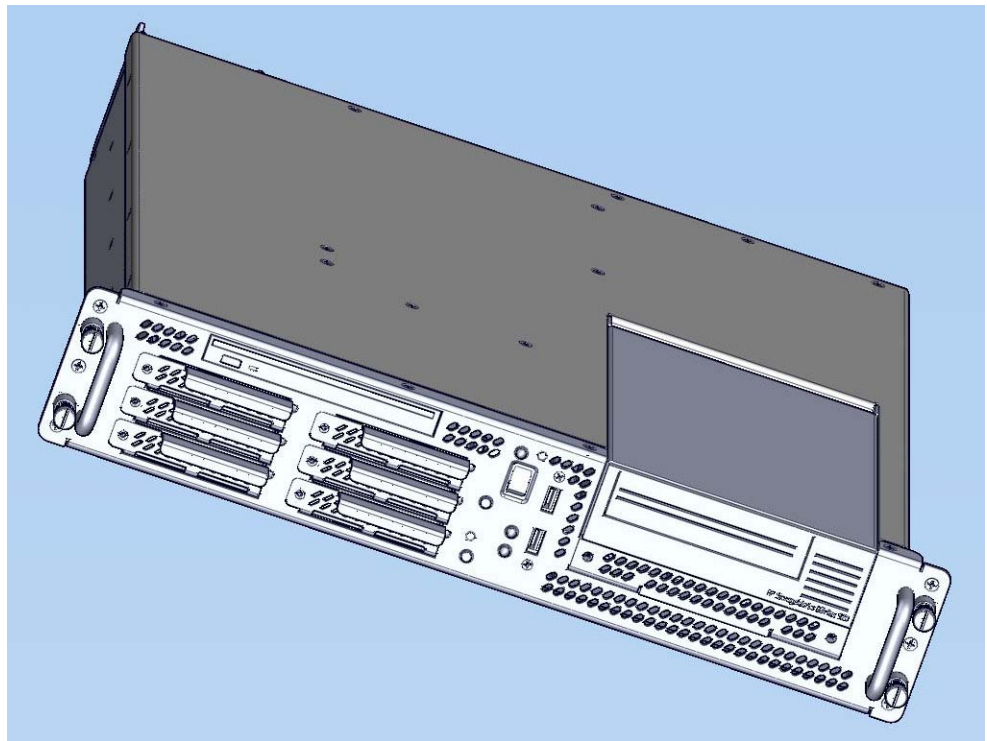




Technology Advancement Group®, Inc.

SV-2000-X2 Server (CENTRIX / JHSV)

Operations Manual



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Dulles, VA
20166

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2 About TAG

2.1 Summary of Qualifications

TAG has served as a leading provider of IT solutions to DoD customers over the past 20+ years and has a long-standing and respected history of providing Systems Engineering, Electronic Equipment and Program Management support to US Military warfighters. Headquartered in Dulles, Virginia, TAG's state-of-the-art 35,000 sq. ft. engineering and manufacturing facility provides all the infrastructure, equipment, and manpower necessary to engineer, design, test, manufacture, and certify products to the rugged requirements of the tactical combat theater. Our facilities in Dulles, VA, San Diego, CA, and St. Louis, MO, allow for rapid deployment of products and support across the globe.

TAG quickly, efficiently, and cost-effectively tailors rugged solutions for large DoD programs with specific MIL-STD requirements. TAG's comprehensive Quality Assurance (QA) policy – enforced through application of our UL-registered ISO 9001:2000 certified processes – enables TAG to rapidly deploy systems and solutions that reliably withstand the stresses of the tactical environment. Today, there are over 20,000 TAG systems deployed across various weapons platforms throughout the US Military. TAG effectively balances all corporate assets – our people, expertise, infrastructure, and experience – to consistently and successfully execute and deliver to the DoD.

TAG's success lies in focusing on the corporate Mission Statement and leveraging the tenets of our business model to ensure the customer's expectations are exceeded throughout lengthy program lifecycles.

TAG's Mission is to resolve our customers' IT challenges with World-Class:

- *Engineering;*
- *Manufacturing and Integration; and*
- *Lifecycle Management*

TAG has a proven track record in implementing these tenets to serve as a trusted advisor to our Government customers. TAG uses this foundation to ensure risk is mitigated, expectations are exceeded, and the customer can consistently rely on the company, our equipment, and our services.



2.2 Core Competences

2.2.1 Engineering

TAG's engineering methodology is built upon Multi-Disciplinary Optimization (MDO) and rigorous design reviews. Although PMs drive the schedule at TAG, Engineering leverages Computer-Aided Design (CAD) tools, Computational Fluid Dynamics (CFD) models, rapid prototyping processes, and diverse test equipment and facilities to ensure requirements are being met at every step of the design. TAG Engineering follows a proven design-review process, ensuring all entrance and exit criteria are met at each stage. Rigorous documentation is compiled to demonstrate requirement compliance, risks are mitigated, and decisions are prudent – throughout the design process.

TAG prides itself on its engineering laboratories and facilities. Over the past three years, TAG has invested in several pieces of equipment that allow TAG to test and certify products directly onsite to the harshest environmental requirements of military standards – including the MIL-STD-810F and DO 160D.

TAG's onsite test equipment currently includes a Highly Accelerated Lifecycle Testing (HALT) Chamber, an Electromagnetic Interference (EMI) test chamber, and a high-/low-temperature thermal test chamber. TAG's facility also provides:

- Floor plan designed to support a cellular manufacturing model with modular assembly lines
- A dedicated 24-hour system burn-in room
- A modern production status tracking and Enterprise Resource Planning (ERP) system with external web collaboration capabilities
- Dedicated Quality Assurance workstations for system compliance and validation inspection



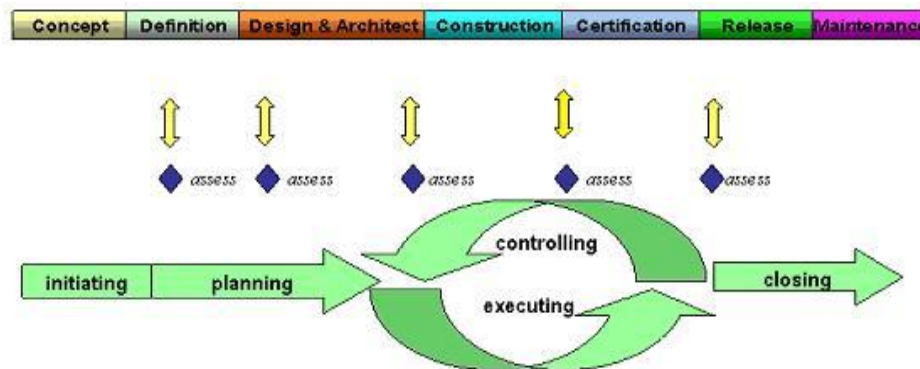
2.2.2 Manufacturing and Integration

TAG implements Cellular Manufacturing processes through our compartmentalized, state-of-the-art production facility to minimize waste byproducts and maximize production efficiency. TAG's manufacturing facility is physically partitioned to model the major philosophies of Lean Manufacturing. Consistent with the model, each of TAG's production cells are capable of operating in isolation; however personnel and tools are shared across all cells to streamline manufacturing operations, costs, and the production/integration schedule. TAG's floor

technicians are cross-trained in multiple disciplines so they can be redistributed to any cell that encounters production bottlenecks, which ensures optimal efficiency.

2.2.3 Lifecycle Management

TAG’s world-class Program Management discipline models the renowned methodologies of the Project Management Institute (PMI) to ensure successful completion of the task at hand. Our Program Managers (PMs) serve as the voice of the customer – driving requirements to which the rest of TAG’s organization answers. As an explicit tenet of TAG’s corporate mission statement, the PMs not only track cost, schedule, and technical compliance throughout a project’s period of performance, but also ensure the customer is supported well beyond it.



2.3 About TAG

2.3.1 Summary of Qualifications.

Providing engineering services and solutions for our national defense and homeland security is a responsibility that we don't take lightly.

TAG is a recognized industry leader in developing defense technologies and advanced electronics that support some of the most complex solutions for battlespace information networks and management systems in the world.

Our customers depend on our expertise to translate functional requirements and performance objectives into specific design criteria for individual elements and sub-systems that comprise larger mission critical systems. For more than twenty years, we have dedicated our experience in engineering to the design of innovative rugged solutions for military and government, and to providing a wide range of enterprise services and Information Assurance in support of the Defense Information Systems Agency's (DISA) Net-Centric initiatives.

2.3.2 Core Competencies

TAG designs, manufactures, and supports advanced communications electronics as well as integrates, operates, and supports the users of defense communication and information networks for several technology programs in the United States and abroad. TAG has two operating segments consisting of the Rugged Systems and Information and Engineering Services business units;

Rugged Systems provides mechanical, electrical, and thermal engineering for the design and development of MIL-STD certified electronic data enabled systems that are built

for in-theater survivability and communication capability over joint enterprise platforms such as DSN, GIG, STEP, GBS, and JTRS. This includes the custom ruggedization of commercial-off-the-shelf (COTS) and non-developmental items (NDI). TAG's mechanical engineering division designs and fabricates custom hardened enclosures, using high performance metal materials, to house and protect a variety of sensitive devices and controls. TAG's electrical engineering division designs programmable power solutions and advanced sensor technologies including digital receivers, advanced digital signal processors and thermal detection systems. TAG's thermal engineering applies survivability techniques to ensure systems and instruments are designed to withstand harsh environmental conditions encountered by land-based, airborne, and shipboard system in operations

Information and Engineering Services provides a wide range of customer support operations, enterprise network and communications engineering services combining the experience and expertise required to achieve network and communication interoperability for component hardware and software elements. This includes design, simulation, analysis, and testing of the components or systems for the support of command and control operations. Our team of national security cleared network engineering professionals provides planning support for information systems, architectures, and networks while developing strategies that lay the groundwork for sound technical foundations for programmatic plans. Our expertise in analyzing, designing, implementing, and managing network, telecommunication and security solutions addresses the full lifecycle approach to providing mission oriented enterprise class services.

Document Revision History

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10/01/09	1.2	Sean Legg	Draft Update
10/26/2009	1.3	Alan Huckerby	Update
01/12/2010	1.4	Alan Huckerby	Update

3 About This Manual

3.1 Scope and Audience

This manual provides information on the SV-2000-X2 Server. The rugged SV-2000-X2 Server allows for up to 16 cores in a 2U chassis as well as up to 64GB of RAM. The Server meets military standards such as shock, vibration, and humidity. TAG built the SV-2000-X2 to relieve potential problems with a single failing power supply and to create a product that end users can rely on. Each Server features two 2.33GHz dual-core INTEL[®] XEON 5149 processors to maximize the processing power. The SV-2000-X2 is ideal for transit case and deployable situations where such high density computing minimizes size, weight, and power.

3.1.1 Organization:

This manual is divided into the following chapters and appendix:

- **Chapter 1** provides Cautions and Warnings.
- **Chapter 2** provides detailed information on the external and internal Server components.
- **Chapter 3** provides procedures for replacing Hot-Swappable and LRU components, as well as for replacing or adding system memory.
- **Chapter 4** provides a high-level overview that defines RAID, the advantages and disadvantages of various RAID levels, and guidelines to observe when implementing RAID.

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Chapter 1

Cautions and Warnings.

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4 Safety Instructions

4.1 Types of warnings used in this manual

Read this manual thoroughly, paying special attention to the cautions and warnings.

4.1.1 Safety Symbols and Labels



DANGER



WARNING



CAUTION

These warnings and cautions indicate situations or practice that might result in property damage.

4.1.2 Conventions

4.1.2.1 Important Messages

Important messages appear where mishandling of components is possible or when work orders can be misunderstood. These messages also provide vital information associated with other aspects of system operation. The word “important” is written as **“IMPORTANT,”** both capitalized and bold and is followed by text in italics. The italicized text is the important message.

4.1.2.2 Warnings

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as **“WARNING,”** both

capitalized and bold and is followed by text in italics. The italicized text is the warning message.

4.1.2.3 Cautions

Cautionary messages should also be heeded to help you reduce the chance of losing data or damaging the system. Cautions are easy to recognize. The word “caution” is written as “**CAUTION**,” both capitalized and bold and is followed by text in italics. The italicized text is the cautionary message.

4.1.2.4 Notes

Notes inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help you avoid making mistakes. Notes are easy to recognize. The word “note” is written as “**NOTE**,”

Chapter 2

SV-2000-X2 2U Server.

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5 Server Overview

5.1 Product Information

This chapter provides an introductory overview of the TAG family of rugged Servers. TAG Servers are highly customizable; the specific components vary depending on the mission requirements. Your system may contain components not described in this chapter. For detailed information on these components, refer to the manufactures website or contact TAG Technical Support at tech.support@tag.com.

TAG's rugged Servers combine two 2.33GHz dual-core Intel® Xeon processors with state-of-the-art mechanical, thermal and electrical engineering to create customized systems that perform above and beyond end user or program specifications. Our rugged Servers are designed to meet and exceed many MIL-STD requirements to ensure survivability in the field.

Figure 5-1 shows a SV-2000-X2 with off the shelf standard configuration.

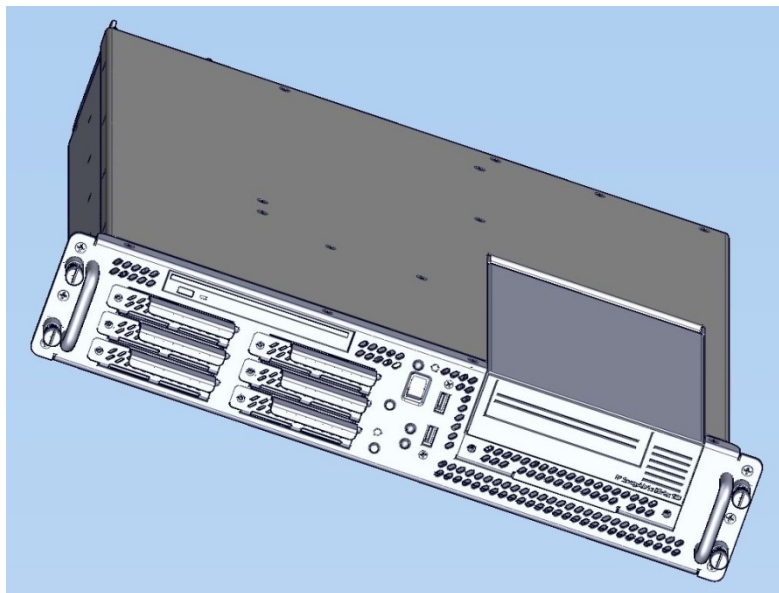


Figure 5-1 SV-2000-X2 (Front View)

5.2 SV-2000-X2 Server

All specifications detailed below are for the standardized version of the SV-2000-X2

5.2.1 Specifications

Chassis & power supply:

- 2U Heavy-duty, 090inch Aluminum/Magnesium alloy, rack-mount chassis
- 3.5"H x 19"W x 20"D (approx)
- Redundant, Hot-Swap, auto-sensing power supplies
- Cooling system developed specifically for harsh environments
- Front accessible on/off switches
- (2) Front Accessible USB 2.0 Ports

Fan Controller

Processor & Cache:

- Intel 5000P Chipset, 1333MHz FSB

Motherboard and On-board Features:

- On-board graphics controller with 16MB of RAM.
- (2)USB 2.0 Ports at rear
- (2) 10/100/1000 Ethernet ports
- (2) PCI-Express slots
- (1) PCI-X Expansion slot
- One USB 2.0 Header brought out to front of chassis
- PS/2 Keyboard & Mouse port
- Expandable to 64GB FB Dimm

System Components:

- 32GB DDR RAM
- (6) 146 GB Hot-Swap, removable SAS Hard Drives with rugged metal carriers & receivers
- Adaptec 5809 SATA/SAS Raid Controller
- Adaptec 29320ALP-R SCSI Controller
- Removable SCSI HP 920 LTO-3 Ultrium tape drive

SV-2000-X2 Server (CENTRIX / JHSV)

Part Number: 1008080

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- Low-profile DVD±RW(DL),-RAM,CD-RW drive

5.2.2 Additional specifications

- Input voltage range: 115 Vrms nominal, 98 to 138 Vrms (-15%, +20%)
- Input frequency range: 60 Hz nominal, 56.4 to 63.6 Hz (- 6%, + 6%)
- Maximum operating power: 494.4 Watts
- Maximum operating current: 4.12 Amps
- Typical operating power: 410.4 Watts
- Typical operating current: 3.42 Amps
- Idle power: 367 Watts
- Idle current: 3.059 Amps
- AC Input Power connector: IEC 320
- PFC: .97 typical
- Operating temp range: 0-50°C
- Non-operating temp range: -40-70°C
- Operating humidity: up to 90% non-condensing

5.2.3 SV-2000-X2 Server Highlights

- The SV-2000-X2 is unlike any other Server that is currently on the market. The SV-2000-X2 is ideal for use in deployable situations where the product's compact size, high density computing, minimized size, weight, and power make for a highly portable, rugged and reliable system.

5.2.4 SV-2000-X2 Server

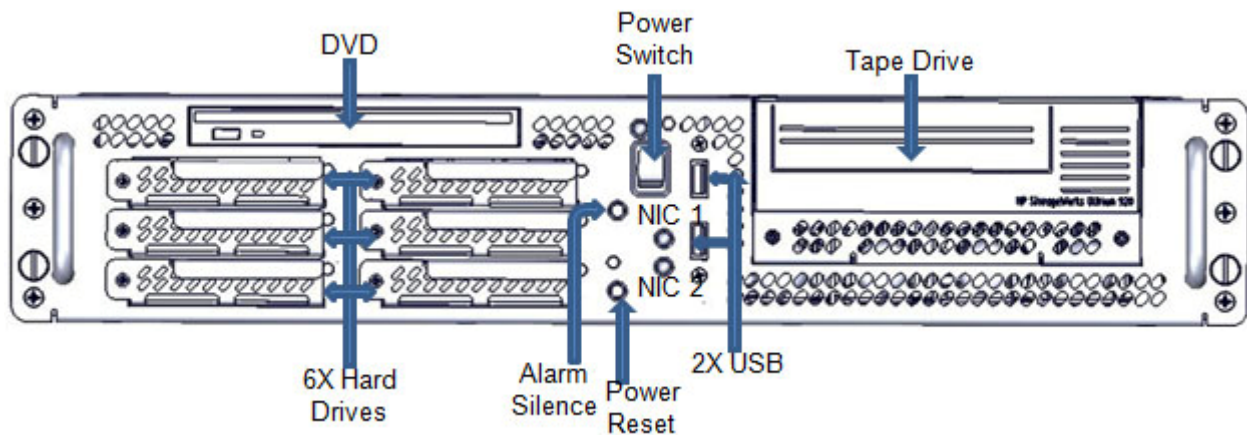


Figure 5-2 SV-2000-X2 Server Components and Connectors (Front View)

5.3 Server Components

This section provides an overview of the most common components installed in TAG rugged Servers. Information is also provided on how to identify specific components within your Server. For detailed information on the specific components installed in your Server, refer the manufactures website.

5.3.1 Motherboard Model and Type

The version of an Intel Server motherboard can be determined by decoding the last three digits of the board part number.

For example: For the product C44686-703, the number following the "-" is as follows:

7 = Fabrication (FAB) Number
03 = Revision 3.

The board part number can be found on the motherboard. The board part number can also be determined by using Intel Server Management software.

5.4 System Memory

The type and amount of system memory, or RAM (random access memory), on your Server depends on the motherboard installed and how it was configured.

5.4.1 Identifying System Memory

Refer to your Motherboard Model and Type. Once you have identified the motherboard, TAG technical support can assist you in determining the type and amount of system memory in your system. See “Contacting information on TAG on back page of this manual for information on how to contact Technical Support.

For information on replacing or upgrading your system memory, refer to “Adding and Replacing System Memory on page 62.”

5.4.1.1 Power Management

Modern motherboards provide Advanced Configuration and Power Management Interface (ACPI) settings such as wake-up, power button function and standby/suspend timers. These functions are configured in the CMOS Setup.

5.5 Identifying your I/O Connectors

Figure 5-3 shows a typical configuration of I/O connectors. Your configuration may vary depending on the motherboard installed in your Server; however, the color coding should remain consistent. I/O connectors are color-coded in compliance with PC 99 recommendations.

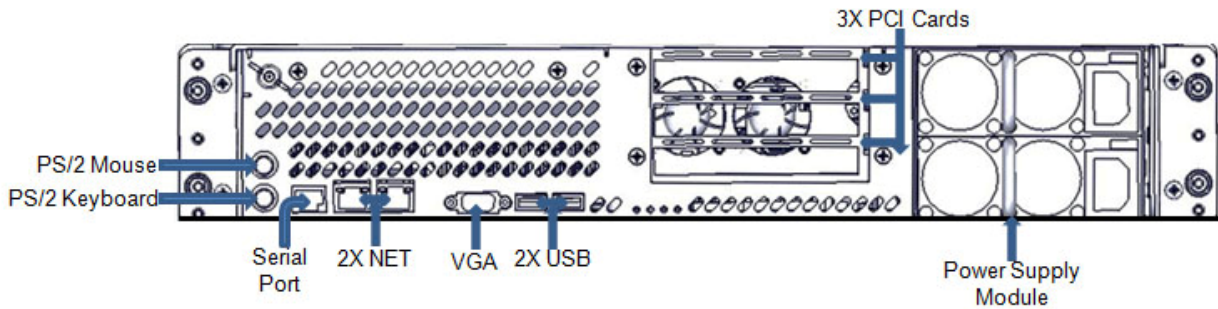


Figure 5-3 I/O Connectors

5.6 Standard Server Components

The following sections provide information on the standard system components installed on TAG Servers

5.6.1 Floppy Drives

The floppy disk drive is a removable storage component and part of the storage subsystem. The drive style installed in your system is the Low Profile Internal Floppy Drive.

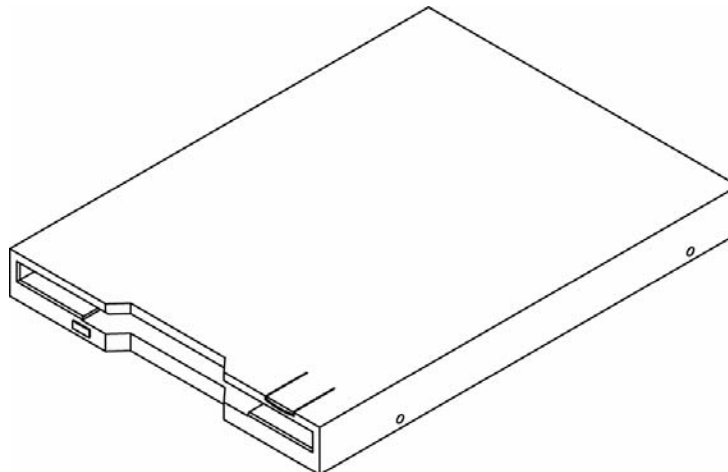


Figure 5-4 Low Profile Internal Floppy Drive

5.6.2 SCSI HP 920 LTO-3 Ultrium tape drive

The Ultrium 3 tape drive technology features a breakthrough in recording technology by writing sixteen tracks simultaneously on a

linear format of 704 tracks. The data is written in a serpentine pattern; the tape reverses direction after each set of eight tracks is written. This provides higher density recording, enabling customers to lower costs and increase efficiency by storing more data on a single tape in an industry standard format.

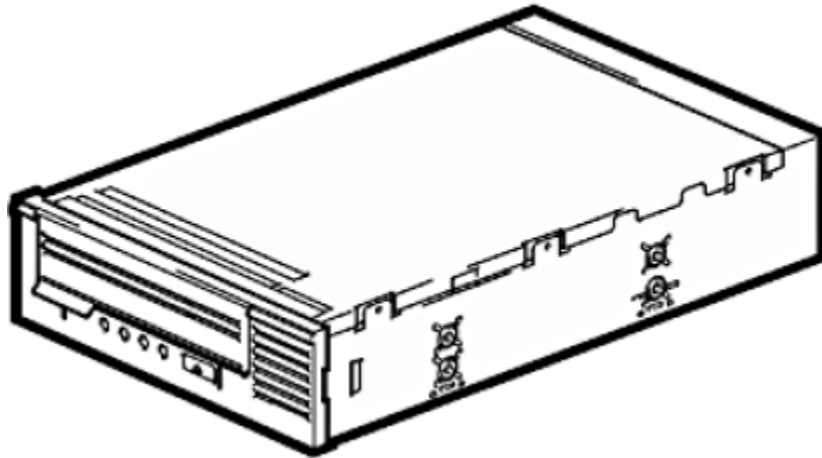


Figure 5-5.5 Internal Tape Drive

5.6.3 D/DVD Drive

The type of optical drive installed in your Server varies per configuration. Figure 5-6.



Figure 5-6 Slot-loading low-profile DVD±R (DL)/-RAM/CD-RW Drive

5.6.4 Dual-redundant, auto-sensing power supply

Power for all the equipment in the system is a dual redundant, Hot-Swap AC input Power supply with an Input AC Voltage Range of 115 Vrms nominal, 98 to 138 Vrms (-15%, +20%).

Input Power Line Frequency

The system shall operate over the input power frequency range of 60 Hz nominal, 56.4 to 63.6 Hz (- 6%, + 6%).

Power Connector

The AC input power connector is IEC 320

WARNING

Power supplies contain dangerous voltages. Before attempting to work on any power supply always unplug the device and drain the power source by turning the Server on after the power supply has been disconnected. Failure to follow these instructions could result in serious injury due to electrical shock.

To satisfy reliability requirements, TAG Servers are designed with Hot-Swappable power supplies. If in the event of a power supply module failure or if the power source fails and only one module is receiving power, an audible alarm sounds. For procedures on how to Hot-Swap a power supply module, refer to the Procedures Section of this manual Replacing a Hot-Swap Hard Drive55.

Although most TAG power supplies for the 1U and 4U series Servers are similar in physical sizes, and physical characteristics, some Servers use smaller foot print power supplies. Figure 5-7 shows a typical Hot-Swap power supply.

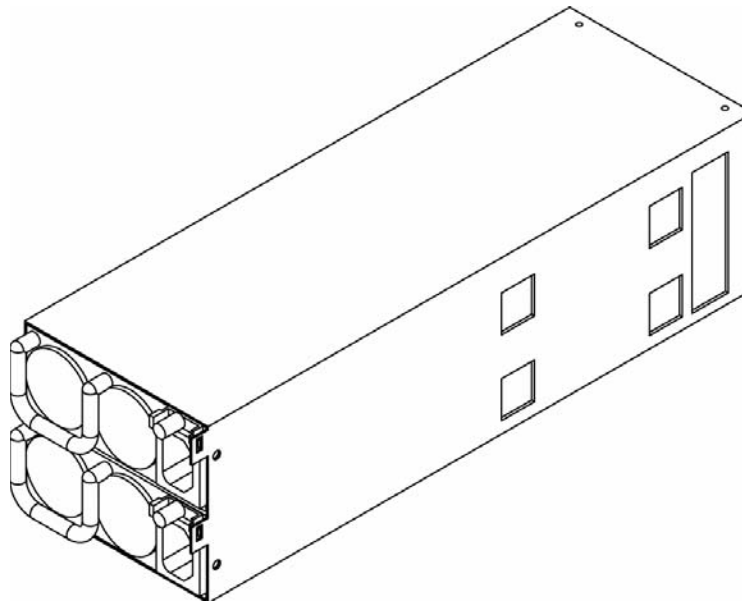


Figure 5-7 Hot-Swap Power Supply

NOTE: *If your Server has two power input receptacles, then the Server is equipped with a redundant Hot-Swap power supply.*

5.7 PCI I/O Expansion Cards

The following sections provide an overview of the PCI I/O components that may be included with your Server. For detailed information on these components, refer to the manufacturers' websites, or contact TAG Technical Support at tech.support@tag.com. For more information, See back page of this document.

5.7.1 Adaptec 5805 SAS/SATA RAID Controller

8 internal port, low profile, PCI-Express (PCIe) Unified Serial RAID controller with Intelligent Power Management delivers exceptional performance, advanced data protection, and maximum scalability for enterprise-class, high-density server applications



Figure 5-8 Adaptec 5805 RAID Card

5.7.2 Adaptec 29320 ALP-R SCSI Controller

The Adaptec SCSI Card 29320ALP-R is a low profile, 64-bit 133 MHz PCI-X, single-channel Ultra320 SCSI card with integrated HostRAID® RAID 0, 1 and 10 optimized for rack-mount servers. The Adaptec 29320ALP-R offers additional drivers for HostRAID and a new management tool. It provides worry-free data protection at the fastest SCSI speeds available up to 320 MByte/sec. The card has a 68-pin internal connector and a 68-pin VHDCI external connector for Ultra320 SCSI (LVD) hard disks drives.

NOTE: Serves as connection to Tape Drive



Figure 5-9 Adaptec 29320 ALP-R SCSI Controller

Chapter 3

Procedures

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6 Procedures

The procedures within this Chapter contain relevant information to ensure your SV-2000-X2 Server maintains its maximum performance potential.

6.1 Server Startup

1. Check to make sure that all the cables are seated and connected correctly to the back of the unit such as keyboard, mouse, monitor VGA cable and both power cables.
2. Then Press the **power switch** ON to start the computer (power switch is located in the front of the unit)
3. Once the unit starts, System will go thru Power On self Test (POST) (no action is required at this time)
4. At windows dialog box press **Ctrl, Alt, Delete** at once to login
5. Type in the **correct user name** and **password** and then press **enter** to login
6. Once the operator is logged on to the unit they could use the computer as they wish.

NOTE: Assuming the Server is not connected to any network.

6.2 Server Shutdown

1. The operator needs save any data that is needed to be saved and then close application
2. Once all data is save and applications are closed, click on **Start menu**, select shutdown and then click **OK** to shutdown the computer.

6.3 Identifying Server Components Using Device Manager

The Device Manager is one of Windows' most useful diagnostic tools. It lets you see all of the devices attached to your computer, and which resources they are each using. To access the Device Manager do the following:

1. Click **Start**, point to **Settings**, and then click **Control Panel**. (Figure 6-1).

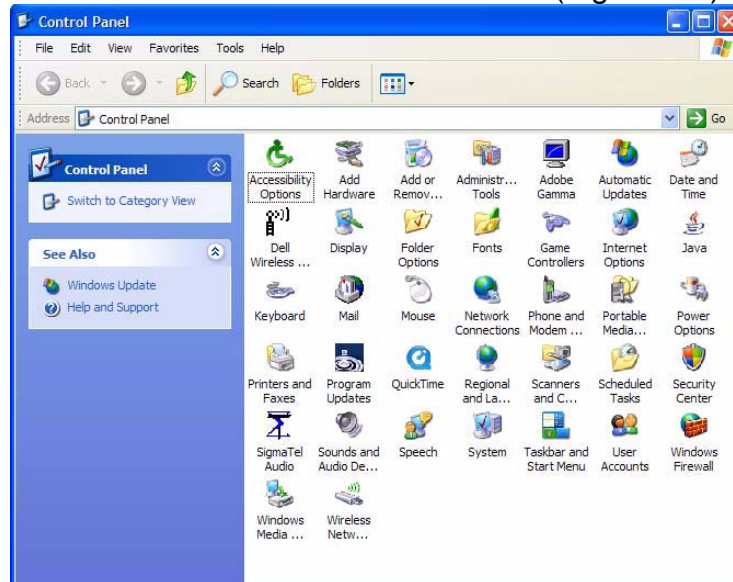


Figure 6-1 Control Panel

2. Double-click the **System** icon. (Figure 6-2).

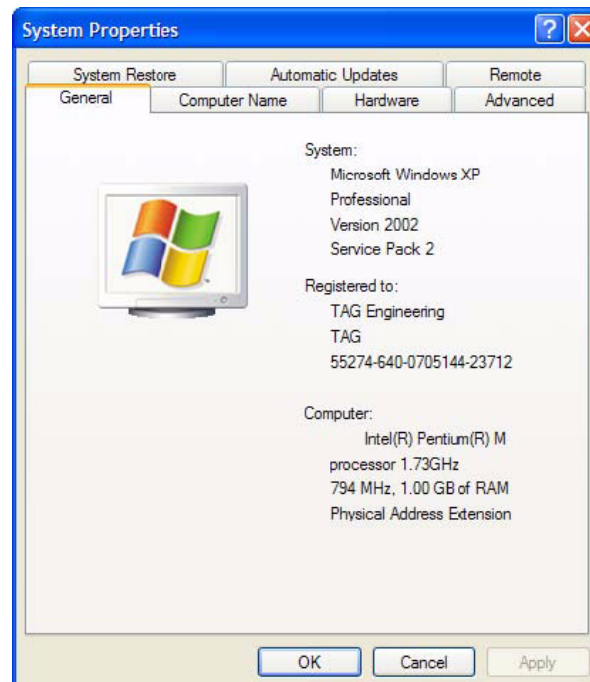


Figure 6-2 System Properties

3. Click the **Hardware** tab, and then click the **Device Manager** button. (Figure 6-3).

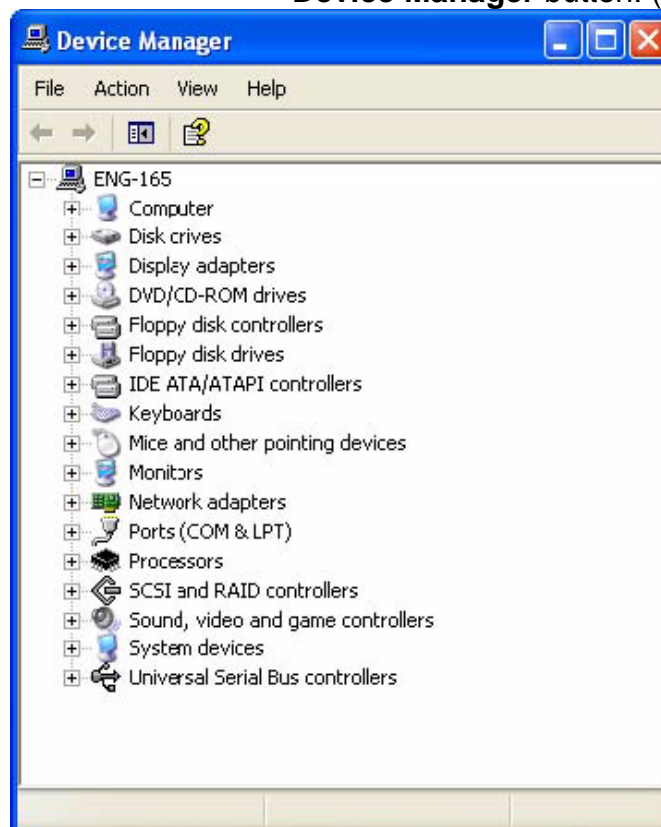


Figure 6-3 Device Manger

After opening Device Manager, you will see a list of all the devices Windows detected on your system. The Device Manager display is recreated each time the computer is started, or whenever a dynamic change to the computer configuration occurs, such as addition of a new device while the system is running.

NOTE: *To include hidden devices, on the View menu, click Show hidden devices. A check mark next to Show hidden devices indicates hidden devices are showing. Click it again to clear the check mark. Hidden devices include non-PnP devices and devices that have been physically removed from the computer but have not had their drivers uninstalled.*

The devices shown represent the computer's current hardware configuration information. Any non-functioning devices are displayed with an exclamation point, indicating that a problem exists with the device; disabled devices are displayed with a small red "x" over the icon.

You can use Device Manager to enable or disable devices, troubleshoot devices, update drivers, use driver rollback, and change resources such as interrupt requests (IRQs) assigned to devices.

6.4 Working with Device Properties

To display a device's properties do the following:

1. Access the Device Manager as described in steps 1 through 3 (Figure 6-4).

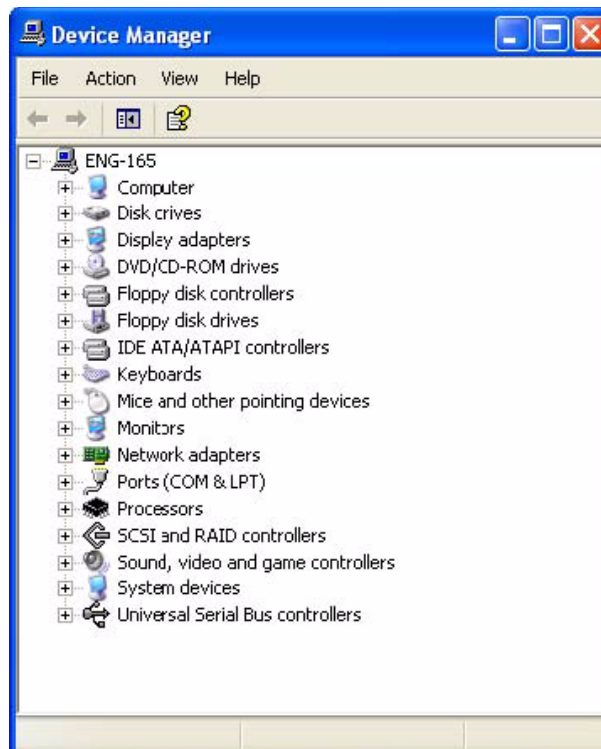


Figure 6-4 Device Manager

2. In the Device manager dialog box (Figure 6-5), double-click the device, or select the device and then click the **Properties** toolbar button



Figure 6-5 Properties Dialog Box

In the device's Properties dialog box, there might be several tabs. You can view the status and configuration information, as well as the device manufacturer, device type, and location in the upper portion of the General tab.

The Device status box in the middle of the General tab displays the status of the device, including any errors. If the device has any problems, the Device Status box briefly describes the problem, and usually describes the appropriate course of action to correct the problem.

3. Click **Troubleshoot...** to use the built-in mechanisms for detecting the nature of the problem.

Other tabs include the Driver tab, which displays the details of the driver being used. This tab also lets you update or uninstall the

driver. The Resources tab displays the hardware resources being used. This tab allows you to see and resolve any conflicts caused by non-PnP devices. Along with these tabs, some devices have additional advanced settings or tabs for device-specific settings.

6.5 Installing and Removing Hardware in Windows

Plug and Play (PnP) is a standard that makes installing new hardware devices easier. Prior to PnP, installing new hardware meant finding and installing peripheral drivers and making sure the new device didn't conflict with another device. Theoretically, if you have a computer designed for PnP and are using a PnP operating system (like Windows), installing a printer, sound card, modem, or other peripheral is a simple matter of plugging in the device.

It's not always quite this simple. Assuming you are using a PnP computer, when you attach a PnP device, you may see a message indicating that Windows has recognized the new device—either immediately or the next time you start up your system. If Windows needs a driver that is not currently installed, you may at that point be asked to insert a disk or the Windows CD-ROM. If you don't see a message but the device appears to be working, you can assume that everything is fine.

6.5.1 Using the Add New Hardware Wizard

If the device is not working properly, try using the Add New Hardware Wizard. To run this wizard, do the following:

1. From the **Start** menu, point to **Settings** and then click **Control Panel**. (Figure 6-6).

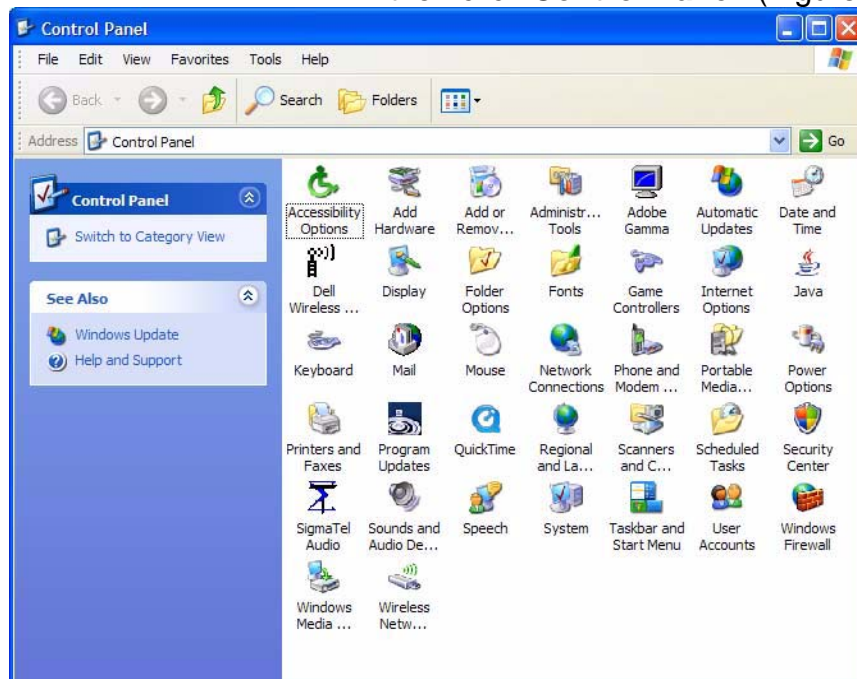


Figure 6-6 Control Panel

2. Double-click the **Add Hardware** icon. (Figure 6-7).



Figure 6-7 Add hardware Wizard

6.6 Installing Legacy Peripherals

When you install what Microsoft calls a legacy peripheral, you will need to use the Add Hardware Wizard, as described “**Error! Reference source not found.**” on page XXXX, to let Windows know about the new device.

NOTE: *The term legacy refers to anything that's no longer on the cutting edge.*

6.6.1 Removing Legacy Peripherals

When removing a legacy peripheral from your system, you need to let Windows know that the device is gone. This enables Windows to reuse the resources (places in memory and internal communications channels) that it previously allocated to that device.

To tell Windows that you have removed a legacy device, perform the following steps:

1. From the **Start** menu, point to **Settings** and then click **Control Panel**. (Figure 6-8).

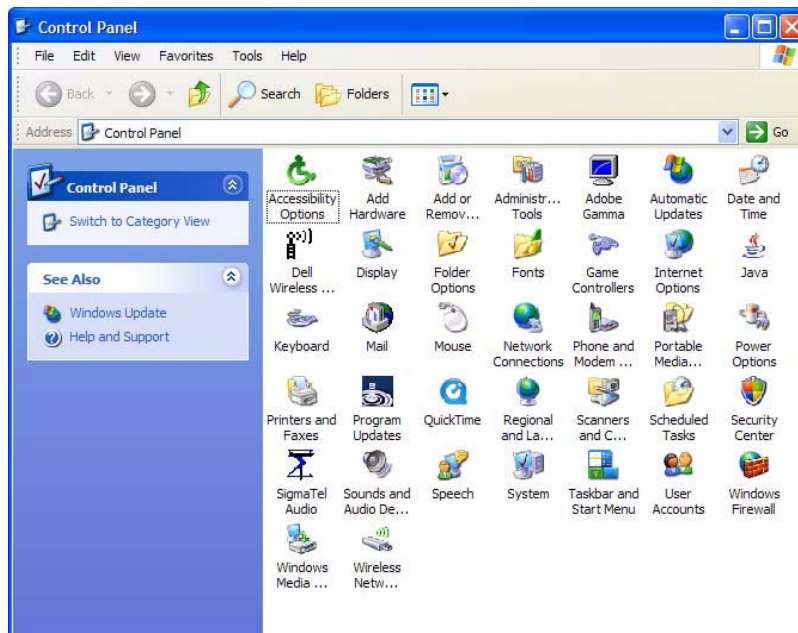


Figure 6-8 Control Panel

2. Double-click the **System** icon. (Figure 6-9).

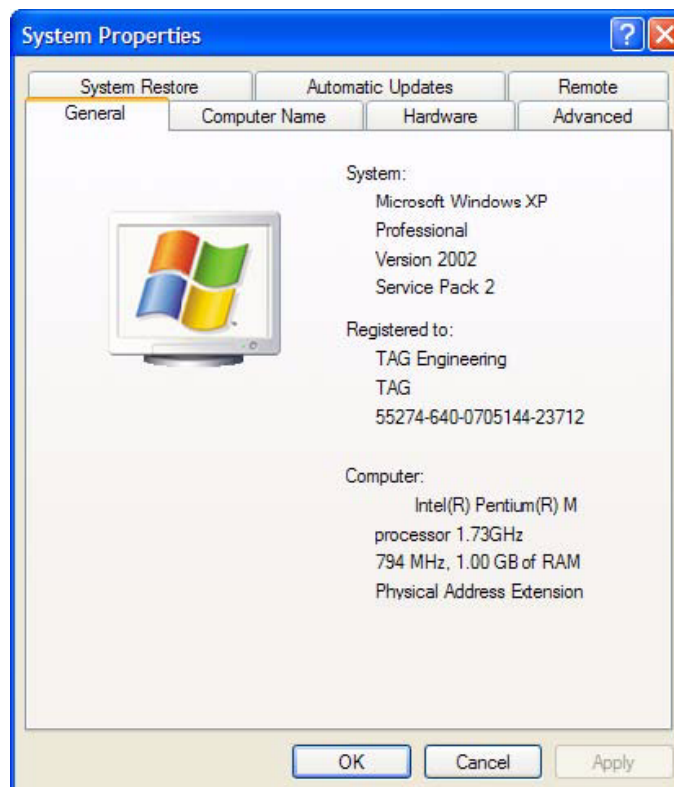


Figure 6-9 System Properties

3. Click the **Hardware** tab.

4. Click the **Device Manager** button. (Figure 6-10).

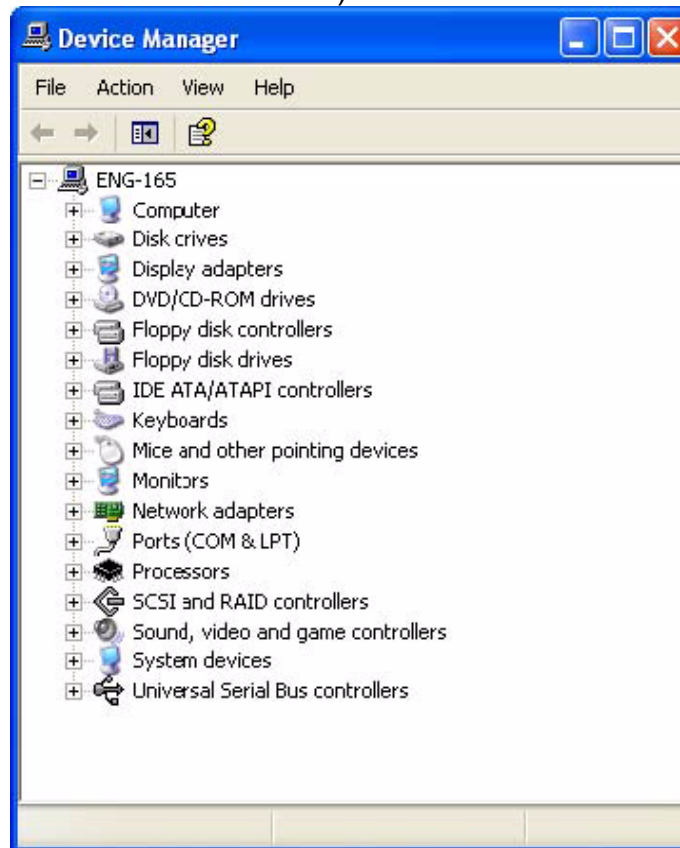


Figure 6-10 Device Manger

5. Click the **name** of the item you have removed from your system. If you don't see the item, look for a category heading that describes the type of device you removed, and then click the plus sign to its left to display a list of items in that category.
6. From the **Action** menu, click **Uninstall**.
7. Click **OK**.

6.7 TAG Approved BIOS

The BIOS (basic input/output system) is the program stored on the CMOS that the Server's microprocessor uses to get the system started after you turn it on. The BIOS also manages data flow between the computer's operating system and attached devices such as the hard disk, video adapter, keyboard, and mouse.

CAUTION: *The BIOS installed on your Server was loaded and tested with all the devices initially installed in your system. If you desire to have the BIOS updated, consult TAG technical support in advance as updates to your approved BIOS may cause your system to become unstable or inoperable.*

6.7.1 Common BIOS Settings

Printer Parallel Port-Uni., Bi-directional, Disable, Enable, ECP, EPP

6.7.1.1 Printer Parallel Port Uni. Bi-Directional, Disable, Enable, ECP, EPP.

Settings in the CMOS enable you to configure a parallel port to use Enhanced Parallel Port (EPP) or Enhanced Parallel Port (ECP). ECP, EPP and ECP are bi-directional standards, operate in 8-bit, and allow data transfer speed of approximately 2 MB/s. Some of the main differences are that ECP supports Direct Memory Access (DMA) and data compression, which enables higher transfer rates.

It is also possible to completely disable the parallel port in the BIOS. Most BIOS' allow you to set the DMA channel, when the port mode is set to ECP.

6.7.1.2 Com / Serial Port

Most personal computers have two serial ports. In the BIOS you can assign

COM1/COM2/COM3/COM4 to serial port 1 or 2.

Most BIOS' also allow you to set the I/O and IRQ but this is mostly done automatically.

6.7.1.3 Floppy Drives

The floppy drive(s) can be enabled or disabled in the BIOS. The BIOS also allows you to choose the capacity of the media.

- 360 KB 5.25-inch
- 1.2 MB 5.25-inch
- 720 KB 3.5-inch
- 1.44 MB 3.5-inch
- 2.88 MB 3.5-inch

Some BIOS' allow you to swap A: and B: and disable seeking a floppy disk for a boot sector during startup.

6.7.1.4 Hard Drives

Most modern BIOS' allow automatic detection of disk parameters. The settings can be individually configured for the primary master and slave device and the secondary master and slave device. The following are some of the primary settings that apply to hard drives as well as CD/DVD-ROM drives, tape backup drive, etc.

Common disk types are:

- User-defined Cylinders, Heads, Sectors (CHS) values
- Auto-automatically detects hard disks parameters at every startup
- 1-46-predefined combinations of CHS values
- CDROM-used for AT Attachment Packet Interface (ATAPI) CD-ROM drives
- ARMD-used for ATAPI ZIP and LS 120 drives
- DVDROM

Size - Determines the capacity of the drive **CHS** values:

- Number of Cylinders
- Number of Heads
- Number of Sectors
- **LBA** (Large Block Addressing)-technology to overcome the 528 MB limit

6.7.1.5 Boot Sector Virus

A common setting related to hard drives. When enabled, the BIOS issues a warning message/beep if an attempt is made to write to the boot sector or partition table of a hard disk.

6.7.1.6 Memory

Parity adds an extra bit (odd or even) to the 8-bit data-string to ensure data integrity in memory modules. Its successor, ECC, provides improved data integrity by adding information about individual bits.

6.7.1.7 Boot Sequence

This setting is used to control the order that the BIOS uses during the boot process to look for a boot device from which to load the operating system. For example:

- CD
- Floppy
- Hard Disk

6.7.1.8 Date and Time

The Date and Time is set in the BIOS, stored in CMOS, and maintained by CMOS battery.

6.7.1.9 Passwords

In most cases a user (startup) password and a supervisor (setup) password can be set in the CMOS. When a Setup password is required,

the computer will prompt for it when you try to access the BIOS setup. When a Startup password is configured, the computer will prompt for it at every startup.

The CMOS password can be reset by shortening the "CMOS restore to factory defaults jumper" or by temporarily removing the CMOS battery.

6.7.1.10 Plug and Play BIOS

Today's BIOS' are Plug_and_play (PnP)-aware. This means they are able to automatically assign resources such as IRQ and DMA to PnP devices.

Information about PnP devices is stored in a separate area of non-volatile CMOS memory, called the Extended System Configuration Database (ESCD). Both the PnP BIOS and the operating system can access this area and communicate with each other about resource settings assigned to PnP devices as well as non-PnP devices. For example, when a fixed interrupt request (IRQ) is manually assigned to a particular device using Device Manager, Windows will write this information to the ESCD on shutdown thereby preventing the BIOS from assigning the same IRQ to a PnP device at startup.

You can also reserve IRQs for non-PnP devices in the CMOS setup, this will prevent the BIOS from assigning these reserved resources to PnP devices, a common example is a legacy sound card that needs IRQ 5.

6.8 Bios Configuration for SV-2000-X2

1. Press F2 to access the **Main BIOS Page**. On the **Main Page**, Select **Quiet Boot** then select **Enable** and press **Enter**. (Figure 6-11).

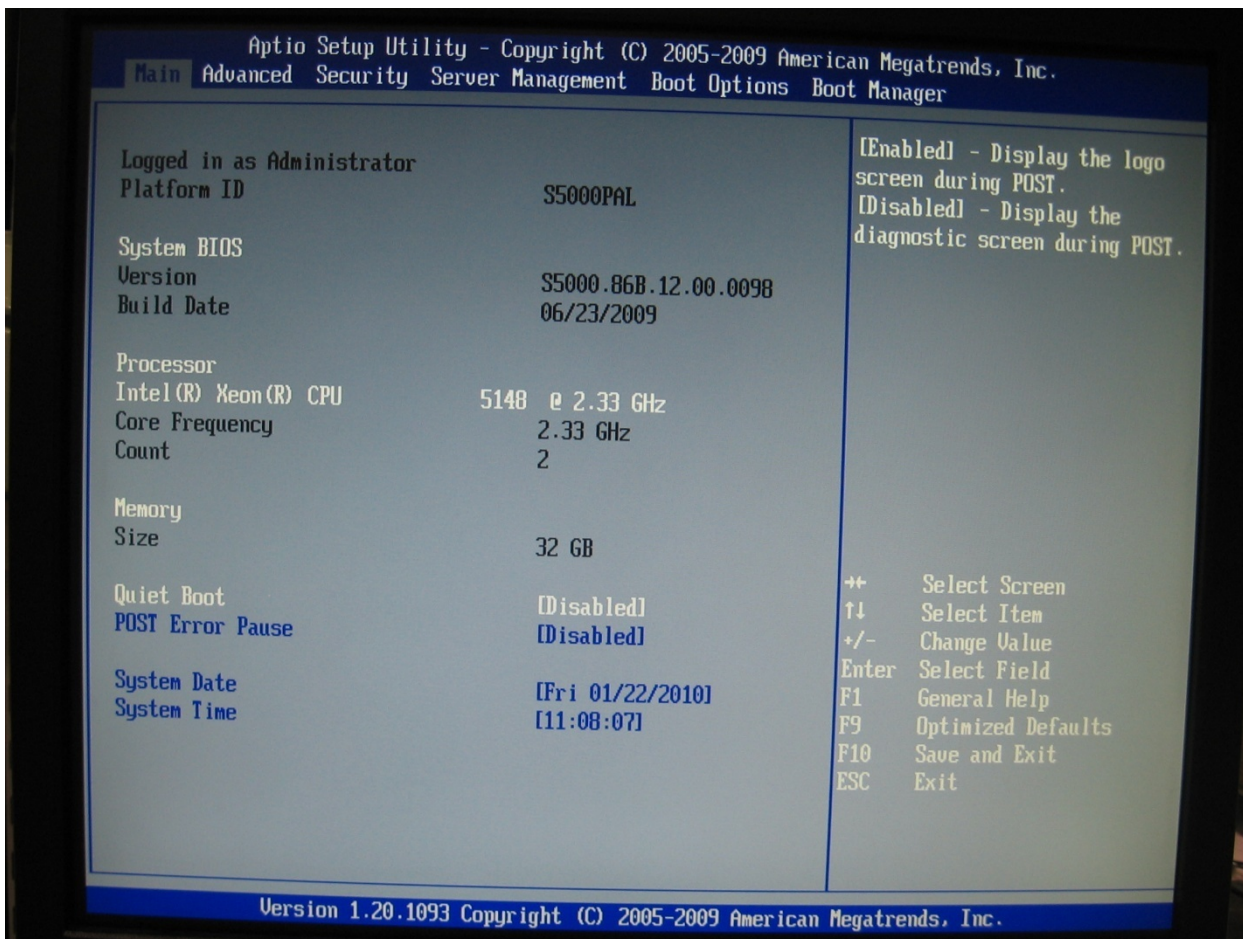


Figure 6-11 Quiet Boot

- Back at the **Main Screen** press **F9**. On the drop down menu select and press **YES**. (Figure 6-12).

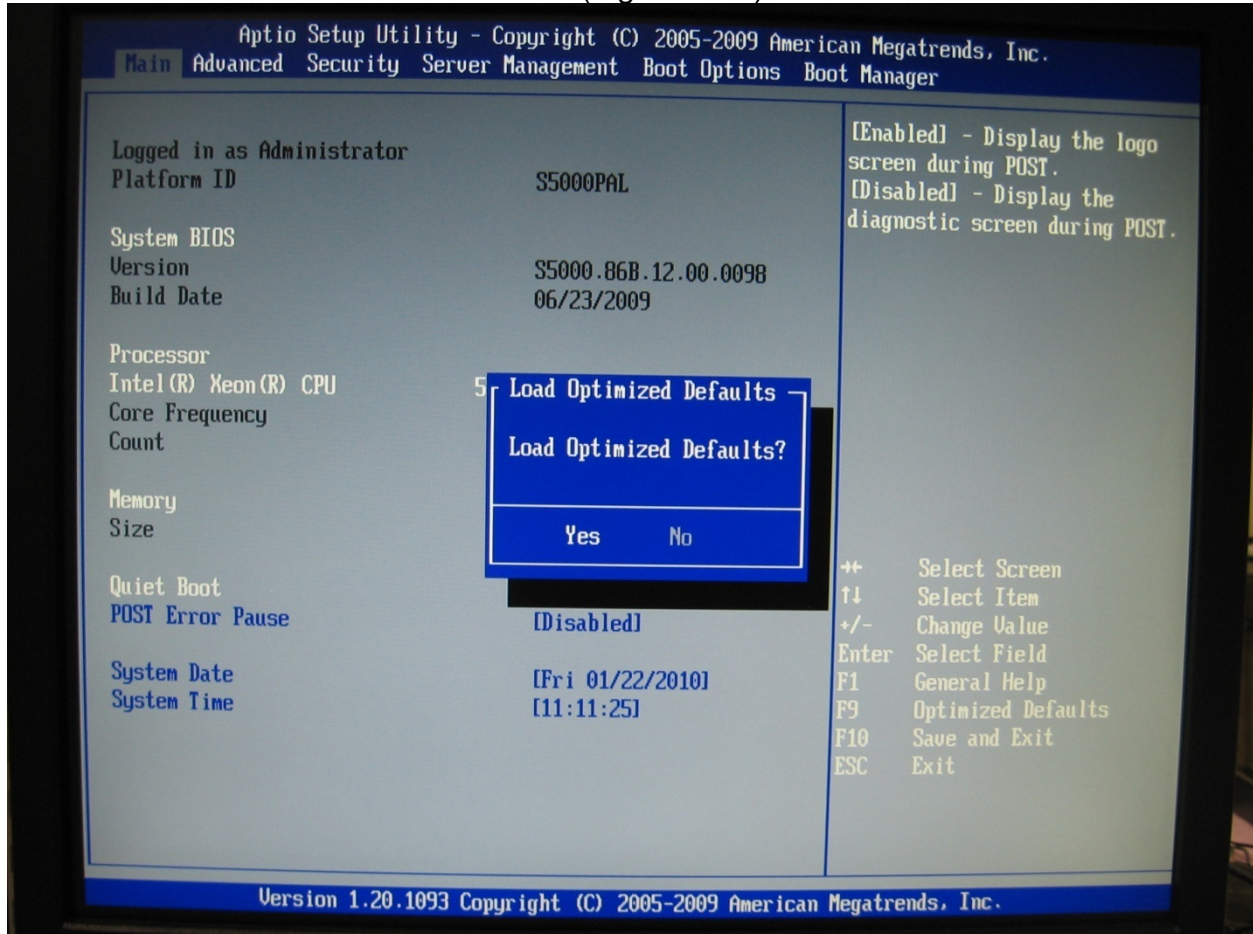


Figure 6-12 Load Optimized Defaults

3. In the **Advanced Menu** scroll down and select **Enhanced Intel** press **Enter**. (Figure 6-13).

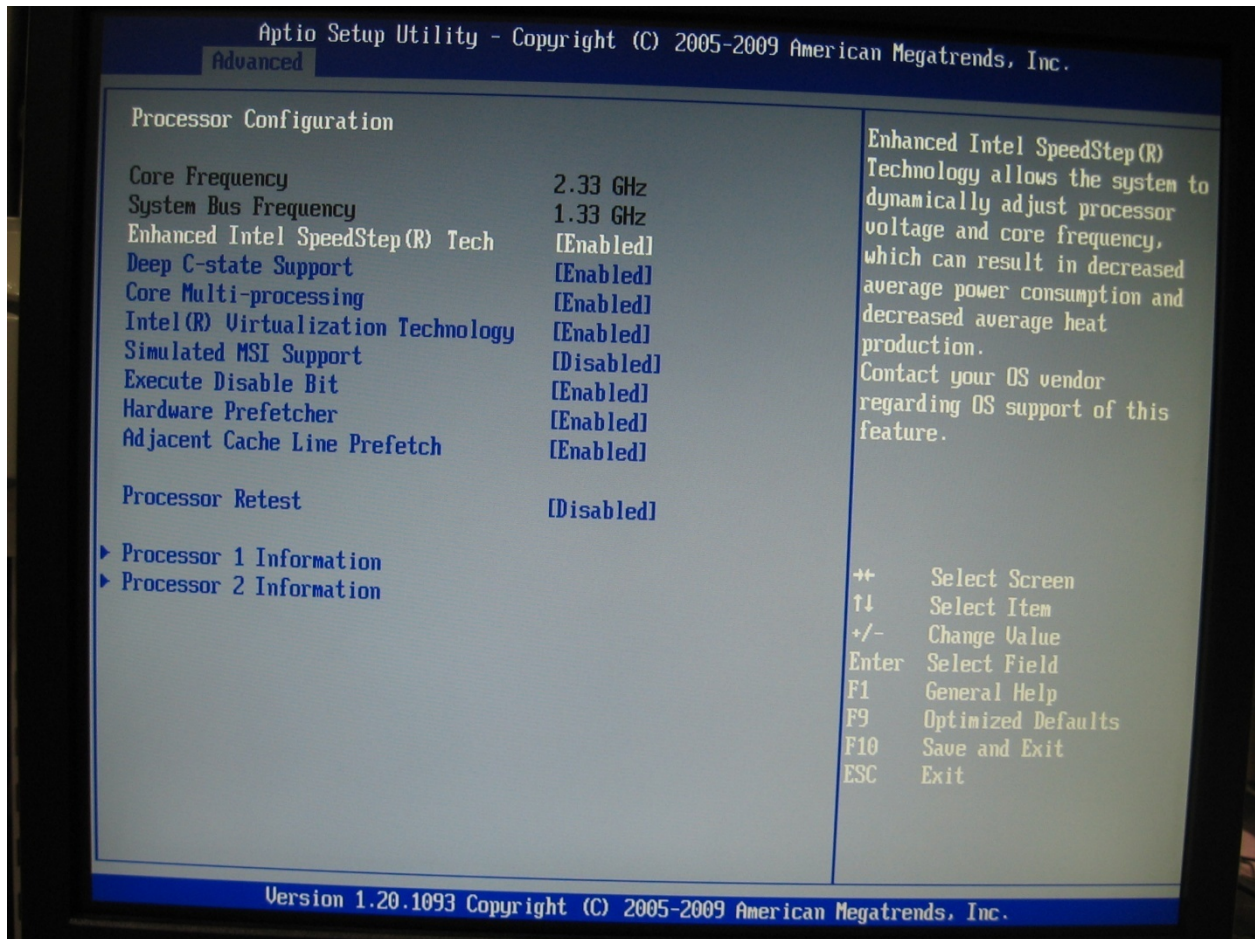


Figure 6-13 Enhanced Intel

- In the **Enhanced Intel** drop down menu select **Disable** and press **Enter**. (Figure 6-14).

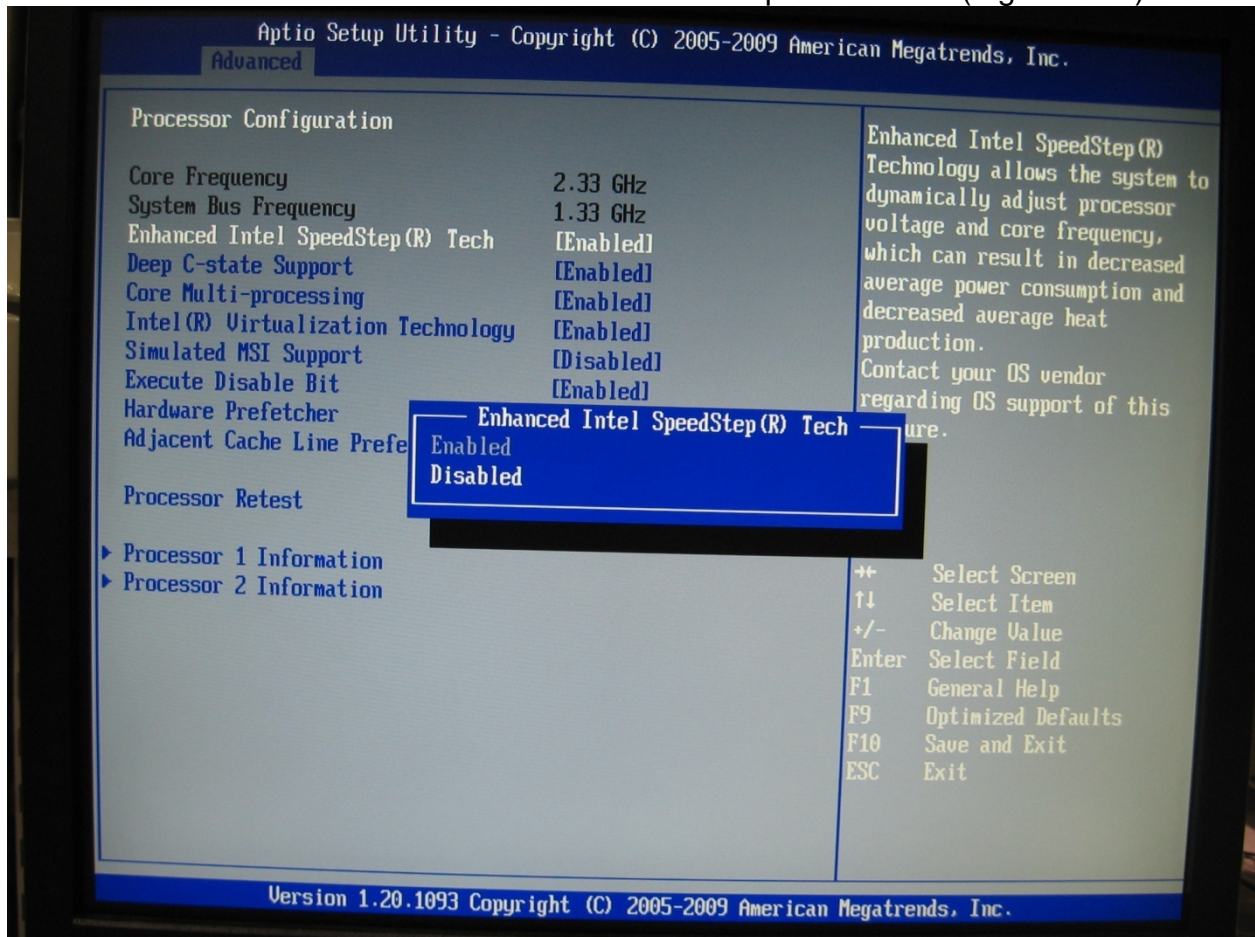


Figure 6-14 Enhanced Intel, Disable

- In **Processor Confirmation** screen select **Deep C-state Support** and press **Enter**. (Figure 6-15).

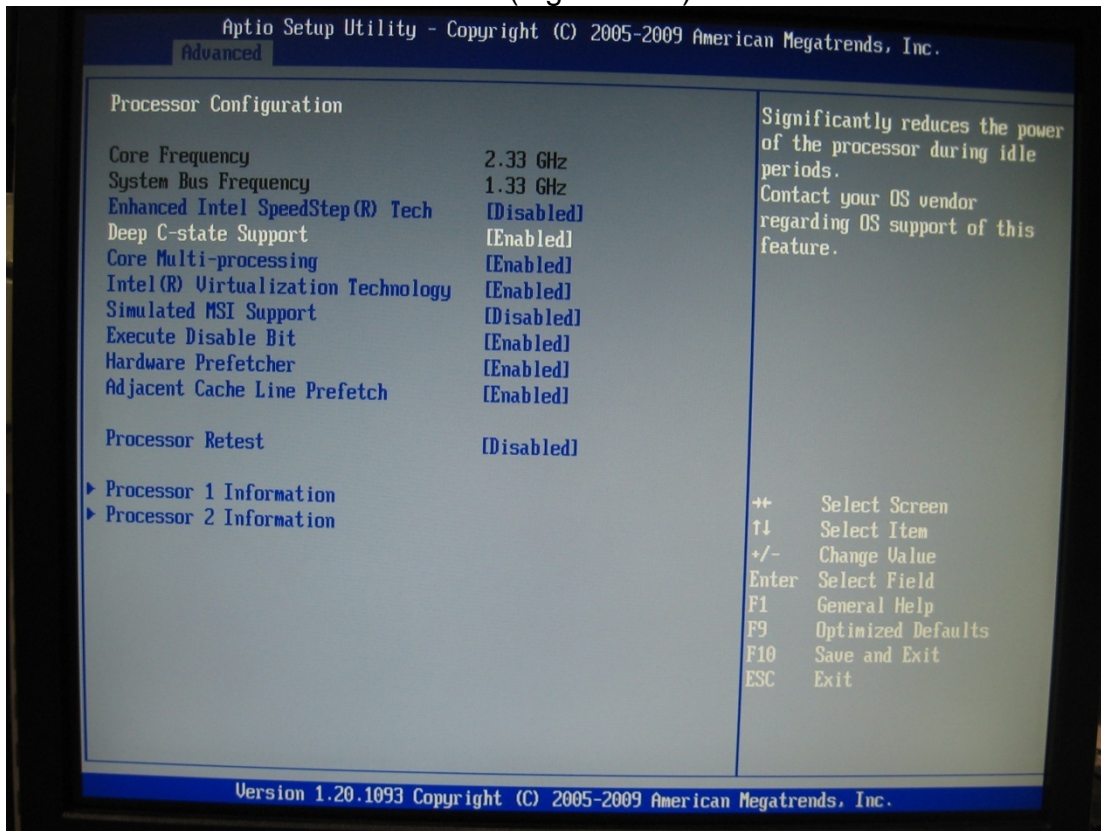


Figure 6-15 Processor Confirmation Screen

- In **Deep C-state Support** screen select **Disable** and press **Enter**. (Figure 6-16).

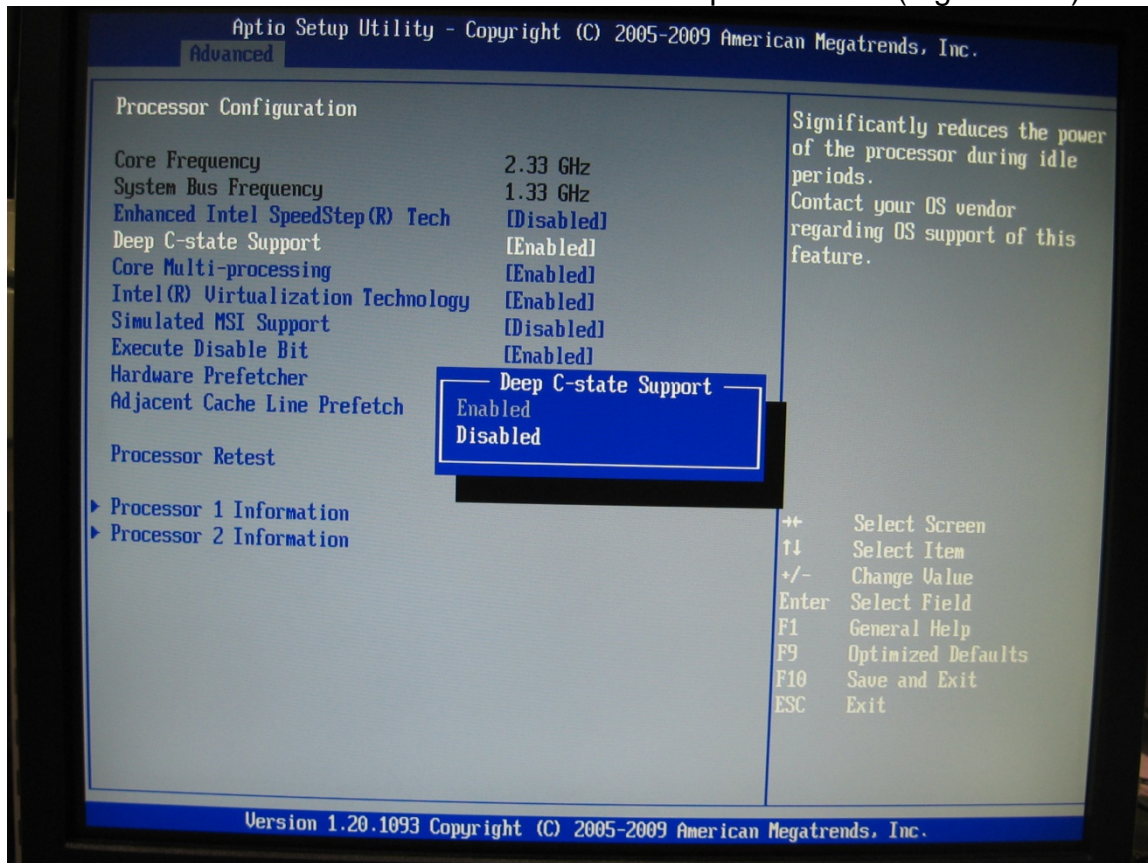


Figure 6-16 Deep C-state Support Screen

7. In **Processor Confirmation** screen select **Intel Virtualization Technology** and press **Enter**. (Figure 6-17).

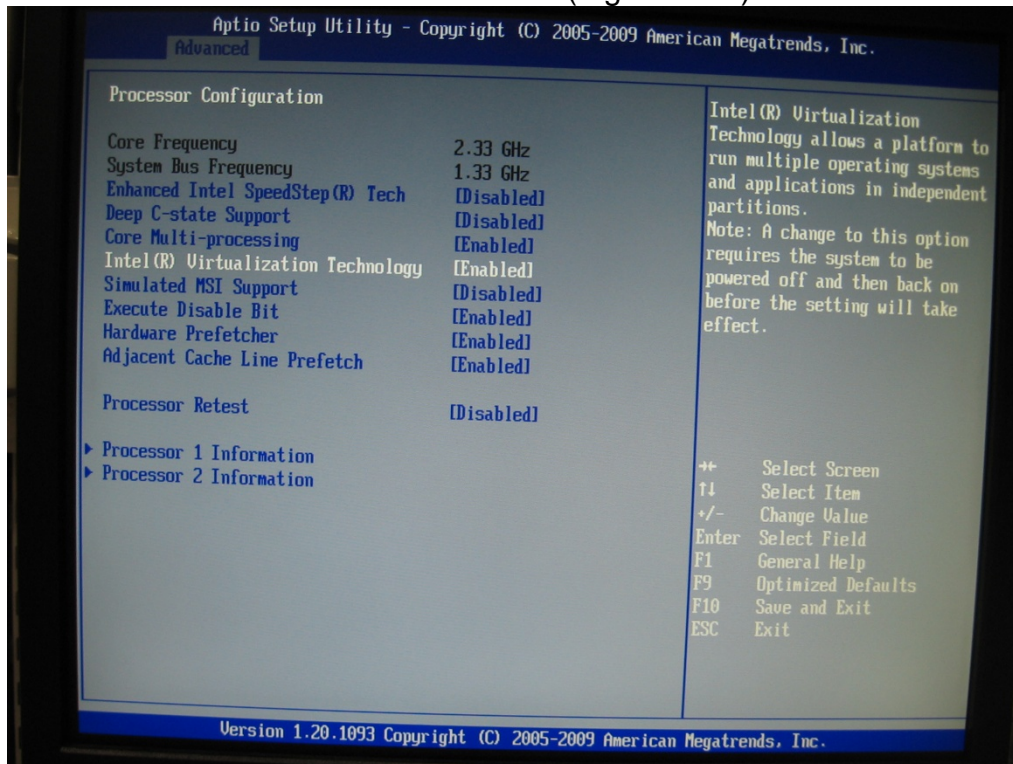


Figure 6-17 USB Configuration

8. In **Intel Virtualization Technology** drop down menu select **Enabled** and press **Enter**. (Figure 6-18).

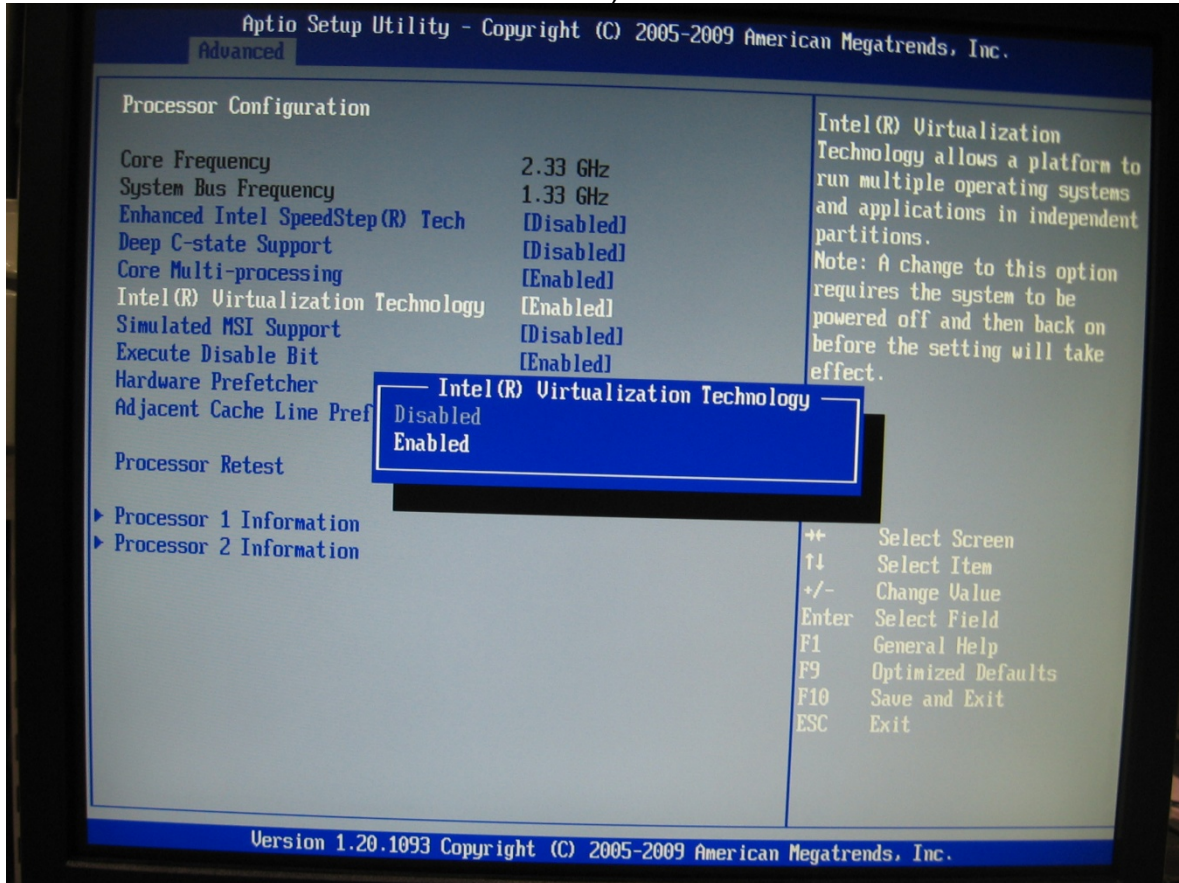


Figure 6-18 Intel Virtualization Technology

9. In **Processor Confirmation** screen drop down menu **Save and Reset** select **Yes** and press **F10**. (Figure 6-19)

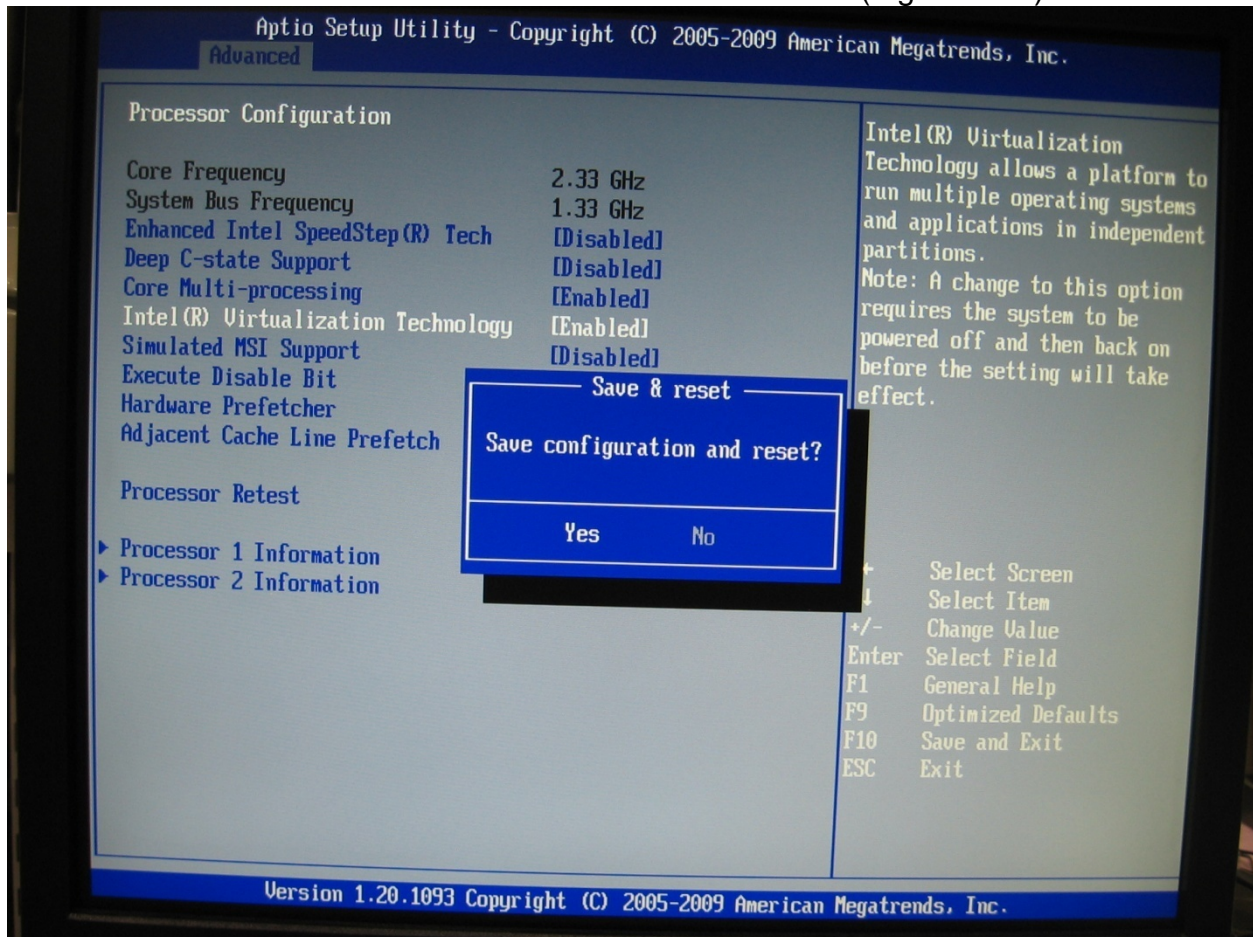


Figure 6-19 Save and Reset

6.9 Upgrading Memory and Replacing Hot-Swap and LRU Components

6.9.1 Preventing Static Electricity

This section provides procedures for replacing all Hot-Swappable and LRU components, including procedures for replacing or adding system memory.

The components inside your computer are extremely sensitive to static electricity, also known as electrostatic discharge (ESD). ESD can permanently damage electrostatic discharge-sensitive components in your Server.

To prevent ESD damage, follow these guidelines before opening the Server case:

1. Turn off the **Server** and unplug the **power cord** before opening the case.
2. Wear a **grounding wrist strap** and attach it to a **bare metal** part of the Server, workbench, or other grounded connection.

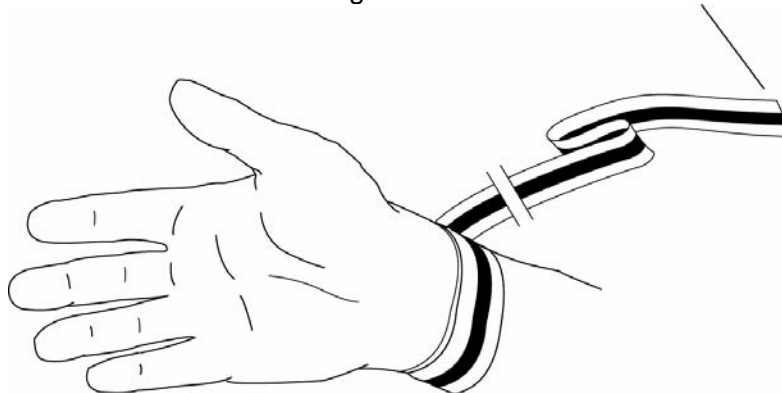


Figure 6-20 Grounding Wrist Strap

3. Do not insert any object into the vent holes on the case or the power supply. Touch a bare metal surface on the back of the computer, a bare metal surface on your workbench, or other grounded object before handling DIMMs or other components. Before working with computer components, follow these guidelines:
 - Avoid static-causing surfaces such as carpeted floors, plastic, and packing foam.

- Remove components from their antistatic bags only when you are ready to use them. Do not lay components on the outside of antistatic bags because only the inside of the bags provide electrostatic protection. Always hold memory modules and components by their edges or their metal mounting brackets.
- Avoid touching the edge connectors and components on the cards. Never slide memory modules or components over any surface.

6.10 Replacing a Hot-Swap Power Supply Module

Your TAG Server was designed with the ability to Hot-Swap a power supply module without disconnecting system power. Refer to Figure 4-12 and the steps that follow to Hot-Swap a power supply module.

NOTE: *If you need to remove both modules, you must shutdown the system, unplug the power source from the unit and drain the systems onboard battery by pressing the on/off switch and holding it in place for approximately 10 seconds to drain any charge that might be retained by the systems motherboard.*

1. Obtain certified replacement module from TAG. For more information on contact information see document back page.
2. Depending on the series of your Server, either a retention bracket or filtering cover that is secured with thumb screws will need to be removed first.

NOTE: *In some cases a screw driver (Philips head) might be required to remove a retention bar that is screwed into the power supply.*

3. Loosen the **thumb screws** on the desired module to be replaced.
4. Depress the **module safety latch** and gently pull the handle as shown in Figure 5-42



Figure 6-21 Hot-Swap of 2U Server Power Supply Module

5. Slide the replacement module into the **power supply**.
6. Press firmly and evenly on the power module until you feel the module seat in the back of the power supply

6.11 Replacing a Hot-Swap Hard Drive

The system's hard drive Hot-Swap feature enables you to remove a hard drive without shutting down the operating system or turning off the system power. The way in which you remove a hard drive depends on the application you are using and whether you are replacing a drive, adding a new one, or removing a drive permanently.

When you remove a drive using the Hot-Swap operation, you need to stop the hard drive and take it offline to remove the logical software links to the hard drive, and to reconfigure the file system so that it will now ignore the removed drive. You might also have to reconfigure your application software to operate without the removed drive. Therefore it is strongly recommended that you contact TAG Technical Support at tech.support@tag.com before attempting to Hot-Swap a hard drive. For more information on contact information see document back page.

6.11.1 146GB SAS Hard Drive

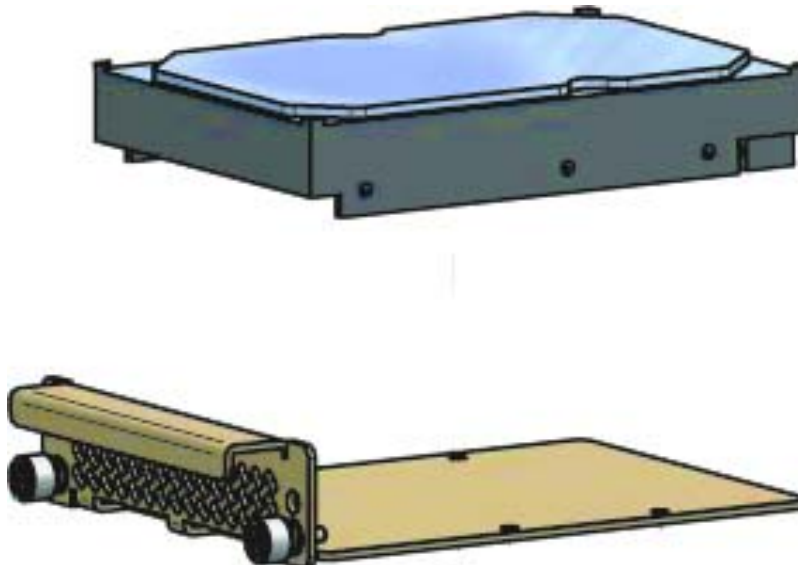


Figure 6-22 146GB SAS HDD (Removed from HD Carrier)

6.12 Removing the Server Cover

The location of the mounting screws securing the Server cover varies per Server model. To remove the cover, use a Phillips screwdriver to remove all screws from the sides and top of the cover.

NOTE: *It is important to make note of the location from which screws are removed since different screw lengths may be used to secure the cover.*



CAUTION

It is not safe to operate TAG Servers without the cover in place. Failure to take this precaution may result in personal injury and system damage.

6.13 Adding or Replacing System Memory

This section lists the procedures for adding or replacing system memory.



WARNING

Ensure that the system is powered-down and all power sources have been disconnected from the Server prior to removing or replacing system memory. Failure to do so could result in serious injury from electrical shock.



CAUTION

Printed circuit boards and hard drives contain electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or the work environment can destroy components. Do not touch the components or any metal parts without taking proper antistatic precautions.

AG's rugged Servers combine Intel® Xeon® technology with state-of-the-art mechanical, thermal and electrical engineering to create customized systems that perform above and beyond end user or program specifications. Our rugged Servers are designed to meet and exceed many MIL-STD requirements to ensure survivability in the field.

6.13.1 Install system memory.

Unlatch both DIMM socket levers, as shown in Figure 4-14.

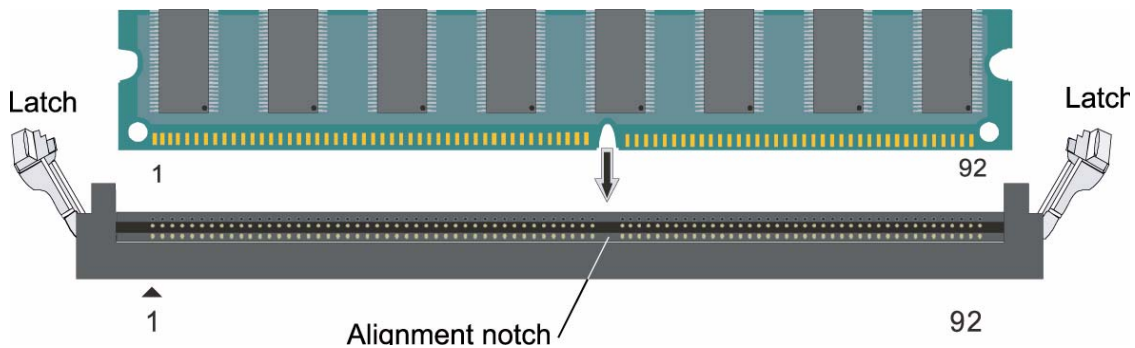


Figure 6-23 DIMM Module Bank

1. Note the location of the alignment notch.
2. Align the notches on the new module with the notches on the memory and press it firmly into the bank.

NOTE: *The tabs on the sides of the memory module should secure the DIMM automatically. When the DIMM locks into place, you will hear a click.*

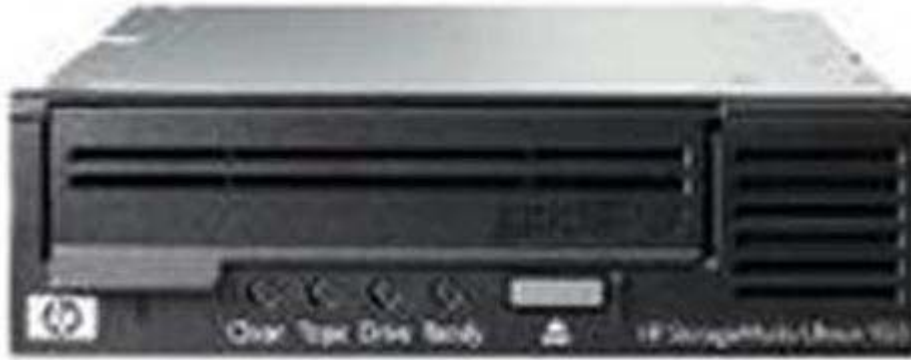
6.14 Replacing the CMOS Battery

This section lists the procedures for replacing the motherboard CMOS Battery.

1. Boot up the Server and enter set-up mode.
2. Record all the settings from the various BIOS menus.
3. Power off the Server.
4. Remove the lid from the Server.
5. Locate the CMOS battery on the motherboard (ref. Figure , Notation "H").
6. Remove the old battery.
7. Replace it with the new battery.
8. Replace the lid and power on the Server.
9. Enter the set-up mode of the Server.
10. Re-enter any applicable settings through the various BIOS menus.

6.15 Ultrium 920 Tape Drive

The Ultrium 920 delivers a compressed storage capacity of 800GB per data cartridge and a compressed data transfer rate of 432GB per hour. The Ultrium 920 Tape Drive is fully read and write.



6.15.1 Remove Tape Drive

1. Turn off all power to the server and remove power cables from their power source.
2. Unscrew the four (4) thumb screws holding the Tape Drive into place.
3. Pull the Tape Drive body slightly toward the front of the server and then tilt upward.
Note: Pulling slightly forward will take it from under the Server top cover.
4. When Tape drive body is in the upright position remove all cable connections. Then remove Tape Drive.
5. Pull the top cover off the tape drive body.
6. Remove the four (4) retaining screws that are holding the bottom cover on to the Tape Drive.

6.15.2 Install Tape Drive

7. Install the bottom cover and its four (4) retaining screws.
8. Replace the Tape Drive top cover.

9. Slide the cover end of the new Tape Drive under the servers top cover and tighten all four 94) thumb screws.
10. Restore all power cables to their power source.
.Power up the server and test the new Tape Drive.

Chapter 4

RAID.

Electronically distributed. Subject to user discretion when printed.

7 RAID

RAID is an acronym for Redundant Array of Inexpensive (or Independent) Disks. This section provides a high-level overview that defines RAID, the advantages and disadvantages of various RAID levels, and guidelines to observe when implementing RAID.

7.1 RAID Defined

RAID is a way of storing data on two or more physical disks for the purpose of redundancy, improved performance, or both. The combined physical disks make up what is called an array. This array appears on the host system as one disk. For example, if you have physical disk 1 and physical disk 2, those two disks appear to the host system as one disk.

RAID consists of different levels, which determine how the data is placed in the array. Each RAID level has specific data protection and system performance characteristics. The following are commonly used SCSI RAID levels:

1. **RAID Level 0:** Striping, good performance, no redundancy
2. **RAID Level 1:** Mirroring, one-to-one redundancy
3. **RAID Level 5:** Striping with parity striped across all drives; offers performance and redundancy
4. **RAID Level 10:** Mirroring and striping; best redundancy and best performance
5. **RAID Level 50:** Parity striped across all drives in a mirrored set; redundancy and performance

You can manage RAID arrays with a RAID controller (hardware RAID) or with software alone (software RAID).

7.1.1 RAID Level 5

RAID Level 5 maps the data across the drives and stores parity information for each data stripe on different drives in the array. The parity data, labeled P in Figure , is distributed. This lessens the data congestion that occurs if all of the parity data is written to one drive. A RAID 5 array can preserve data if one drive fails. However, if two drives fail, all data in the array is lost.

7.2 Create a RAID 5 Array On Adaptec 5805

1. Power up your computer. When prompted, press **Ctrl A** to enter the ARC Utility.

NOTE: During boot up, if your system has insufficient memory the following message will display. *“Adaptec RAID Configuration Utility will load after, system initialization. Please wait. Or press <Enter> Key to attempt loading the utility forcibly [Generally, not recommended]”*

2. Select **Array Configuration Utility** from the menu and press **Enter**. (Figure 7-1).

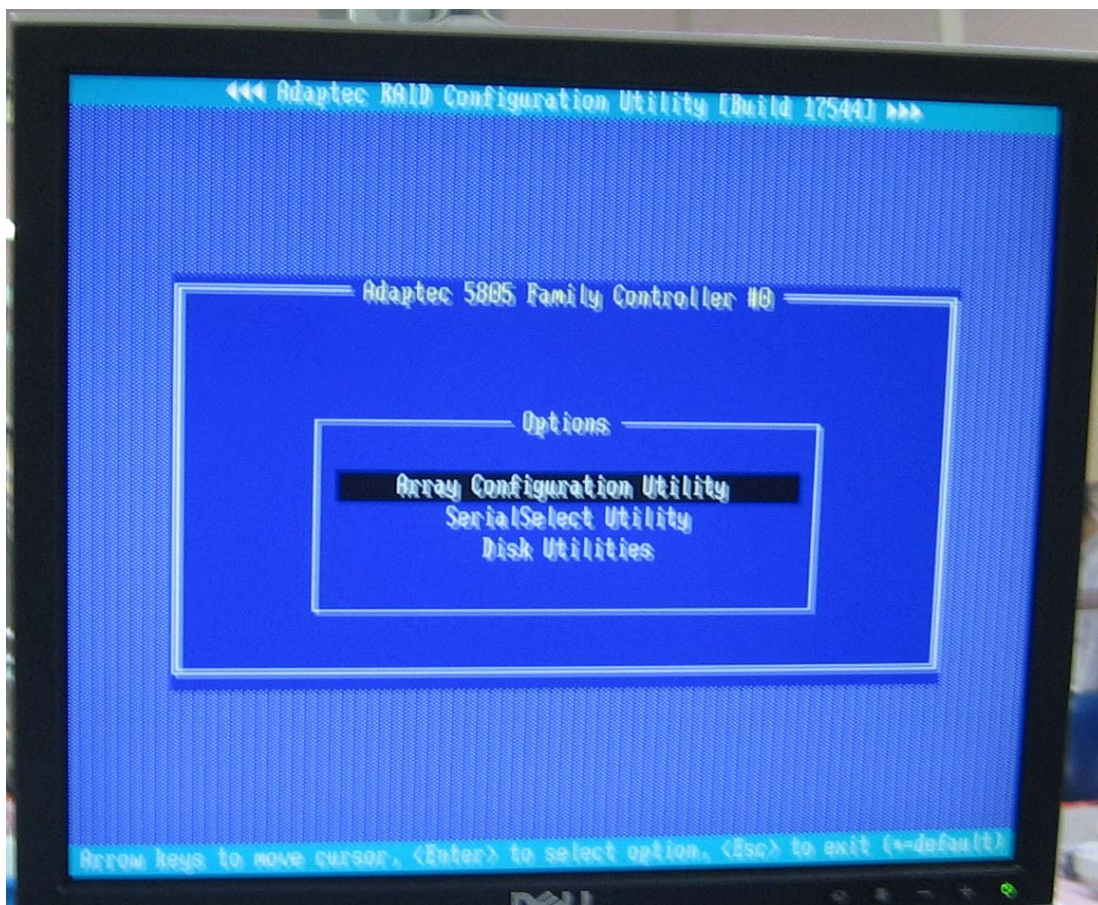


Figure 7-1 Array Configuration

3. Select **Initialize Drives**, and then press **Enter**. (Figure 7-2).



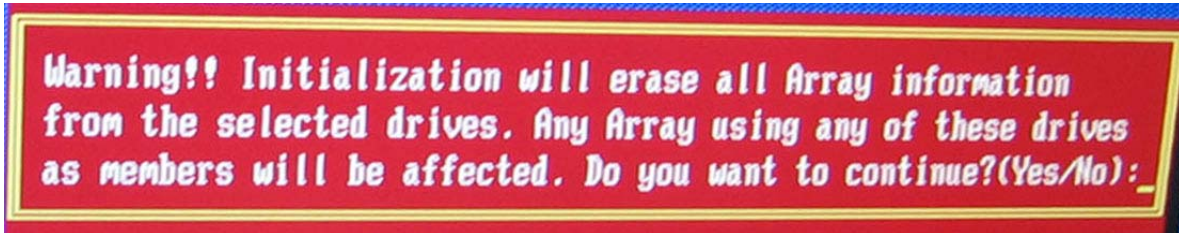
Figure 7-2 Initialize Drives

4. Select **Initialize all Hard Drives** for the array, press **Insert** for each selected disk drive, then press **Enter**. (Figure 7-3).

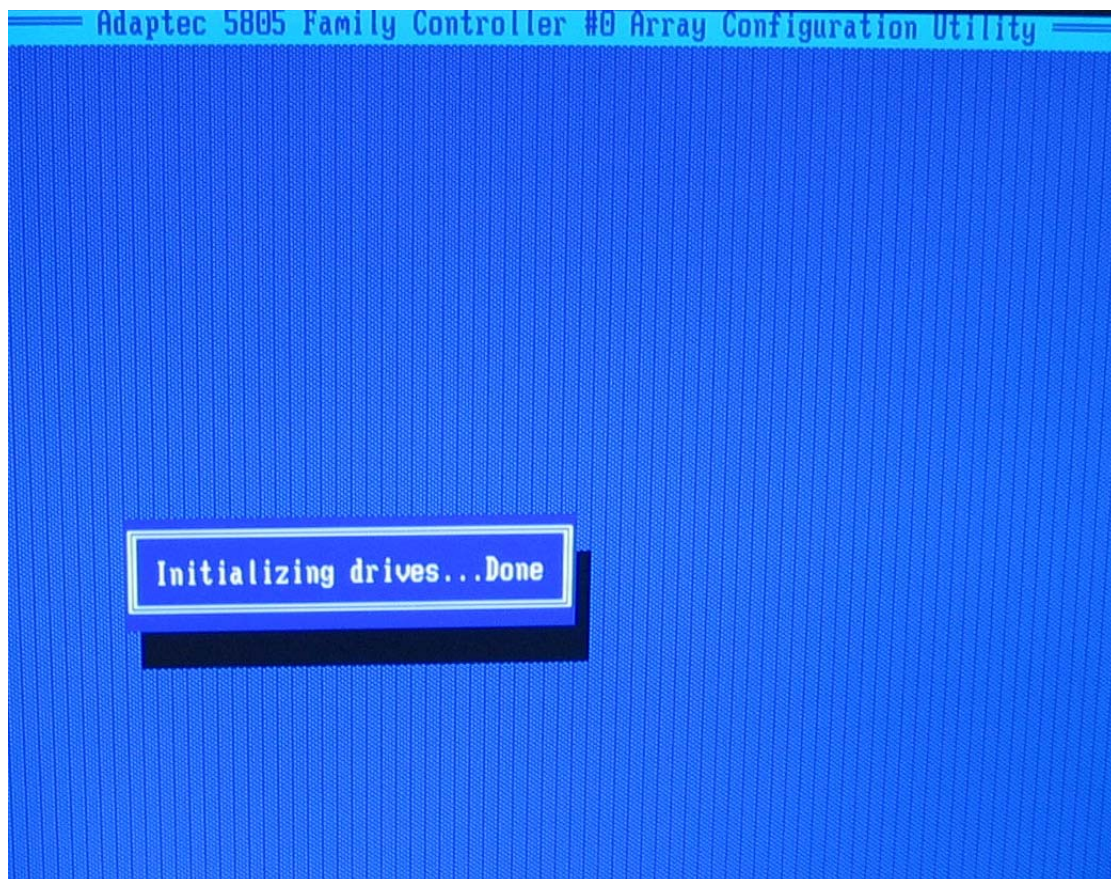


Figure 7-3 Select Drives

5. During initialization, all data is deleted from the disk. Before continuing back up any data you want to keep. (Figure 7-4).

**Figure 7-4 Initialization Warning**

6. Press **YES** to continue. (Figure 7-5).

**Figure 7-5 Initialized**

7. Press any key to continue

8. On the **ACU** screen select **Create Array** from the **Main Menu** and press **Enter**. (Figure 7-6).

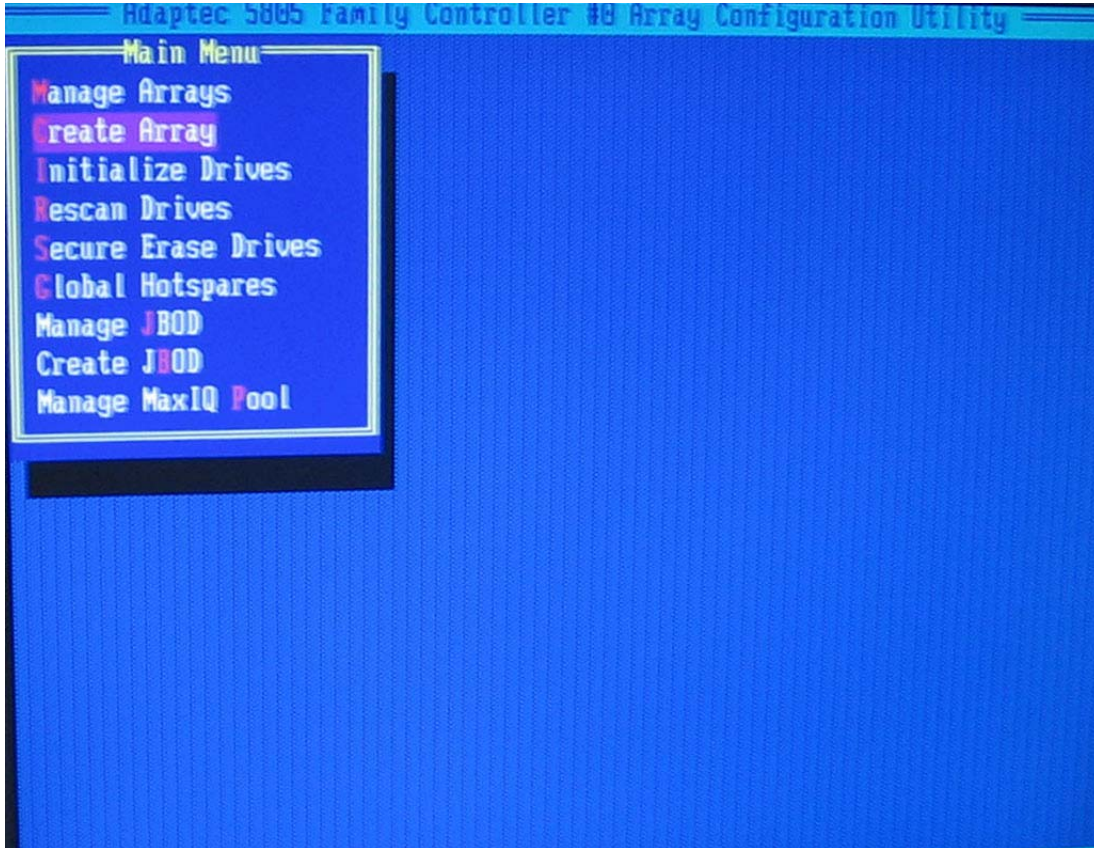


Figure 7-6 Create Array

9. Select the first Five (5) Hard Drives that were just initialized, press **Insert** for each selected disk drive, then press **Enter**. (Figure 7-7).

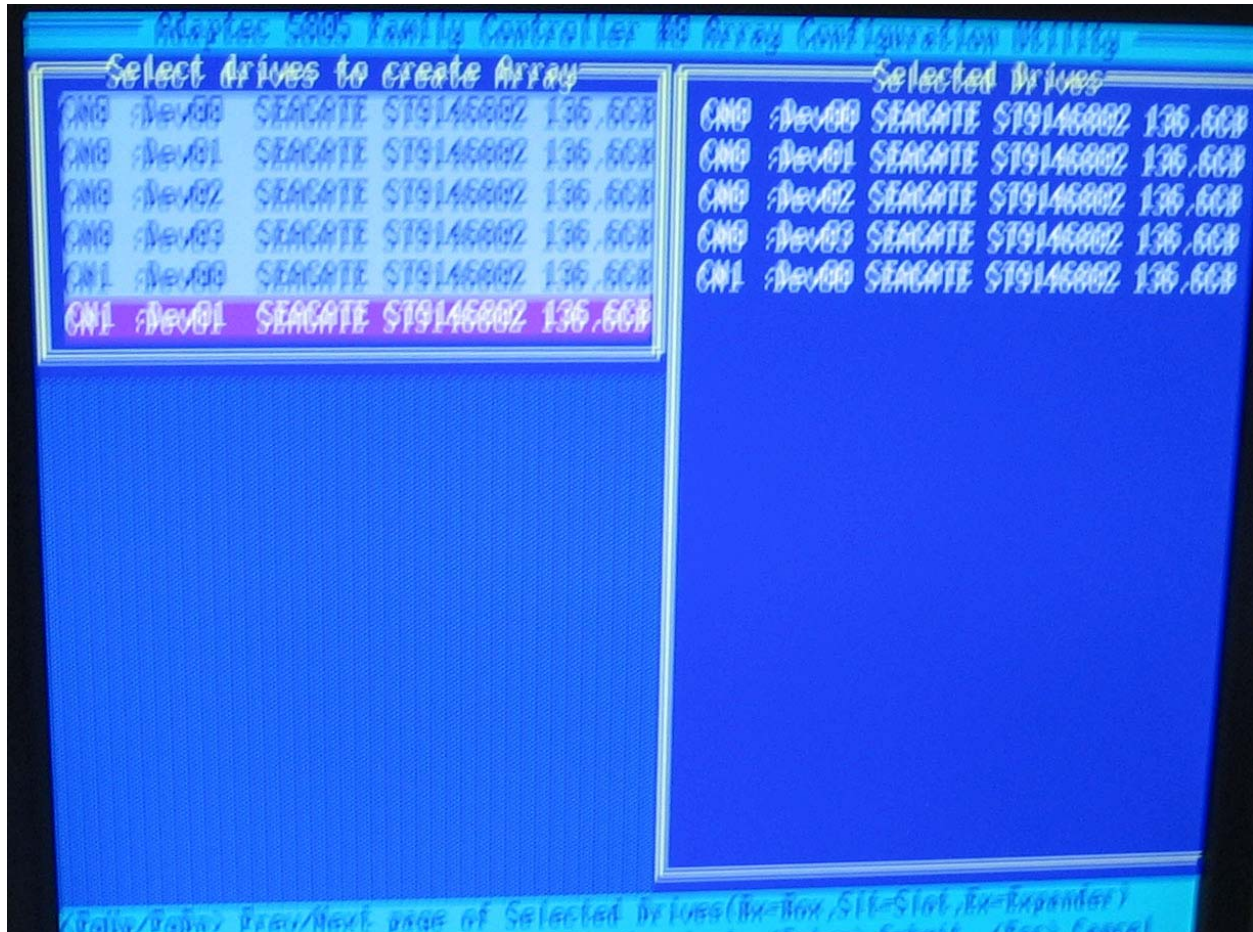


Figure 7-7 Select Drives

10. In **Array Type** select **RAID 5** press **Enter**.
(Figure 7-8).

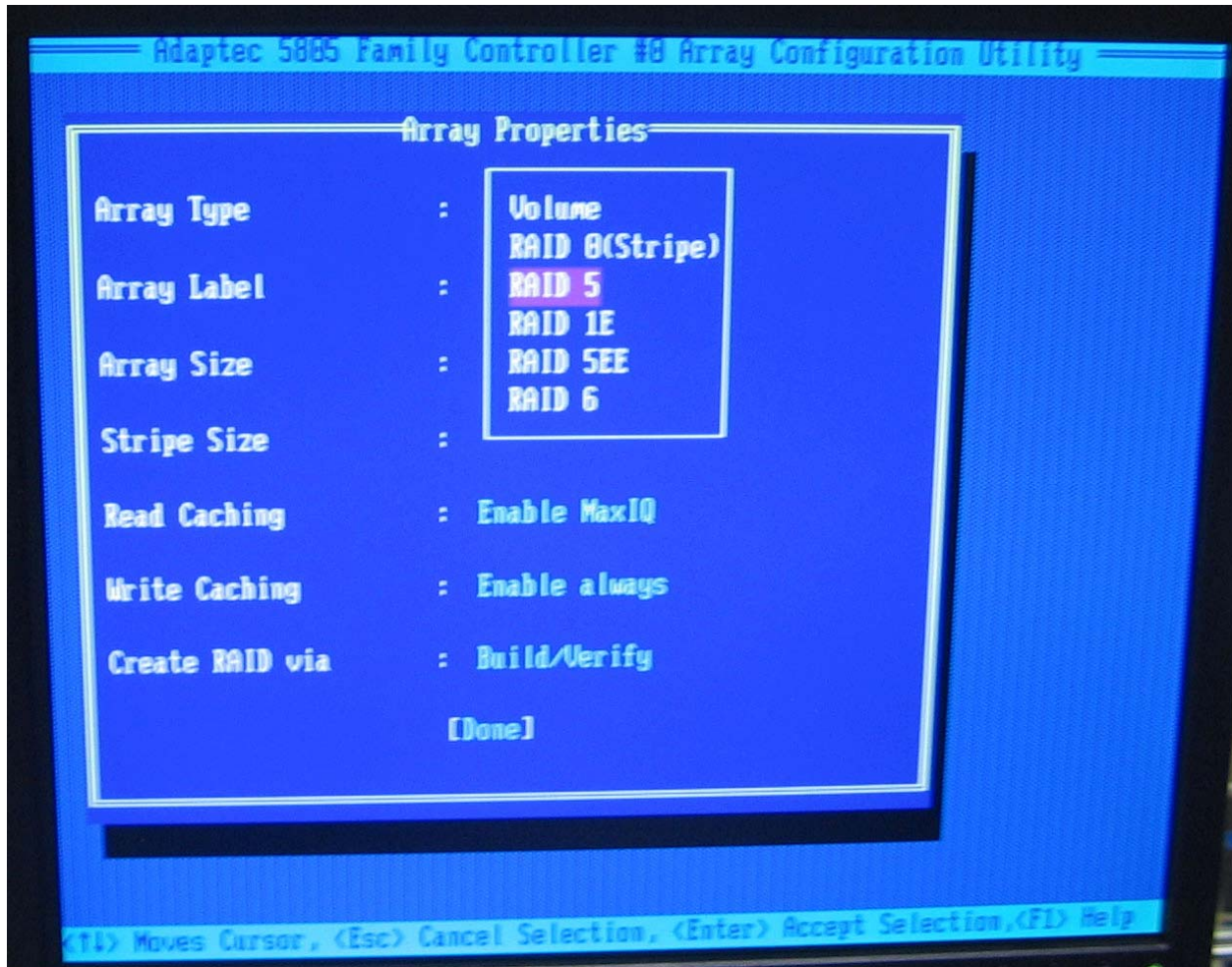


Figure 7-8 RAID 5

11. In **Array Label** type a name and press **Enter**. (Figure 7-9).

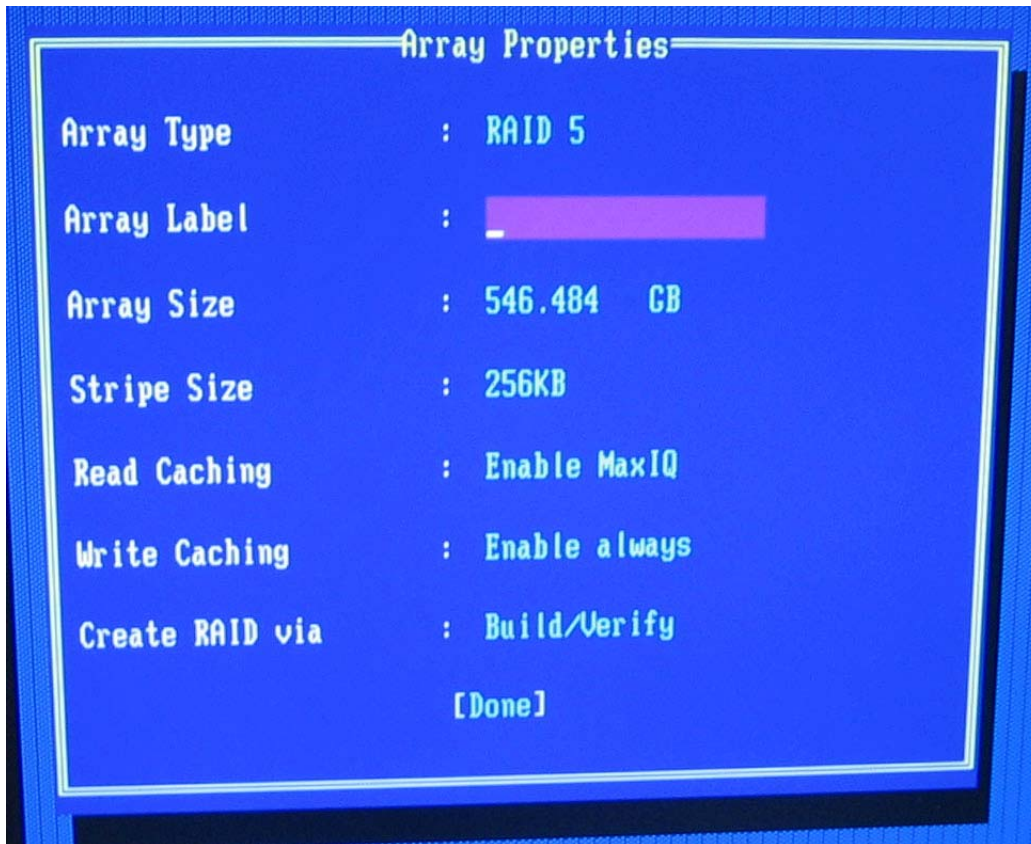


Figure 7-9 Array Label

12. **Array Size** Press **Enter**, then press **Enter** again to use the default granularity of GB. (Figure 7-10).

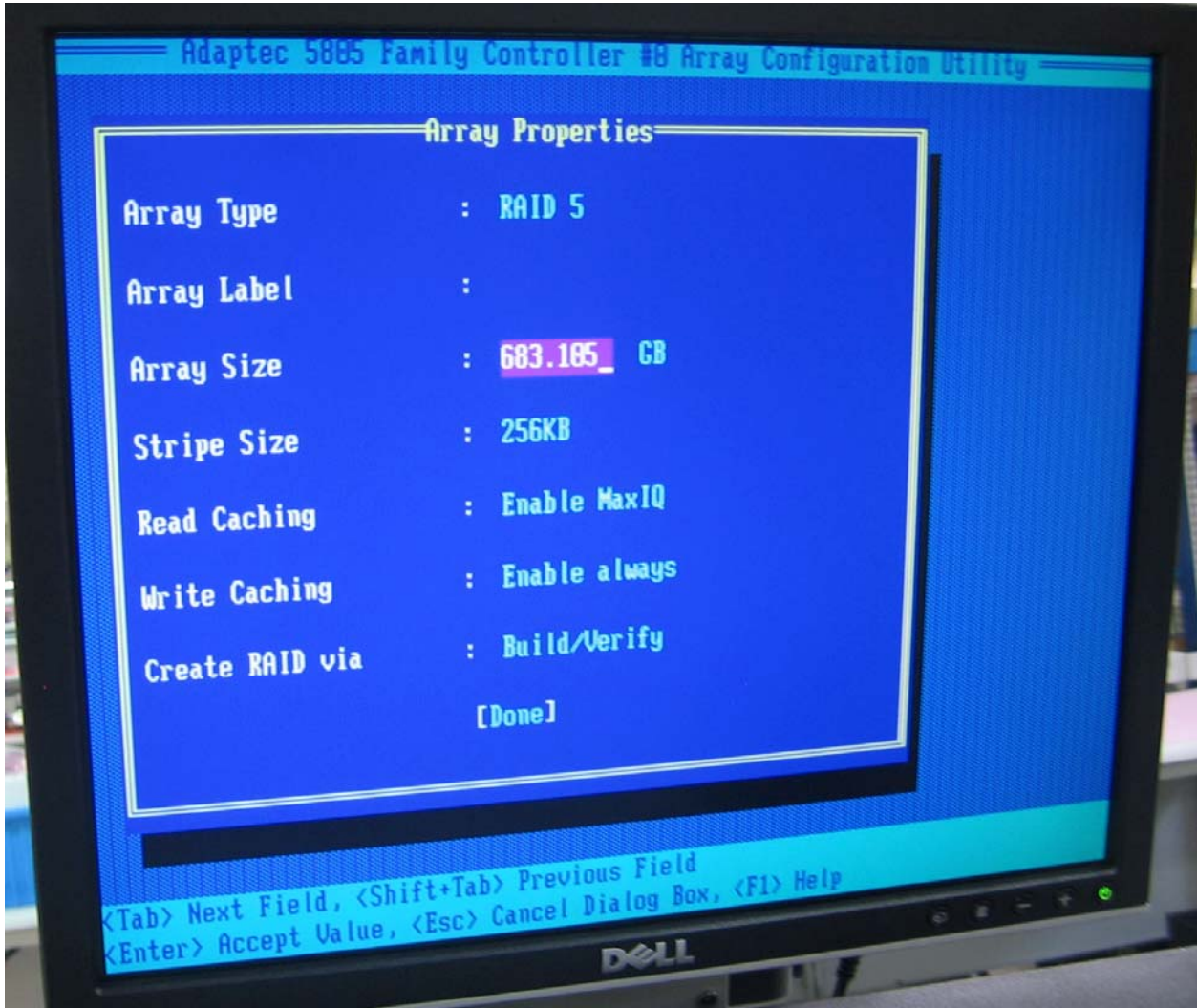


Figure 7-10 Array Size

13. In **Stripe Size** scroll down and select (25 KB). (Figure 7.11).

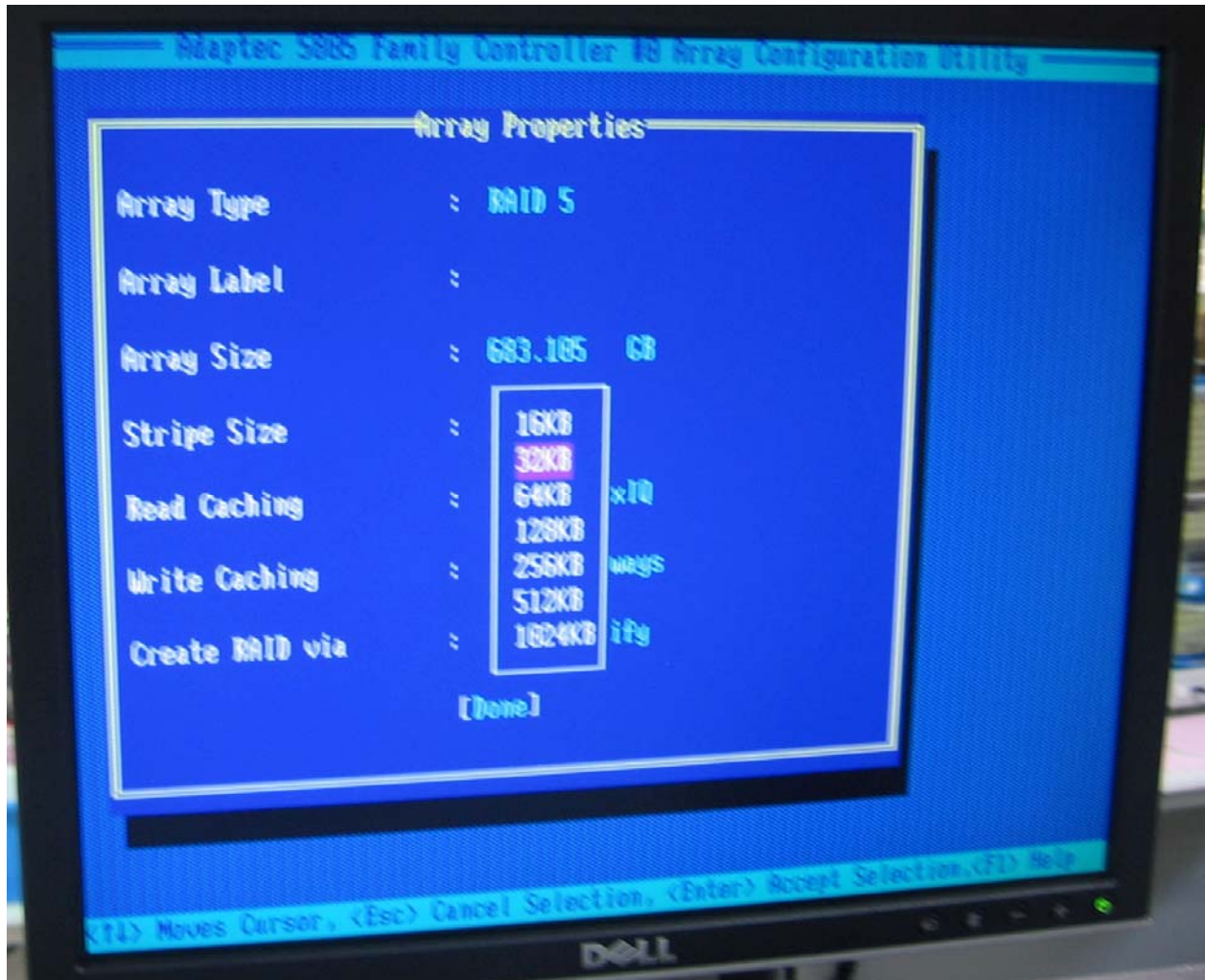


Figure 7-11 Stripe Size

14. In **Read Caching** scroll down and select **Enable Max ID**. (Figure 7-12).

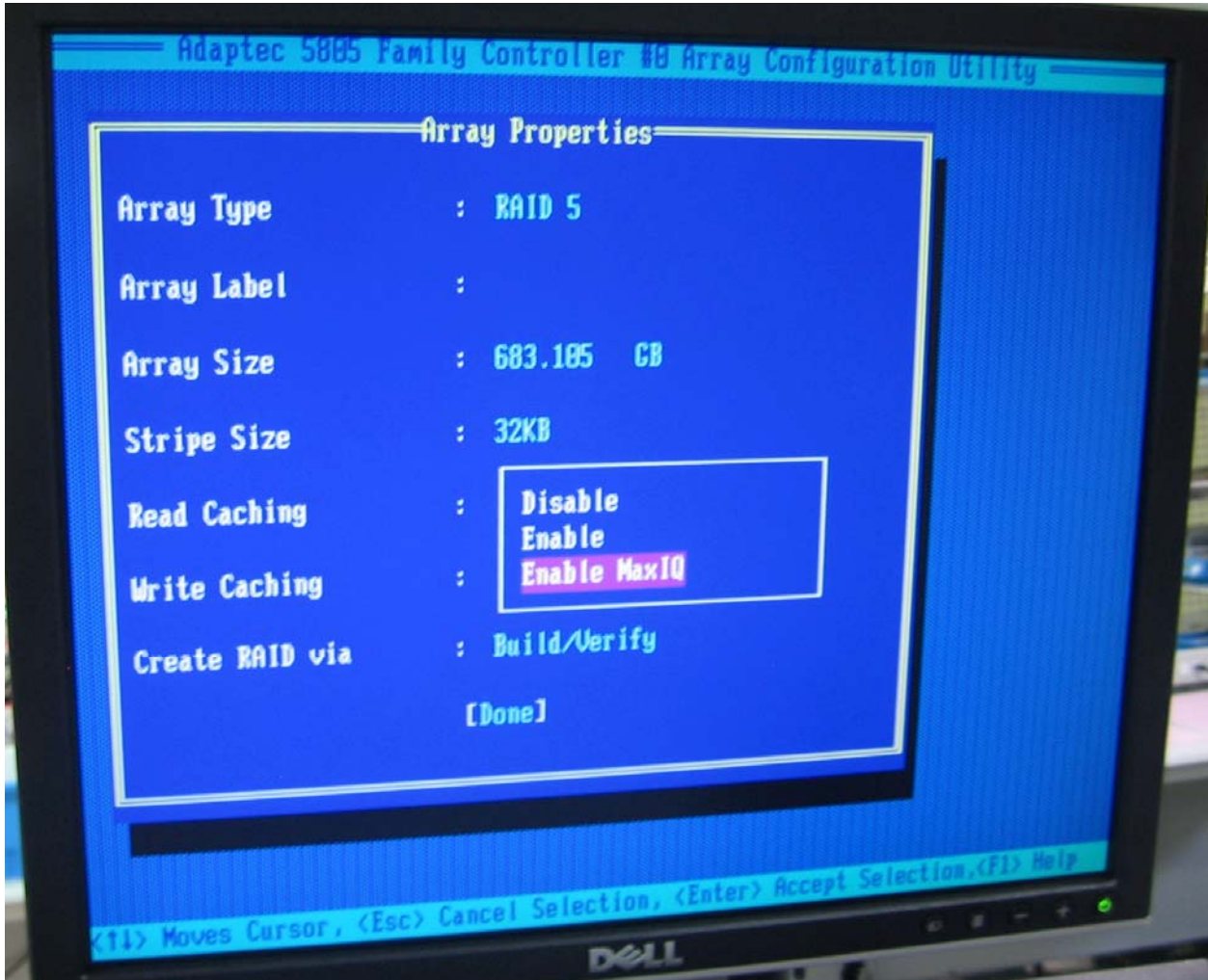


Figure 7-12 Read Caching

15. In **Cache Warning** press **Enter**. (Figure 7-13).

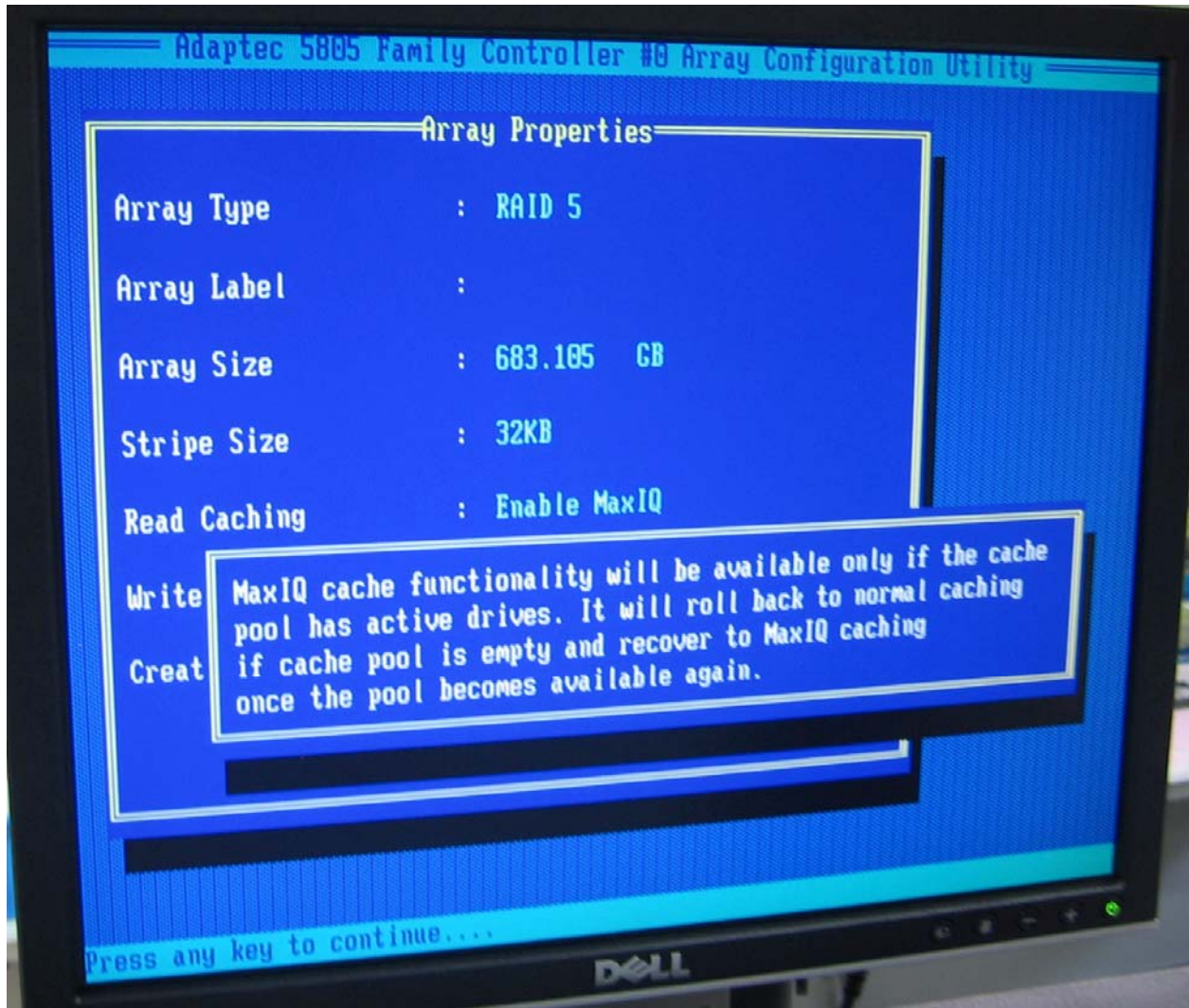


Figure 7-13 Cache Functionality

16. In **Write Caching** select **Disable** and press **Enter**. (Figure 7-14).

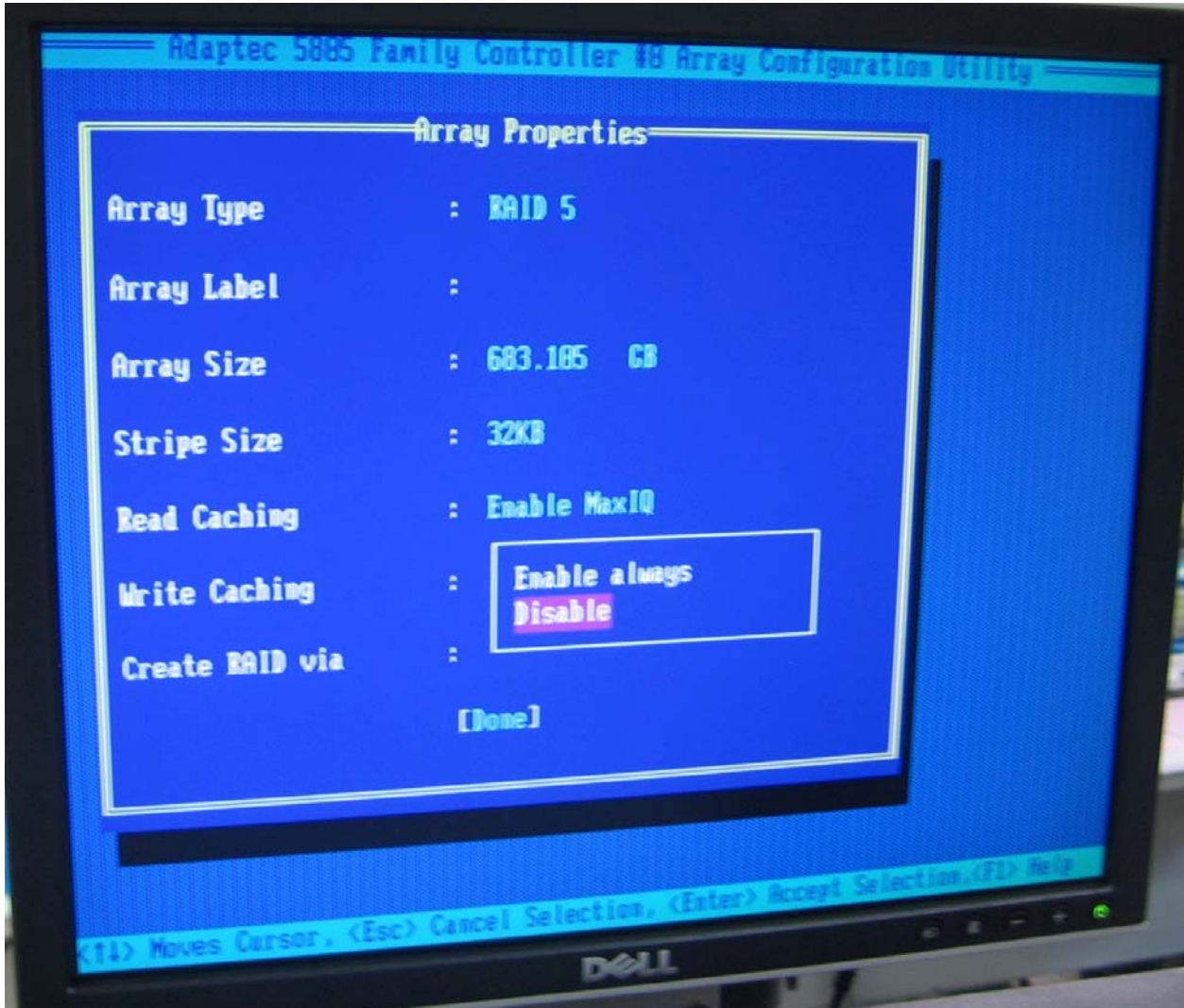


Figure 7-14 Write Caching

17. In **Create RAID** select (**Build/Verify**) and press **Enter**. (Figure 7-15).

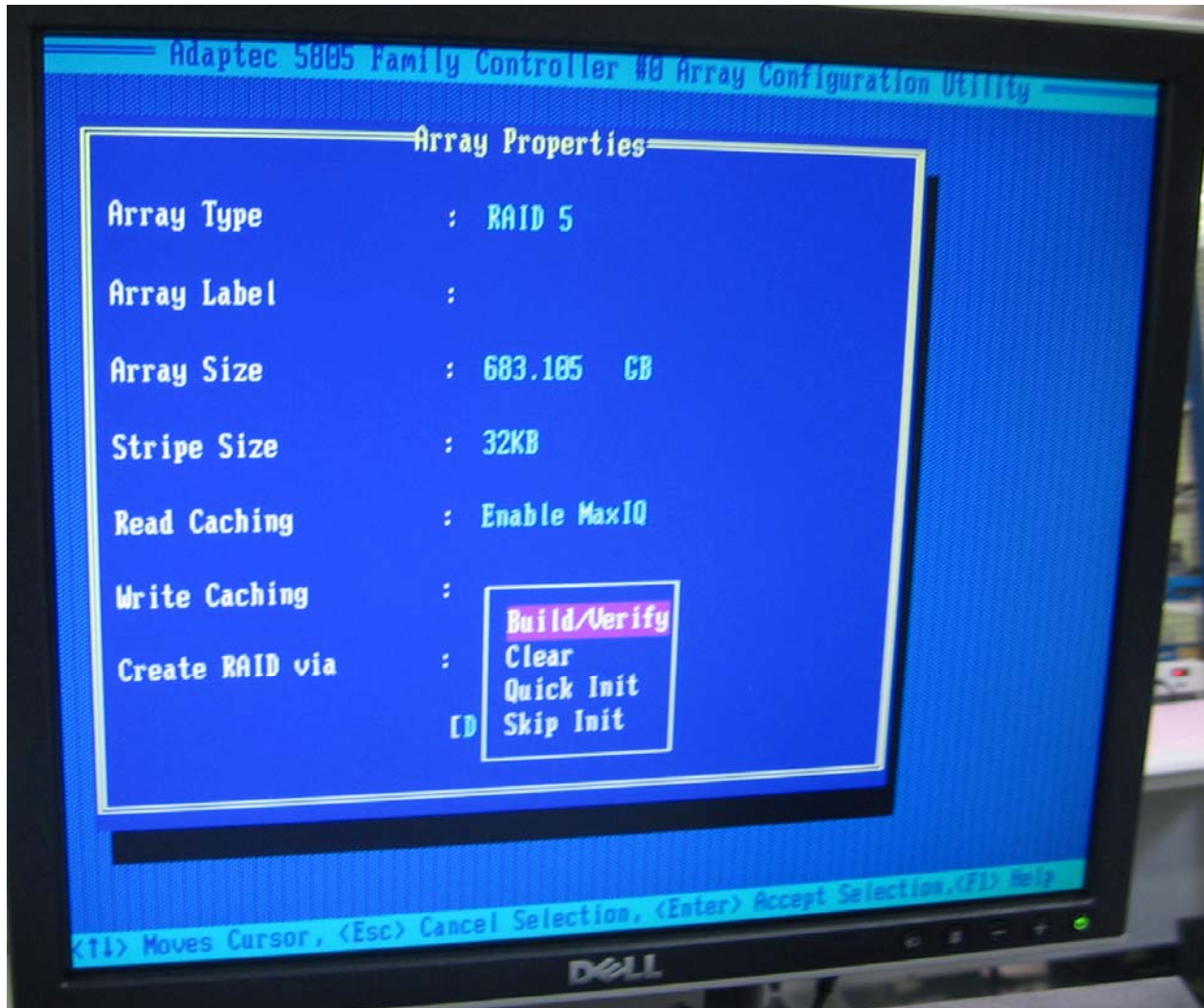


Figure 7-15 Build/Verify

18. Press **Enter** to continue. (Figure 7-16).

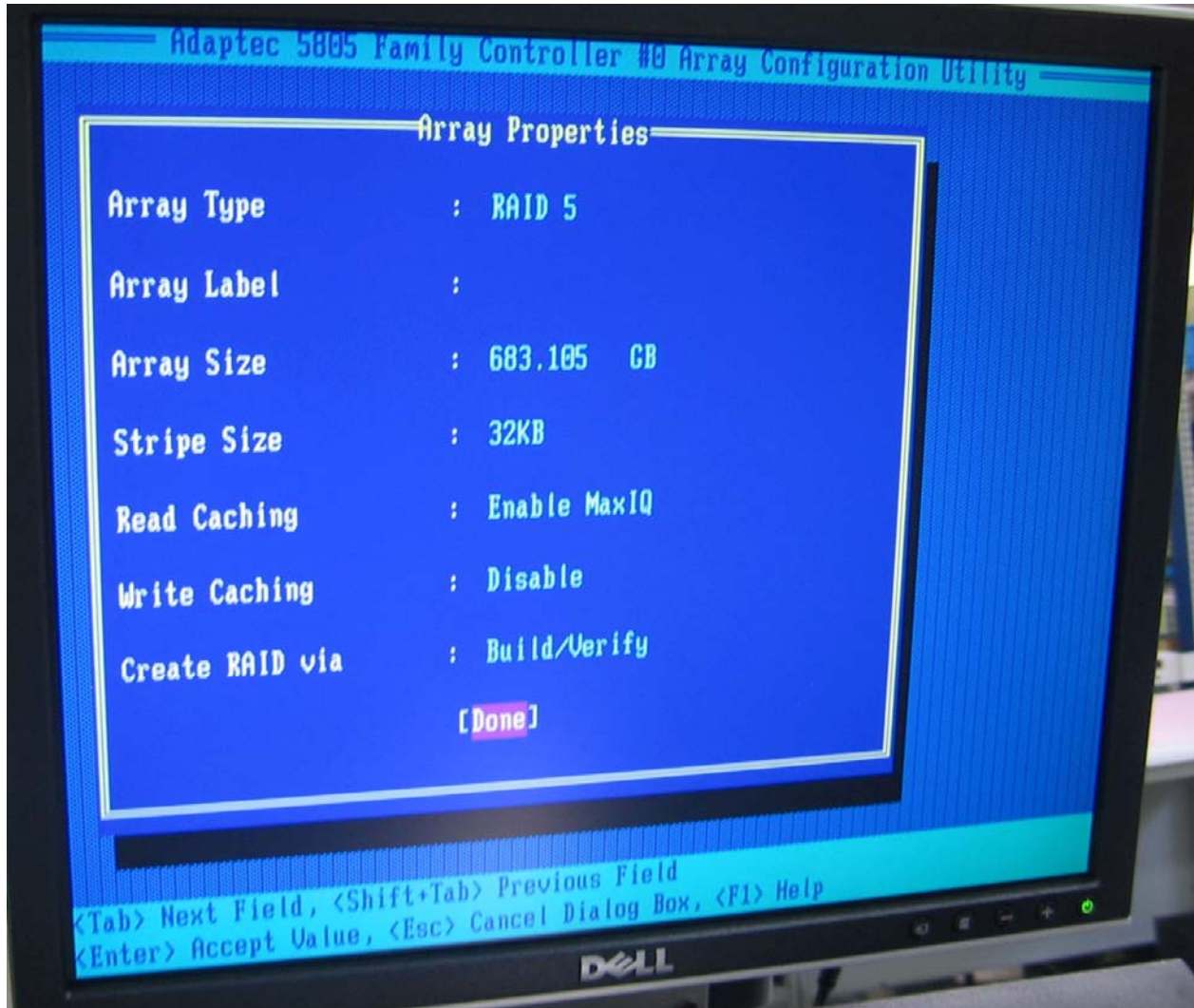


Figure 7-16 Press Enter

19. When a cache warning message displays, type Y. (Figure 7-18).

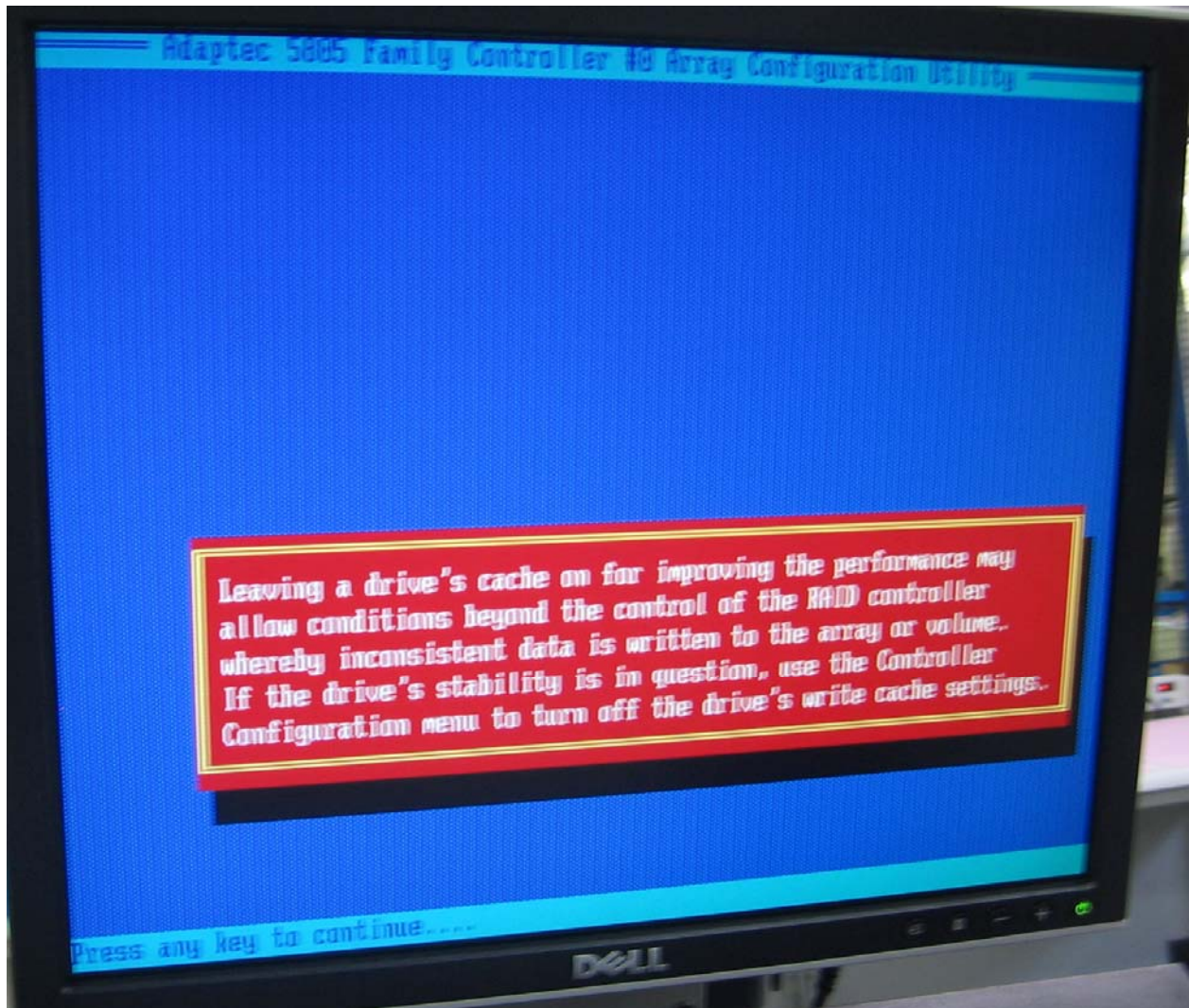


Figure 7-17 Cache Warning

20. Check that a Global Hotspare is available.
(Figure 7.18).

NOTE: Ensure you have previously only selected five (5) of the available six (6) drives this will ensure you have a Hot Spare.

21. After viewing the response press any key to return to the **ACU Menu**.



Figure 7-18 Hot Spare Check

22. Press **Escape**. The Exit utility window will appear. Select **YES** and press **Enter**. (Figure 7-19).

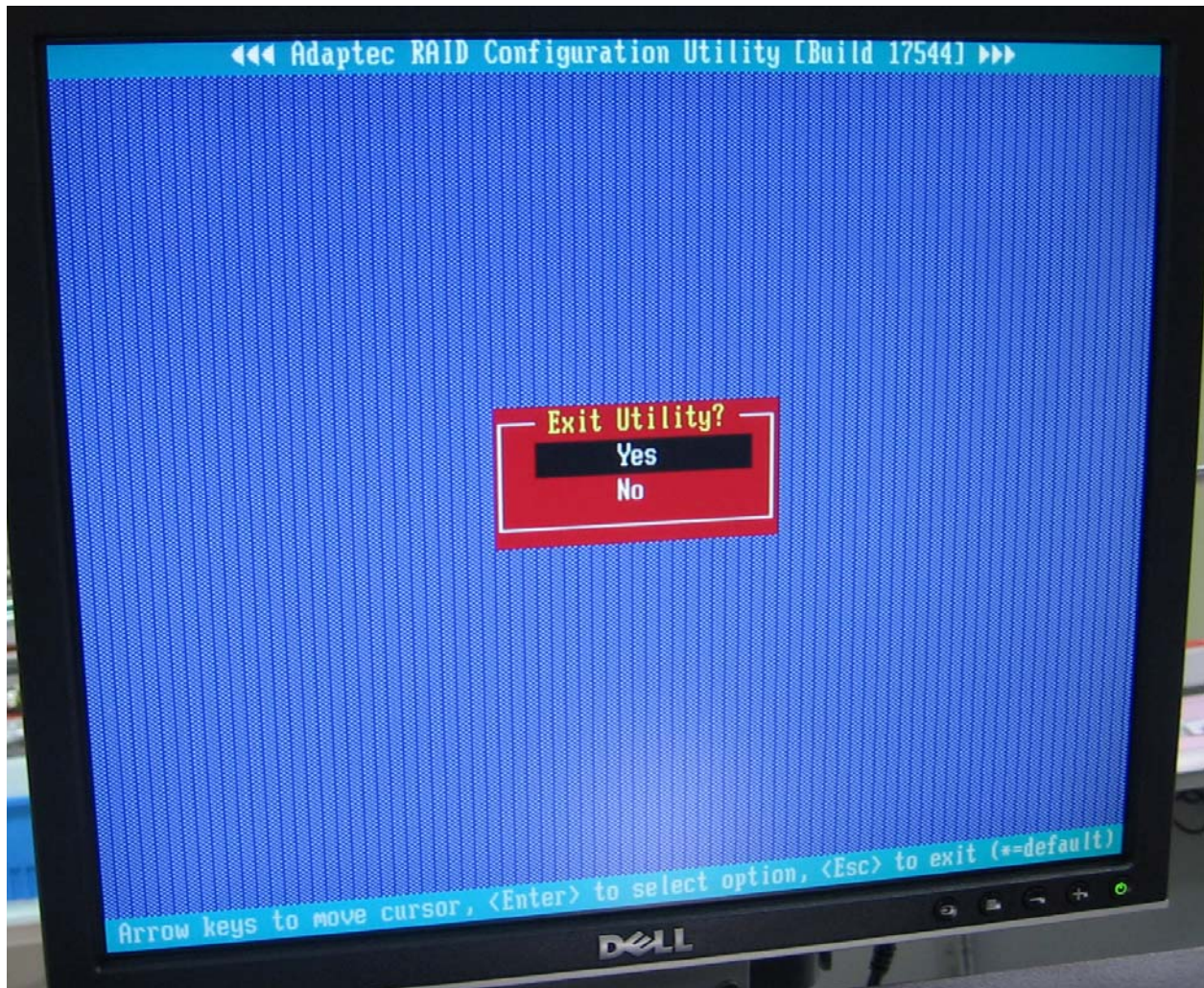


Figure 7-19 Exit Utility

23. Your Computer Restarts

7.3 About RAID Global and Hot Spares

A hot spare is a drive that is on standby in case another drive fails. Depending on how the array is configured, the drive is either picked up automatically and the array is rebuilt, or you manually select the drive (or insert a new drive in the same slot as the failed drive) and rebuild the array.

How the hot spare works depends on how the array is configured. When a drive fails, the array rebuilds automatically using the hot spare. This is assuming that automatic rebuild is enabled. If automatic rebuild is disabled, you must manually start the rebuild process.

During a rebuild you may notice degraded performance on the drives.

7.4 Global and Dedicated Hot Spares

A dedicated hot spare is assigned to one or more arrays, whereas a global hot spare can be used for any array that is on the same controller as the hot spare. Also, dedicated hot spares that reside in the same storage enclosure typically have better performance than global hot spares.

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