WHITE PAPER

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Compaq Value Add Features and Server Families

Compaq systems offer features that differentiate them from the competition. This trend was already well established when Compaq introduced the first server-class systems and has continued since then. The number and variety of options and features available for Compaq servers has grown rapidly. This white paper is intended to help you understand the various options and features available on Compaq servers. This document also provides concise information about Compaq server products and the options available for Compaq servers.

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Compaq Server Families and Value Add Features

Third Edition (June 1998)

OVERVIEW

Compaq products have always provided customers with innovations designed to enhance the quality, reliability, maintainability, performance and Total Cost of Ownership (TCO). These innovations are evident in the hardware, software and service products that Compaq offers. Even the Compaq quality pledge reflects the commitment to listen to customers in order to deliver the highest quality products, services and solutions that ensure value and contribute to your success.

Compaq products pioneer new technologies that are subsequently adopted as industry standards. Features such as Automatic Server Recovery, once found only on Compaq servers, are now tauted by several vendors. Recently, Compaq engineered PCI Hot Plug technology, which has since been adopted as an industry standard.

Compaq also enhances products through partnerships with leading software companies. Compaq has developed strategic relationships with these industry leaders to provide total solutions that offer the highest level of service and support.

This document examines the tangible and intangible features that make Compaq servers and workstations the number one choice for customers who demand quality and reliability. Included within these pages are descriptions of features and the server families and server options that support them. This document is intended as a reference aid for those who need to understand how Compaq adds value to products.

HIGH AVAILABILITY FEATURES

Compaq understands that customers utilize systems to perform mission critical functions. Such functions are central to the success of business operations, and any loss of availability translates into a loss of time and money. To protect the customer from such losses, Compaq offers many features that ensure Compaq servers provide maximum uptime with minimal maintenance requirements.

High availability involves providing three major classes of functionality:

- Features that work around any failures without interruption of service (*Non-Stop Computing*)
- Features designed to reduce the time it takes to recover from failures (*Rapid Recovery*)
- Features designed to prevent problems from occurring at all (*Fault Prevention*)

Non-Stop Computing Features

Non-Stop Computing technologies provide a second line of defense against failures. These technologies enable you to route around potential faults and continue operating with little or no interruption of service. In many cases, non-stop computing features incorporate some degree of redundancy. The features listed in Table 1 enable Compaq systems to work around potential failures without requiring immediate intervention.

TABLE 1 : NON-STOP COMPUTING FEATURES

Feature	Description
Advanced Network Control Utility	Merges two similar network controllers into a controller pair allowing failover if a fault occurs.
Cluster Verification Utility	Helps determine whether a configuration is suitable for use with Microsoft Cluster Service.
On-Line Recovery Server	Allows two servers to act as a redundant pair while handling two separate workloads.
Online Storage Controller Recovery	Merges matched SMART-2 controllers into controller pairs, providing controller redundancy.
Redundant Fans	Ensures proper airflow around temperature sensitive components in the event of fan failure.
Redundant Hot Plug Power Supply	Redundant power supplies that can be added or replaced without shutting down the server.
Redundant Power Modules	Power Safe Modules that act as hot spares in the event that the primary module fails.
Redundant Power Supplies	Ensures that the server continues operating even when a power supply fails.
Standby Recovery Server	Allows two servers to act as a redundant pair, one acting as the hot spare for the active server.
Storage Automatic Reconstruction	Automatically reconstructs data to an online spare drive or a replacement drive if a drive fails.

Rapid Recovery Features

The features listed in Table 2 provide the ability to recover from server or component failure with the least possible impact on uptime. Several of the features listed here enable recovery from component failures without shutting down the server.

TABLE 2 : RAPID RECOVERY FEATURES

Feature	Description
Automatic Server Recovery-2 (ASR-2)	Allows the server to reboot, call the administrator, and report critical problems.
Fan Detect and Shutdown	Allows the operating system to detect failure of the fan(s) and invoke automatic shut down.
Hot Pluggable Drives	Permits you to plug and unplug SCSI drives from the system while the system is running.
Hot Plug Fans	Fans that can be replaced without shutting the system down.
Hot Plug Keyboards	Provides the ability to replace keyboards on a server without the need to reboot..
PCI Hot Plug	Allows removal and replacement of PCI controllers without shutting down the system.
Server Failure Notification	Sends a pager alert to notify a system administrator of a server malfunction.
Server Recovery Notification	Sends a pager alert to notify a system administrator of recovery from a server malfunction.
Temperature Detect and Shutdown	Detects when the temperature of the system exceeds the caution level and invokes shutdown.
Windows NT HAL Recovery	Replaces the Windows NT HAL in the event it becomes corrupted.

Fault Prevention Features

One of the most obvious ways to improve the availability of a server is to include features that enable the system to avoid problems. Such features involve forward-looking technologies, which anticipate the likelihood of a situation and prevents the situation from becoming a problem. Table 3 lists features that improve uptime by preventing server failures.

TABLE 3 : FAULT PREVENTION FEATURES

Feature	Description
ECC Memory	Error Checking and Correcting enables detection and correction of all single-bit memory errors.
Memory Deallocation	Tests all memory, automatically deallocates any bad memory blocks that it finds.
Intelligent Power Switch	Software configurable power switch that allows administrative control of power switch function.
Power Safety Interlock	Automatically turns system power off when the case cover is removed.
Pre-Failure Warranty	Identifies potential problems and provides replacement for critical components before they fail.

LIFE CYCLE COST REDUCTION

The most significant portion of the costs for owning a system usually comes from maintaining and expanding systems. Many of the features Compaq incorporates into server products extend the useful life of the products and reduce the maintenance effort and cost. Features that reduce the life cycle costs are listed here in three major categories:

- Server Maintenance
- Remote Capabilities
- Investment Protection

In this section we will examine the features which fall into these categories and show how they protect Compaq customer investments in hardware, software, and especially in the time and efforts of the people who use, manage and service the systems.

Server Maintenance

Server Maintenance involves tracking system parameters, maintaining the various subsystems, expanding capacity as needed, and monitoring the status of the systems. Table 4 lists features that enable many of the functions of server maintenance to be carried out while the system is operating.

TABLE 4 : ONLINE SERVER MAINTENANCE FEATURES

Feature	Description
Asset Tag Number	A firmware repository for storing company-specific property asset numbers for easy tracking.
Corrected Error Log	Allows quick determination of the type and frequency of corrected errors.
Hobbs Meter	Measures the amount of time a server has been operating since the last power cycle.
Integrated Management Display	Provides a view of information in the Integrated Management Log and other user defined text.
Power Line Monitoring	Tracks fluctuations in external power line connections.
RAID Online Expansion	Allows adding a new disk to a RAID array without destroying the data held in the array.
Survey Parameter Capture	Captures system parameters, compares with previous captures, and delivers a comprehensive view of the server and any differences between captures.
System Partition Admin. Utility	Used to access and update the System Partition on-line.
System Serial Number	An EEPROM that is factory burned with the system serial number when the system is built.
Temp Monitor w/Digital Output	Monitors temperature information in digital format to protect thermal sensitive devices.
Voltage/Current Monitor	Tracks voltage and amperage fluctuations through the power supplies.

Some server maintenance features are implemented during power-up, or may involve shutting down the system to complete the process. These off-line server maintenance features are listed in Table 5.

TABLE 5 : OFF-LINE SERVER MAINTENANCE FEATURES

Feature	Description
Boot Block ROM	A read-only section of the ROM that ensures you can always boot a ROMPaq diskette.
CD ROM Boot	Provides the option of booting from the CDROM.
Configurable Boot Order	Determines which mass storage controller services the boot device.
Critical Error Logging	Records catastrophic errors.
DOS CPR	Installs MS-DOS on a FAT partition with Microsoft Windows NT already installed.
Drive Firmware Upgrade	Compaq drive firmware upgrades.
Failure/Status LED	Indicates device status and alerts the customer of any device failure.
Fibre Fault Isolation Utility	Verifies installation and operation of Fibre Channel Storage System.
Flashable ROM	Used to apply software updates from the Integration Server to the production servers.
Integrated Management Log	Provides a log of system events, including Power-On Self Test results.
Power Down Manager	Gives the administrator an advanced level of flexibility in configuring the behavior of I^2C power switches.
PCI Plug and Play	Support of the Plug and Play standard for PCI devices.
Power-On Error Log	Records errors that occur during Power on Self Test (POST).
Revision History Table	Stores board revision information in non-volatile memory.
SmartStart	Simplifies configuration and installation of Compaq servers and options.
System Partition	Contains diagnostic tools and utilities, including the System Configuration Utility.

Remote Capabilities

Table 6 lists features providing the ability to perform functions on a server without actually being at the machine, via network or modem. Also included are features that communicate with the system administrator remotely to announce problems or changes.

TABLE 6 : REMOTE CAPABILITY FEATURES

Feature	Description
Compaq Insight Manager (CIM)	Delivers fault, performance and configuration management for servers and desktop clients.
CIM Alerts	Sends alerts to designated pager numbers in the event of an impending problem with a server.
Graphical Remote	Enables a graphical view of the Windows NT console to be displayed on the remote console.
Info Messenger	Automatic notification via e-mail of the availability of new information or software pertinent to you.
Integrated Remote Console (IRC)	Allows out-of-band management capabilities such as remote console and remote reset.
Power Supply Viewer	Views information about I_2C power subsystems remotely.
Remote Alpha/Numeric Paging	Alpha/numeric pager alert text is sent via Remote Insight/CIM when problems are detected.
Remote Asset Management	Allows collection or setting of asset management information remotely by way of CIM.
Remote Diagnostics	Analyzes the condition of the server remotely using Compaq Insight Manager.
Remote Insight	Offers the most complete out-of-band server management solution.
Remote NT SSD Upgrades	Enables system administrators to apply NT SSD upgrades to systems over the network.
Remote Threshold Settings	Sets alert threshold parameters remotely.
SmartStart CIMU	Allows manual upgrade or installation of Compaq products via Integration Server or CD.
Software Upgrades via Internet	Software updates are available for many operating systems via easy to navigate web pages.

Investment Protection

Compaq protects the customer's investment in several ways. Compaq systems provide features that enable the systems to grow as the demands on the equipment grow.

Compaq products incorporate industry standard components, which can be reused and moved between systems.

Compaq provides continued feature updates for outdated versions of popular operating systems. This offers customers who cannot upgrade to current versions of the operating systems to take advantage of many of the latest advances in Compaq technology. The commitment to providing on-going support of outdated operating environments gives Compaq customers the ability to decide when upgrades are necessary based upon their own business requirements, which protects the customer's investment in those outdated environments.

TABLE 7 : INVESTMENT PROTECTION FEATURES

Feature	Description
Long O/S Support Life	Continued feature updates for less recent versions of supported operating systems.
New OS Support for Older Servers	Older server platforms are supported with new operating system support software releases.
Pre-Failure Warranty	Protects your investment by replacing components prior to complete component failure.
Industry Standard Components	Standard components, such as memory and disks, are interchangeable between platforms.

PERFORMANCE TRACKING AND OPTIMIZATION

Table 8 lists features that provide information needed to evaluate system performance metrics and allow for tuning and optimization of Compaq systems.

TABLE 8 : PERFORMANCE ANALYSIS AND INFORMATION FEATURES

Feature	Description
EISA Bus Utilization Monitor	Tracks and graphs utilization of the EISA bus. Part of the Compaq Insight Management product.
Memory Fault Recovery Tracking	Tracks operations of the memory subsystem for uncorrectable errors.
NIC Fault Recovery Tracking	Tracks over 20 failure indications of Ethernet and Token Ring network interfaces.
PCI Bus Utilization Monitor	Tracks and graphs utilization of the PCI bus(es). Part of the Compaq Insight Management product.
Server Parameter Tracking	Provides timely fault, performance, and configuration information about critical server subsystems.
Storage Fault Recovery Tracking	Tracks failure parameters of mass storage controllers and attached hot pluggable drives.

SECURITY

Compaq servers offer many features that enhance physical and logical security. Table 9 lists security features, broadly defined as features which provide controls over physical access, remote access over the network or modem, and access by other software methods.

TABLE 9 : SECURITY FEATURES

Security Feature	Description
Administrative Password	Prevents changes to the configuration unless the password is entered.
CD Lock	Provides a means of disabling the CDROM from access.
Configuration (NVRAM) Lock	When locked, non-volatile memory cannot be modified, which disallows configuration changes.
Diskette Drive Control	Enable and disable the diskette drive. No read, write or boot functions are available.
Diskette Write Control	Enable and Disable diskette write functions. Boot and read functions are still available.
Front Bezel Key Lock	Locks the front portion of the server protecting the removable media components.
Keyboard Password	Locks out the keyboard to prevent unauthorized access to Compaq servers.
Network Server Mode	Allows system startup from hard disk or network server while the keyboard and mouse are disabled.
Power Down Lock	Disables the power switch to prevent accidental shutdown.
Power On Password	Prevents use of the computer unless the password is entered.
Protected Power Switch	Prevents accidental server shutdown due to incidental contact with the power switch cover.
QuickLock	Disables the keyboard and pointing device without exiting the application.
Serial Parallel Interface Control	Prevents unauthorized transfer of data through the integrated serial and parallel ports.

SERVER FAMILIES

In this section we will examine the Compaq server families and outline their hardware configurations and features.

ProLiant Family

The ProLiant family represents the premier family of Compaq servers, offering the latest reliability and performance enhancements.

ProLiant 800

The ProLiant 800 delivers exceptional performance with up to two 180- or 200-MHz Pentium Pro processors with 256-KB second level cache for SMP operating systems such as NetWare 4.11 and Windows NT 4.0. The integrated Wide-Ultra SCSI-3 Controller transfers data at rates of up to 40 MB per second, doubling the transfer data rates of Fast-Wide SCSI-2 controllers. The integrated Ethernet Controller offers highly reliable network connectivity and is upgradeable to 100 Mb/s Ethernet for higher bandwidth requirements. ProLiant 800 comes with Integrated Remote Console; a hardware-based management tool that cost-effectively delivers seamless remote console and full remote server reboot capabilities.

32 MB of ECC memory is standard and can be expanded to 512 MB using industry-standard DIMMs. The system is equipped with SmartStart and a CD-ROM Drive to make configuration and software installation faster, easier and more reliable.

ProLiant 850R

ProLiant 850R offers a rack optimized 3U design, providing a high-density, convenient rack-mount solution. ProLiant 850R provides full support for dual processing, allowing customers to take advantage of operating systems such as NetWare and Windows NT 4.0. The expansion bus provides two PCI slots, one ISA slot, and one shared PCI/ISA slot. The chassis provides five bays, three of which are available for hard drives. The integrated Wide-Ultra SCSI-3 Controller provides data transfer rates up to 40 MB per second, doubling the transfer data rates of the Fast-Wide SCSI-2 controllers for higher performance. The integrated 10/100 TX UTP Controller provides high performance connectivity that autosenses both 10 Mb/s and 100 Mb/s for maximum performance and has ports for both UTP and coax cable connections. Integrated Remote Console delivers seamless remote console and full remote server reboot capabilities with the addition of a modem. The system ships with 32 MB of EDO Memory, which can be expanded up to 512 MB using industry-standard unbuffered DIMMs.

SmartStart and the standard CD-ROM drive make configuration and software installation faster, easier and more reliable. The server comes standard with Compaq Insight Manager (CIM).

ProLiant 1000 (Discontinued)

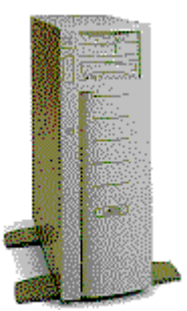
The first member of the ProLiant family, the ProLiant 1000 was built upon the EISA bus architecture and provided eight expansion slots, consisting of seven 8/16/32-bit EISA bus master expansion slots and one management modem slot. The system board provided an integrated Fast-SCSI-2 Controller, as well as integrated SVGA video controller. The system shipped with 16 MB of RAM, expandable to 144 MB (Pentium models) or 128 MB (486 models) using industry standard SIMMs. The system included a pre-installed NetFlex-2 Ethernet Controller and CD-ROM drive. The chassis provided space for eight total internal storage device bays, of which five were internal hot-pluggable drive bays.

ProLiant 1200

The Compaq ProLiant 1200 is an affordable and dependable server for demanding workgroup and remote-office applications. The ProLiant 1200 is ideally suited for price sensitive users who need a powerful and high availability server platform that is easy to use.

The ProLiant 1200 uses the Intel Pentium II 233/512K ECC cache processor. Base memory is 32 MB, with eight memory slots allowing expansion up to 512 MB (a limitation of the Pentium II processor). The system architecture is based on Dual Peer PCI buses. Integrated Remote Console delivers seamless remote console and full remote server reboot capabilities by adding a modem.

Up to three 1.6" hot plug drives can be installed in the case, giving workgroups and remote sites the uptime they need while providing plenty of disk space for your ever-growing file demands. The integrated Cirrus 54M30 video controller with 1MB of video RAM provides 1024 x 768 resolution with 256 colors. The integrated network interface is the Netelligent 10/100 TX PCI UTP controller, which occupies one of the PCI slots. The ProLiant 1200 comes with an integrated Wide Ultra SCSI-3 controller, offering data transfer rates up to 40 MB per second. The system is I_2O capable with I_2O Look Aside Connector. The system can be ordered with an optional Integrated Management Display.



ProLiant 1500 (Discontinued)

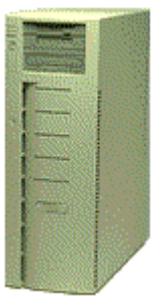
FlexSMP System Architecture allowed the ProLiant 1500 to upgrade to dual processing. A 6/200 FlexSMP Dual Processor Board was available to expand to a second 200 MHz Pentium Pro Processor. 512 KB secondary write-back cache provided enhanced system performance. 32 MB of ECC memory was located on processor board, and was expandable up to 256 MB.

The ProLiant 1500 system board had an integrated 32-Bit Fast-Wide SCSI-2 Controller connected to a cage with five hot pluggable SCSI drive bays. Eight total expansion slots (five EISA, two PCI and one shared EISA/PCI) were provided, one of which was consumed by the preinstalled NetFlex-3/P Controller. A quad speed CD-ROM drive was standard, and was connected to an integrated EIDE interface on the system board. A redundant power supply upgrade was available.

ProLiant 1600

The Compaq ProLiant 1600 is a high performance server for workgroup and remote-office application with uptime features unmatched in its class. A state-of-the-art Pentium II 266 MHz or 300 MHz processor with 512 KB second level (L2) ECC cache and dual processing capability provides exceptional performance, and the hot plug drives deliver increased uptime. Two Wide-Ultra SCSI-3 controllers offer 40 MB per second performance each, with plenty of headroom for growing network demands. The system comes standard with 64 MB of EDO ECC memory and is expandable to 512 MB using industry standard DIMMs. The ProLiant 1600 incorporates Highly Parallel System Architecture, providing improved system bandwidth. It comes standard with an I_2O Connector and Integrated Remote Console. A preinstalled 16X MAX IDE CDROM is part of the standard configuration. The system can be ordered with an optional Integrated Management Display.

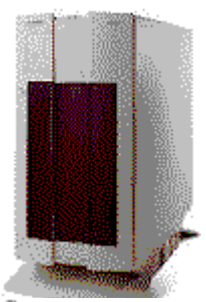
The system is equipped with a hot pluggable power supply and can be ordered with an optional redundant hot plug power supply to enhance system availability. The ProLiant 1600 is protected by a three year limited warranty and the Compaq Pre-Failure Warranty.



ProLiant 2000 (Discontinued)

The ProLiant 2000 offered the option of running from one or two processors, using the FlexSMP System Architecture. The system board provided eight EISA bus master expansion slots, one of which was consumed by the preinstalled NetFlex-2 Ethernet or Token Ring controller. The system board sported an integrated Fast-SCSI-2 Controller. 32 MB of Advanced ECC RAM was standard, and could be expanded to 512 MB using industry standard SIMMs.

The chassis had eight total internal storage device bays, of which five were hot plug drive bays. An optional redundant power supply was also available for the system.



ProLiant 2500

The ProLiant 2500 provides full support for dual processing, using up to two Pentium Pro processors for high performance in departmental and Internet/Intranet applications. The system board is equipped with an integrated Wide-Ultra SCSI Controller, and an integrated high performance network interface that autosenses both 10 Mb/s and 100 Mb/s. In addition, the Integrated Remote Console delivers seamless remote console and full remote server reboot capabilities with the addition of a modem. The system ships with 32MB of ECC memory, and supports up to 1 GB using industry-standard DIMMs.

The chassis provides improved serviceability and flexibility for rack mounting, and some models include an Integrated Management Display that delivers fault tolerant service and configuration information on an easy-to-use LCD panel.

SmartStart and 8X CD-ROM Drive are standard, making configuration and software installation faster, easier and more reliable. In addition, the system comes standard with Compaq Insight Manager, Automatic Server Recovery-2, and the Compaq Pre-Failure Warranty to improve system availability.

Some of the other server management features of the ProLiant 2500 include Server Health Logging, Revision History Table, Off-Line Backup Processor, and the Compaq Remote Insight Board (optional).

Security

MultiLock security features include power-on password, keyboard password, diskette drive control, diskette boot control, network server mode, security provision, parallel and serial interface control, administrator's password, and disk configuration lock.

ProLiant 3000

The ProLiant 3000 is the department server with performance and expansion you will not outgrow. ProLiant 3000 systems are available in tower or rack-mount (3000R) form factors and feature up to two Pentium II 300MHz or 333 MHz CPUs with 512 KB (L2) cache. It uses the new Highly Parallel System Architecture that includes dual memory controller and Dual Peer PCI buses. The new Dual Channel Wide-Ultra SCSI-3 controller provides support for up to six 1.6" or eight 1.0" hot plug SCSI drives. This system provides a hot-pluggable 750 watt power supply with optional redundant power supply. There are eight expansion slots, of which five are PCI and three are shared PCI/EISA. The system is equipped with a standard 16X MAX IDE CDROM drive.

The system also includes an integrated Cirrus 54M30 video controller. The Netelligent 10/100 TX PCI UTP Network Interface Controller comes standard and uses a PCI slot. The system can be equipped with optional redundant fans. The Integrated Management Display LCD panel is standard. In addition, the system offers support for network controller pairing, and SMART-2 array controller pairing, providing a very high degree of fault tolerance for mission critical applications.

The system ships with 64 MB Memory standard, expandable to 512 MB (3GB with the 333 MHz model). The ProLiant 3000 is I_2O capable and comes equipped with an I_2O Look Aside Connector. It is protected by a three-year on-site limited warranty and extended Pre-Failure Warranty that covers Pentium Pro processors, memory and disk drives.

ProLiant 4000 (Discontinued)

ProLiant 4000 servers offered highly extensible performance by allowing up to four system processor boards to be installed, using the FlexSMP system architecture. The I/O board included an integrated Fast-SCSI-2 Controller and provided eight 8/16/32-bit EISA bus master expansion slots. ProLiant 4000 shipped with a standard 64 MB of Advanced ECC memory, expandable to 512 MB. In addition, the ProLiant 4000 was equipped with a pre-installed NetFlex-2 ENET-TR controller and CD-ROM drive and SmartStart

ProLiant 4500 (Discontinued)

ProLiant 4500 provided up to four processors, including support for an off-line back-up processor with automatic processor recovery. The I/O board included an integrated Fast-Wide SCSI-2 Controller and offered eight 8/16/32-bit EISA bus master expansion slots. The system shipped with 64 MB (32 MB in Model 1) of advanced ECC RAM, expandable to 1GB using industry-standard SIMMs. The system included a preinstalled NetFlex-3 Controller and CD-ROM drive. The chassis provided seven storage device bays, of which four were internal hot-pluggable drive bays. Some models were equipped with an optional redundant power supply. A 2 MB Transaction Blaster option was available for customers interested in running high-end, multiprocessing applications.

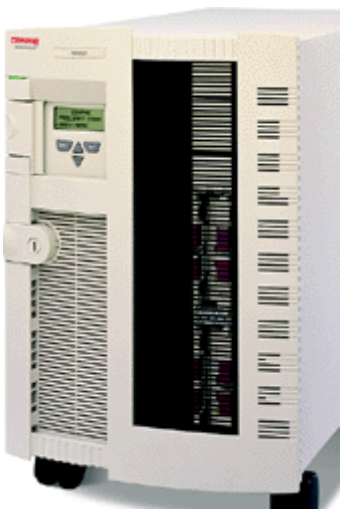
ProLiant 5000

The award winning ProLiant 5000 systems utilize 166 MHz or 200 MHz Pentium Pro processors with integrated 256 KB or 512 KB (L2) cache. The system has a 4 GB memory capacity with industry-standard DIMMs. The system includes ECC-protected processor-memory data bus and L2 cache. An optional Redundant Processor Power Module provides continued availability if one power module should fail. Support for optional off-line backup processors allows near-maximum availability in case of processor failure. Dual peer PCI buses deliver an aggregate 267 MB/sec for improved system throughput.

The ProLiant 5000 is equipped is equipped with a Netelligent 10/100 TX PCI UTP Network Interface Controller. Customers may elect to install additional redundant Netelligent 10/100 Ethernet NIC for maximum system reliability.

The Compaq Pre-Failure Warranty covers the Pentium Pro processor as well as hard drive(s) and memory. Optional SMART-2 array controllers provide multiple RAID protection levels. Compaq Insight Manager and SmartStart, industry-leading management and integration tools, are standard on every server.

Three-year on-site warranty is included and upgrade and trade-in programs are available to protect your server investment.



ProLiant 5500

The ProLiant 5500 enterprise-class server combines advanced multiprocessing capabilities with the latest high performance system architecture and high performance I/O subsystems to deliver industry-leading performance. It comes in either tower or rack-mount (5500R) models, each supporting up to four Pentium Pro 200 MHz/512 KB cache processors. The system utilizes Highly Parallel System Architecture for improved system bandwidth, and provides dual memory controllers and Dual Peer PCI bus for improved throughput to I/O devices resulting in increased overall system performance. The system is equipped with a Dual Channel Integrated Wide Ultra SCSI-3 controller that provides support for up to either six 1.6" or eight 1.0" hot plug SCSI drives, with data transfer rates of up to 40 MB per second on each channel.

The ProLiant 5500 also includes a 750 watt hot plug power supply, with an optional redundant power supply. It comes standard with the Integrated Management Display LCD panel. In addition, the system offers support for redundant fans, network controller pairing, and SMART-2 array controller pairing, providing a very high degree of fault tolerance for mission critical applications.

The ProLiant 5500 has an integrated Cirrus 54M30 video controller. A Netelligent 10/100 TX PCI UTP Network Interface Controller ships standard with the ProLiant 5500, and occupies a PCI slot.

The system ships with 128 MB ECC EDO memory, which can be expanded, to 3GB using industry standard DIMMs. The ProLiant 5500 is I_2O capable with an I_2O Look Aside Connector standard. It is protected by a three-year on-site limited warranty and extended Pre-Failure Warranty that covers Pentium Pro processors, memory and disk drives.

ProLiant 6000

The ProLiant 6000 can be configured with up to four 200 MHz Pentium Pro Processors, delivering leading price/performance, and is upgradeable to the next generation of Intel processors. The system board provides integrated Dual Channel Wide-Ultra SCSI-3 Controller, providing two SCSI channels which transfer data at rates of up to 40 MB/s per channel, doubling the data transfer rates of Fast-Wide SCSI-2. Also included is a 10/100BaseTX PCI Ethernet Controller for high performance, auto-sensing 10 Mb/s or 100 Mb/s network connectivity. The integrated PCI based video controller (Cirrus 5430) has 512 KB of video RAM (expandable to 1 MB). The server includes Integrated Management Display and Integrated Remote Console, which makes the server easier to manage and service.

The base configuration includes 128 MB of ECC-Protected EDO Memory, with support for Fast Page Mode (mixing allowed), and expands up to 4 GB of four-way interleaved memory using industry-standard DIMMs.

The system offers easy conversion to 19" rack mount, using 14U per server and allowing 3 to be installed in a 42U rack, which maximizes configuration flexibility. Optional Hot Plug Redundant Power Supply is available on base models, offering N+1 redundancy support for max load configuration. The system supports up to six 1” drives and four 1.6” drives on each backplane, with a maximum of three SCSI backplanes. Duplexing can be accomplished by adding a second SCSI backplane.

New replicated installation from SmartStart and the standard CD-ROM drive deliver quicker and easier enterprise rollouts. Compaq Insight Manager support is included, as is support of enhanced event logs with 32 KB of NVRAM supported. Optional Integrated Management Display is available.

ProLiant 6500

ProLiant 6500 sets new standards for system availability by introducing the first Industry-Standard PCI Hot Plug bus. It supports up to four Pentium Pro 200 MHz processors with either a 512 KB or a 1 MB (L2) cache. Planned upgrades will allow you to move to the next generation of Intel processors, offering the power and performance needed to handle virtually any server environment. The system is available in both tower and rack-mount form factors, providing the flexibility to fit into any customer environment.

The system uses EDO Buffered DIMM memory technology to support a maximum of 4 GB of RAM. The chassis supports six hot-plug PCI slots and two shared non hot-plug PCI/EISA slots. It comes with modular drive bays (five 1.6" or seven 1" hot-plug drive bays), 1 3.5" floppy, 1 CD ROM, two 1/2 high devices, an integrated parallel port, 2 serial ports, a mouse and keyboard.

The system contains two 750 W redundant hot-plug power supplies. ProLiant 6500 also offers new enhanced system management features (Integrated Remote Console, Integrated Management Display LCD, Enhanced Event logs). The system includes a single integrated Ultra SCSI-3 controller, providing a data transfer rate up to 40 MB per second. The system board has an integrated Cirrus 54M30 with 1 MB of video memory. It is protected by CompaqCare, including a limited three-year parts, labor and on-site warranty with optional 4 hour response. Pre-Failure Warranty and Compaq Service and Support Programs are available on a worldwide basis.

ProLiant 7000

The Compaq ProLiant 7000 is the ultimate standards-based server, delivering superior performance, breakthrough high-availability, and unparalleled growth opportunities for 7x24 environments. The ProLiant 7000 offers 1-4 Pentium Pro processors with a planned upgrade to next generation Intel processor technology. Combined with the latest high-availability features, including PCI Hot Plug, the ProLiant 7000 offers superior investment protection for your most demanding business-critical applications.

The system includes four redundant power processor modules and standard redundant hot plug replacement fans. It ships with two redundant hot plug power supplies, with a slot for a third hot plug power supply for maximum availability. The system has a rack-ready form. ProLiant 7000 also includes three out of three Internal Drive Cages, Integrated Management Display and the Integrated Management Log. Installed in PCI Hot Plug slots are a Netelligent Dual-Port 10/100Base-TX UTP Controller and a SMART-2DH Array Controller. ProLiant 7000 supports I_2O technology.

ProLiant 7000 is protected by CompaqCare, including a limited three-year parts, labor and on-site warranty with optional 4-hour response. Pre-Failure Warranty and Compaq Service and Support Programs are available on a worldwide basis.

ProSignia Family

The ProSignia system architecture built upon the success of the SystemPro family, while providing more compact packaging.

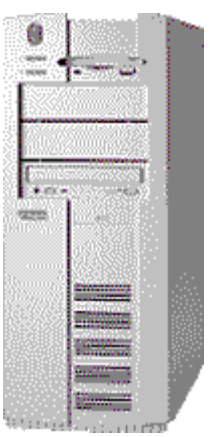
ProSignia (Discontinued)

The original ProSignia utilized the EISA bus architecture with several integrated components that left the expansion slots available to answer customer requirements. The system supported up to eight mass storage devices internally, allowing a full complement of SCSI disks to be attached to the integrated Fast-Wide SCSI controller. ProSignia came standard with a CDROM plus the SmartStart CDROM package to assist customers in getting the system up and running. The ProSignia was the first Compaq server to offer Compaq Insight Manager standard.

ProSignia 200 5/166

The ProSignia 200 5/166 offers powerful uniprocessor performance in an aggressively priced package. The original ProSignia 200 5/166 systems are equipped with 166 MHz Pentium processor with 512 KB second level cache. The system uses the PCI System Architecture, which maximizes server performance of PCI systems. The system board offers integrated 32-bit Enhanced IDE upgradeable to Wide-Ultra SCSI-2 (standard on M1 SCSI). It comes standard with 16 MB EDO memory, and supports up to 128 MB using industry-standard SIMMs (upgradeable to ECC).

The ProSignia 200 5/166 ships with a Netelligent 10 T PCI UTP Ethernet Controller, which delivers reliable, high-performance network throughput. As with all Compaq servers, the system includes Automatic Server Recovery-2 and Compaq Insight Manager. In addition, SmartStart and the standard 8X CD-ROM drive make configuration and software installation faster, easier and more reliable.



ProSignia 200 6/233, 6/266, 6/300

The ProSignia 200 6 system builds on the ProSignia 200 tradition by offering Intel Pentium II processors operating at 233 MHz, 266 MHz and 300 MHz with 512 KB second level (L2) cache. The PCI System Architecture maximizes server performance of PCI systems incorporating second-generation Pentium processor. The system board offers three PCI expansion slots (one populated with Video), one Shared PCI/ISA slot and one ISA Slot, using the Intel 440FX Chipset. Integrated on the system board is a two Channel ATA EIDE controller supporting up to 4 IDE fixed drives (if CD is removed). A 32-Bit Wide-Ultra SCSI-3 controller is available pre-installed in a PCI slot, providing data transfer rates up to 40MB per second. Also integrated on the system board is a Netelligent 10/100 PCI UTP/Coax Controller, which delivers a reliable, high-performance network throughput. 1024 x 768 video support is provided with 1 MB of video memory, upgradeable to 2 MB.

The system ships with 32 MB of 32-bit EDO memory expandable to 192 MB using industry standard EDO SIMMs, or up to 384 MB using optional Fast Page Mode (FPM) ECC kits from Compaq. ProSignia 200 6/xxx comes in tower configuration only, and includes a 16X CD-ROM drive.

ProSignia 300 (Discontinued)

The ProSignia 300 offered integrated 32-bit Fast-SCSI-2 controller and an integrated 32-bit Ethernet controller, that deliver faster response time when users access files from the server. Instead of a computer optimized for running Windows desktop applications, the ProSignia 300 was optimized for running network operating systems like NetWare. Users found true server features, like Automatic Server Recovery and ECC memory that desktop computers lack, made the ProSignia 300 a more dependable server platform.

The ProSignia 300 supported the Standby Recovery Server and the On-Line Recovery Server to add even more fault management to ProSignia 300 servers. With this option, one ProSignia server acted as a standby for another, taking over in the unlikely event of a hardware or software failure. For an even more cost-effective solution, Compaq now allows a ProSignia server to act as the idle server for a ProLiant server in the standby or on-line mode.

Compaq Insight Manager and SmartStart were standard, increasing the dependability and manageability of the server. SmartStart builds a tested and reliable platform for the server while Compaq Insight Manager makes the server easy to manage, across the network or from remote locations.

A Rack-Mounting Kit was available as an option, allowing customers to install ProSignia 300 servers in rack enclosures.

ProSignia 500 (Discontinued)

The ProSignia 500 provided a robust and expandable platform which was board and chip upgradeable, offering one and two processor configurations using the FlexSMP architecture. The system offered 256 KB shared secondary write-back cache. The system board included an integrated 32-Bit NetFlex-L Ethernet controller, integrated 32-bit Fast-SCSI-2 controller, and integrated 1024 x 768 video graphics. The ProSignia 500 contains six total expansion slots, including one processor expansion slot, three EISA slots, one shared EISA/PCI and one PCI slot.

ProSignia 500 came standard with 16 MB of ECC memory, expandable to 208 MB using industry standard SIMMs. The chassis provided eight total storage device bays allowing internal storage expandability up to 30.1 GB. The system was equipped with a preinstalled CD-ROM drive.

ProSignia 500 shipped standard with the Compaq SmartStart integration tool, Compaq Insight Manager, Automatic Server Recovery (ASR) and Server Health Logs.

ProSignia VS (Discontinued)

The ProSignia VS was one of the first members of the ProSignia family. The system was designed to utilize 486 processors to produce a highly serviceable design. The system board offered integrated 32-Bit Fast-SCSI-2 controller and an integrated NetFlex-L Ethernet controller. There are five EISA bus master slots. The ProSignia VS came standard with 16 MB of RAM, which is expandable to 128 MB using industry standard SIMMs. The chassis provided room for five mass storage bays.

ProSignia VS was among the first servers to come standard with Automatic Server Recovery (ASR).

SystemPro Family

The SystemPro family represented the first Compaq server family. Innovative features such as the eight standard internal drive bays and FlexSMP multiprocessor architecture laid the foundation upon which the Compaq server products were built.

SystemPro (Discontinued)

The original SystemPro provided the ability to configure server class systems using Intel processors. SystemPro was designed using the FlexSMP architecture, enabling dual-processor configurations. The chassis provided space for eleven devices, including up to eight disk devices. The system board offered integrated Enhanced IDE, and SVGA video.

SystemPro LT (Discontinued)

SystemPro LT provided a lower cost member of the SystemPro family in a uniprocessor configuration. The chassis provided the same number of storage device bays, and the system board included the integrated Enhanced IDE, SVGA video controllers.

SystemPro XL (Discontinued)

The SystemPro XL enhanced the SystemPro family by providing improved processor options, including 486DX2 and Pentium processors, available in either single or dual processor configurations. Built within the SystemPro chassis, the XL provided eleven storage device bays, of which eight are available for internal Fast IDE devices. The system board included integrated Enhanced IDE, SVGA video and SCSI-2 controllers, leaving the EISA expansion slots available for customer use.

FEATURES SUPPORTED BY OPTION FAMILIES

Fibre Channel Storage Systems

Fibre Channel is the next generation in storage technology combining the reliability and low latency of a serial channel with the flexibility and connectivity of a network. The result is a 100 megabyte-per-second storage network that supports simultaneous transfer of many different data protocols, including SCSI, IPI and IP. Compaq is one of the sponsors of the American National Standards Institute committee responsible for developing the Fibre Channel standards. Over two-thirds of the storage industry have adopted these new standards as an enabling technology for high availability storage networks and server clusters.

With Compaq Fibre Channel Storage System, customers can build a highly scalable and modular storage architecture using Compaq Fibre Channel Host Controllers, Fibre Channel Arrays and Fibre Channel Hub 7 Modules. The Fibre Channel Host Controller is the Fibre Channel Arbitrated Loop (FC-AL) host interface enabling users to attach multiple storage devices to a single PCI or EISA host slot. The RAID functionality and disk drives are contained in the Fibre Channel Arrays, providing simultaneous scalability of capacity, processing power and cache. The Fibre Channel Hub 7 Module can connect multiple devices to the FC-AL, providing a very high degree of connectivity and simplicity of storage growth.

Fibre Channel Storage Hub 7

The Compaq Fibre Channel Storage Hub 7 is a seven port hub that creates a 100-megabyte-per-second fibre channel arbitrated loop (FCAL) through its internal wiring and logic. With the use of the Fibre Channel Storage Hub 7, a Fibre Channel Host Controller occupying a single expansion slot can control up to six Fibre Channel Arrays for a total storage capacity of 873.6 GB.

Fibre Channel Host Controller

The Compaq Fibre Channel Host Controller is a high speed interface that provides connectivity between the server and up to six Fibre Channel Arrays. It is available in either PCI or EISA versions. The Fibre Channel Host Controller/P is a PCI Bus Master device. The Fibre Channel Host Controller/E is for use in servers equipped with only EISA expansion slots, or with a server that has a majority of EISA bus slots. It takes advantage of the EISA architecture by performing 32-bit bus master burst transfers. Both the PCI and EISA versions require installation of a gigabit interface converter to the I/O port before the multi-mode fiber is connected.

Fibre Channel Arrays

A Fibre Channel Array is an external drive enclosure containing a Fibre Channel Array Controller, disk drive housing, fan assemblies and a power supply. A single Fibre Channel Array accommodates up to eight 1.6-inch or twelve 1.0-inch Wide-Ultra SCSI-3 drives. As Table 10 shows, an individual Fibre Channel Array can provide a total capacity of 145.6 GB.

TABLE 10 : INDIVIDUAL FIBRE CHANNEL ARRAY CAPACITIES

Maximum Number of Drives	Drive Size (in inches)	Native Capacity per Drive (Gigabytes)	Maximum Total Capacity (Gigabytes)		
			RAID 0	RAID 1	RAID 4 or 5
8	1.6	18.2	145.6	72.8	127.4
8	1.6	9.1	72.8	36.4	63.7
12	1.0	9.1	109.2	54.6	100.1
12	1.0	4.3	51.6	25.8	47.3

Fibre Channel Array Controllers

The Fibre Channel Array Controller is an intelligent Fibre Channel to SCSI Array controller integrated into the Fibre Channel Array. The controller is based on the Compaq SMART-2 Array Controller technology, and comes with two Wide-Ultra SCSI-3 channels. Each channel can transfer data at 40 MB per second for a combined potential throughput of 80 MB per second. The Fibre Channel Array Controllers are capable of utilizing Wide-Ultra SCSI-3 drives, Fast-Wide SCSI-2 drives, or Fast SCSI-2 drives, which allows customers to configure their storage subsystem using existing drives.

All of the features listed below for the SMART and SMART-2 Array controllers are also available on Fibre Channel Array controllers.

SMART and SMART-2 Array Controllers

The SMART (SCSI Managed Array Technology) and SMART-2 Array controllers are comprehensive PCI or EISA intelligent array controllers that combine configuration flexibility and intelligent storage management to ensure continuous high-performance access to network data. Table 11 lists the SMART and SMART-2 Array controllers and some of their hardware features.

TABLE 11 : SMART AND SMART-2 ARRAY CONTROLLERS COMPARED

Controller Name	Bus	Cache	Max Drives	SCSI Support	Max Storage	RAID levels
SMART	EISA	2 MB Mirrored (4 MB total), write only, battery backed	14	Fast SCSI-2	60 GB	0,1,4,5
SMART-2/E	EISA	4 MB ECC read/write, battery backed	14	Fast-Wide SCSI-2	254 GB	0,1,4,5
SMART-2/P	PCI	4 MB ECC read/write, battery-backed	14	Fast-Wide SCSI-2	254 GB	0,1,4,5
SMART-2DH	PCI	16 MB ECC read/write, battery-backed	14	Wide-Ultra SCSI-3	254 GB	0,1,4,5
SMART-2SL	PCI	6 MB ECC read-only (4 MB accessible)	7	Wide-Ultra SCSI-3	127 GB	0,1,5

***Note**: Max storage numbers in Table 11 are based on the use of 4.3GB drives for the SMART controller and 18.2 GB drives for the SMART-2 controllers.*

Array Accelerator Cache

***Note**: Array Accelerator Cache is disabled when implementing Recovery Server Option or Online Storage Controller Recovery Option in order to preserve data integrity during failover events.*

A write cache on the SMART family of controllers improves performance when writing to the drive array. The cache can accept data from the server at maximum PCI or EISA bus burst rates while writing to the array(s). The size of the cache varies from 4 MB to 16 MB, depending on the specific model of SMART-2 controller. This cache has parity check bits added to ensure integrity, and battery backup protects the cache on the SMART-2 controller. Fully charged batteries will preserve data in the cache for up to 96 hours.

Array Accelerator Tracking

Monitors the Array Accelerator Cache battery status and memory integrity.

Automatic Data Recovery (Storage Automatic Reconstruction)

After you replace a failed drive in a RAID 1, RAID 4 or RAID 5 array, Automatic Data Recovery reconstructs the data and places it on the replaced drive. This allows a rapid recovery to full operational performance without interrupting normal system operations. This feature is implemented at the hardware level and operates independent of the operating system.

Auto Reliability Monitoring

ARM is a background process that scans hard drives for bad sectors in fault tolerant logic drives. ARM also verifies the consistency of parity data in drives with Data Guarding (RAID 4) and Distributed Data Guarding (RAID 5). This process assures that you can recover all data successfully if a drive failure occurs in the future. ARM operates only when you select Drive Mirroring, Data Guarding, or Distributed Data Guarding.

Bus Master Transfers to System Memory

The SMART controllers are bus master devices that take control of the EISA or PCI bus during high speed transfers. This allows the system process to handle application processing or other types of tasks while data transfer is in process. The Intelligent Array Engine (IAE) on the controller buffers the data from the drives before transferring it to system memory. Bus master high speed transfers are particularly important when the supported models are using in conjunction with multiple expansion boards, such as network interface controllers.

Concurrent I/O Request Servicing

SMART Controllers use Intelligent Array Engines (IAE) to service multiple requests concurrently. The first IAE provides parallel control and data access to multiple drives. High Speed transfers are routed directly to main system memory to improve overall performance. During this time the second IAE optimizes the order in which instructions execute. For example, if a user requests data that resides on the first drive and another user requests data that resides on the second drive, the controller can deliver both pieces of data concurrently.

Data Striping

Data Striping is a customized data distribution process that optimizes the storing arrangement of data across multiple physical disk drives organized into a logical drive. Data striping enhances the way the operating system requests data.

Drive Parameter Tracking

Drive Parameter Tracking monitors more than 15 drive operational parameters and functional tests. This includes parameters such as read, write, and seek errors, spin-up time, "cable off" and functional tests such as track-to-track seek time, one-third stroke, and full stroke seek time. Drive Parameter Tracking allows you to detect drive problems before they cause the drive to fail.

Dual Channel Capabilities

Dual channel SMART controllers (SMART, SMART-2/E, SMART-2/P, and SMART-2DH) contain two SCSI buses (ports) which support up to seven drives each. The internal and external connectors reside on separate SCSI buses.

Dynamic Sector Repairing

Dynamic Sector Repairing is the process by which the controller automatically remaps any bad sectors it detects, either during normal operation or during Auto Reliability Monitoring.

Interim Data Recovery

If one of the drives in a RAID 1, RAID 4 or RAID 5 array fails, the server continues to operate in interim data recovery mode. While operating in this mode, the server continues to process I/O

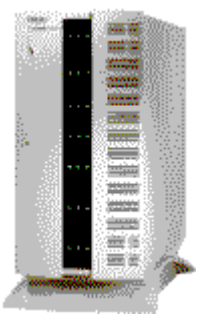
requests, but at a reduced performance level. This feature allows the server to remain functional until the failed drive can be replaced and fault tolerance restored.

Online Spares

Online Spare drives allow SMART controllers to recover from drive failure in RAID1, RAID 4 and RAID5 arrays automatically without the need for manual intervention. When one of the drives in an array fails, the controller replaces the failed drive with the Online Spare and routes all data bound for the failed drive to the spare.

Optimized Request Management

SMART controllers are capable of reorganizing the I/O requests queues they process in order to optimize performance.



ProLiant Storage System

The ProLiant Storage System is a drive expansion enclosure that offers higher storage density, high availability and selective fault tolerance. This product is intended for systems running business critical applications that require high availability, excellent serviceability and large storage capacity. Table 12 lists the ProLiant Storage Systems and some of their hardware features.

TABLE 12: PROLIANT STORAGE SYSTEMS COMPARED

Product Name	Max Drives	SCSI Support	Max Storage	Hot-Pluggable Components
ProLiant Storage System	7	Fast-Wide SCSI-2	63.7GB	Drives
ProLiant Storage System /F	7 (single bus) 8 x 1.6" (dual bus) 12 x 1" (dual bus)	Fast-Wide SCSI-2	127GB (single bus) 145GB (dual bus) 72.8GB (dual bus)	Drives Fans Power Supply
ProLiant Storage System /U	7 (single bus) 8 x 1.6" (dual bus) 12 x 1" (dual bus)	Wide-Ultra SCSI-3	127GB (single bus) 145GB (dual bus) 72.8GB (dual bus)	Drives Fans Redundant Power Supplies

Automatic SCSI Identification

Automatically sets the SCSI ID on each drive to prevent SCSI ID conflicts.

Internal Duplexing (optional)

This feature allows the SCSI bus within a ProLiant Storage System to be divided into two short buses, providing the ability to support connections from two mass storage controllers. This improves system reliability if a drive or controller fails.

Keylock

Secures physical access to the disks in a ProLiant Storage System, protecting critical data.

Thermal Tracking

Thermal tracking notifies the user when the temperature inside the ProLiant Storage System reaches 50°C. The warning is passed on to the operating system by the controller. If the user does not act, the 60°C thermal protection circuitry causes the power supply to shut down.

APPENDIX A - GLOSSARY

In this section, the features and options are listed alphabetically. Detailed feature descriptions are provided in this section. The left column contains a list of the category tables in which the feature belongs.

Security

Administrative Password

Prevents changes to the configuration unless the password is entered.

High Availability

Advanced Network Control Utility

The Advanced Network Control Utility provides the ability to merge two similar network controllers into a controller pair. In such a pair, one controller is the Active controller, and the other remains in standby mode. If the active controller fails, all network traffic is switched to the backup controller. In systems which support PCI Hot Plug technology, a failed controller can be replaced and the controller pair restored to complete redundancy without shutting down the system.

Online Server Maintenance

Asset Tag Number

The Asset Tag is used by customers as a repository for storing company-specific asset numbers for easy tracking and is initially set equal to the system serial number. The Asset Tag is stored in a protected section of non-volatile memory, which can be accessed and modified with the F10 Setup program.

High Availability

Automatic Server Recovery (ASR)

In the event of a critical hardware or software error, Automatic Server Recovery logs the source of the error and allows the server to reboot to either the operating system or Compaq Utilities installed on the fixed disk *System Partition*, call the administrator, and report the problem. ASR provides a cost-effective means of minimizing unplanned downtime since automatic reboot of the server brings users back on line with minimal interruption of service.

The Automatic Server Recovery feature consists of three elements:

- Hardware integrated onto the system board that, with the assistance of an operating system driver, detects when a server has malfunctioned and consequently resets the system.
- Server failure notifications that sends a pager alert to notify a system administrator of a server malfunction.
- Remote capability to reboot to the operating system or to Compaq utilities in order to run diagnostics and reconfigure remotely.

High Availability

Automatic Server Recovery-2 (ASR-2)

ASR-2 is a superset of the functionality provided by ASR. ASR-2 adds the environmental recovery features Thermal shutdown and UPS shutdown.

Off-line Server Maintenance

Boot Block ROM

A read-only section of the ROM which has fail safe code to make sure you can always boot a minimum system in the event that the ROM code becomes corrupted. It ensures that you can always boot to a ROMPaq diskette to restore the ROM.

Security

CD Lock

CD Lock provides a means of disabling CDROM access. This enables the administrator to inhibit the use of the CDROM for unauthorized software loading.

Off-line Server Maintenance

CD-ROM Boot

Many Compaq servers provide the option of booting from the CDROM, which greatly simplifies the process of initial software load by eliminating the need to use floppy diskettes.

Remote Capabilities

Compaq Insight Manager (CIM)

Compaq Insight Manager is an intuitive systems management tool delivering fault, performance and configuration management for Compaq servers and desktop clients. The management software consists of Insight Manager which runs on the management console and the operating system specific Insight Agent which runs on the server or managed desktop client.

The optional Compaq Remote Insight Board provides an operating system independent remote connection to a managed server, allowing a remote PC to display all phases of server activity (including POST sequences and OS load) without loss of connection. In addition, the administrator can use the Remote Insight Manager Board to perform remote reboots and to obtain alphanumeric or digital pages when an alert occurs.

Compaq Insight Management software follows a client-server architecture. The "front-end" management application, such as Insight Manager, delivers management capabilities to the user in an intuitive, easy-to-use manner. Meanwhile, the "back-end" software, Compaq Insight Management Agent, runs on the server providing access to the advanced hardware technologies that make server management possible.

Compaq Insight Management Agents check fault and performance indicators for the server hardware and options, providing the information in the form of a Management Information Block (MIB). CIM agents also collect asset information and component failure information, making these available to administrators, even when the server is down or otherwise inaccessible to the network.

Management information is passed to Insight Manager through the Simple Network Management Protocol (SNMP), the industry standard for management information communication. This standards-based management scheme also allows SNMP-based management platforms to monitor Compaq Server Management data.

Remote Capabilities

CIM Auto Alerts

With Compaq Insight Manager, you can designate who will be "on call" for any Compaq server or subsystem performance issue. If Insight Manager detects an unacceptable operating parameter, it sends out pager alerts to those you specify, who in turn access the analysis capability of Compaq Insight Manager to obtain a diagnosis and recommendation. The system administrators can respond to, and resolve, your server issue even before you know it exists. This feature is part of Compaq Insight Manager 2.0 or later.

High Availability

Cluster Verification Utility

Aids administrators in diagnosing their setup to determine if it is suitable for use with the Microsoft Cluster Service (MSCS).

Off-line Server Maintenance

Configurable Boot Order

Compaq servers provide the option of setting a system configuration parameter that determines which mass storage controller services the boot device. The *Controller Order* parameter, which is available for every mass storage controller installed in a server, is accessible through the Compaq System Configuration Utility.

Security

Configuration (NVRAM) Lock

When locked, non-volatile memory cannot be modified, which disallows configuration changes.

Online Server Maintenance

Corrected Error Log

Contains the date, time, frequency, and unique information about memory errors that have automatically been corrected by various server subsystems. It allows quick determination of the type and frequency of corrected errors. This log contains error information about corrected ECC memory errors, including which SIMM is producing the errors. This log is readable through Compaq Insight Manager and Diagnostics.

Off-line Server Maintenance

Critical Error Log

Critical error log records catastrophic errors, such as non-correctable memory, expansion board and expansion bus attribution errors. After a critical error occurs, the system ROM indicates on boot up that a critical error has occurred, and prompts you to run Compaq Utilities. The critical error log contains the time and date of the error. When a critical error is logged, the server can notify you when it reboots. The critical error log allows quick correlation of server errors and their causes.

Security

Diskette Drive Control

Enables and disables the diskette drive. No read, write or boot functions are available when the diskette drive is disabled.

Security

Diskette Write Control

Enables and disables diskette Write functions. Boot and Read functions are still available when diskette writing is disabled.

Off-line Server Maintenance

Drive Firmware Upgrade

To keep drives operating at peak capabilities; Compaq introduced Drive Firmware Upgrades as a means of allowing administrators to install the latest firmware revisions on their Compaq disk drives.

Off-line Server Maintenance

DOS CPR Utility

Installs minimal MS-DOS on a FAT formatted partition with Microsoft Windows NT already installed, without disabling the Windows NT boot environment.

High Availability

ECC Memory

Error Checking and Correcting (ECC) memory enables detection and correction of all single-bit memory errors, and the detection of all 2-bit and 3-bit memory errors, and most 4-adjacent-bit memory errors. This ensures that common memory errors can be corrected without interrupting system operation, and more severe errors like the loss of an entire 4-bit DRAM are detected quickly.

Performance Analysis

EISA Bus Utilization Monitor

Tracks and graphs utilization of the EISA bus. Part of the Compaq Insight Management product.

Off-line Server Maintenance

Failure/Status LEDs

Most Compaq hardware products include LEDs used to indicate device status and to alert the customer of any device failure. Some examples of the products that incorporate these LEDs are server systems, storage systems, disk drives, network interface cards, and even PCI Hot Plug slots. In general, a solid green LED indicates normal operation, flashing green indicates a change of status or activity, solid amber indicates that some attention is required, and red indicates device failure.

High Availability

Fan Failure Detect and Shutdown

This feature of ASR-2 allows the operating system to detect when the fan(s) of the system fail. In order to prevent a potentially serious degradation of thermally sensitive components, the server may be shut down automatically. Accompanying data in the log notes if an auto-shutdown sequence is invoked by the operating system.

Off-line Server Maintenance

Fibre Fault Isolation Utility

Verifies the installation and operation of a new or existing Fibre Channel Storage System. The utility displays all of the devices that are properly logged onto the fibre channel arbitrated loop and tests for link errors within the loop.

Off-line Server Maintenance

Flashable ROM

Flashable ROMs are included in all current Compaq servers. They allow the customer to download and install the latest versions of firmware (ROMpaqs) at no cost. This ensures that customers have access to the latest enhancements without the need for service calls.

Security

Front Bezel Key Lock

The external key lock protects the removable media components of the server, and provides an additional layer of security for the internal components, such as the memory and CPU(s).

Remote Capabilities

Graphical Remote

Graphical remote enables a graphical view of the Windows NT console to be displayed on the remote console when accessing the Remote Insight Board in a Windows NT server. This feature requires the use of graphical remote console software such as Carbon Copy and pcAnywhere32.

Online Server Maintenance

Hobbs Meter

Tracks the total amount of time the server was operating.

High Availability

Hot Plug Fans

Hot Plug Fans offer Compaq customers the ability to replace a fan without shutting the system down.

High Availability

Hot Pluggable Drives

Many Compaq servers are equipped with hot pluggable SCSI drive cages, which permit you to insert and remove SCSI drives from the system while the system is running. This allows you to replace failed drives in RAID disk arrays without shutting down the server.

High Availability

Hot Plug Keyboard

Hot Plug Keyboards provide the ability to add or replace a keyboard without the need to reboot.

Remote Capabilities

Info Messenger (Spinner)

Compaq Info Messenger is a proactive Compaq Internet service that provides customers the latest information that is relevant to their specific computing environments. Compaq Info Messenger searches the Compaq web site, collecting the information that the customer wants and alerting them via e-mail that it is available on a customized web page on Compaq Access.

Online Server Maintenance

Integrated Management Display

The integrated LCD panel is installed on many of the latest Compaq servers. The management display provides information about events stored in the Integrated Management Log that occur during Power On Self Test (POST), as well as system events during normal operation. In addition to event-specific information, the system can be configured to display administrative contact information, as well as system name and address, which are entered through the Integrated Management Display Utility.

Server Maintenance

Integrated Management Log

Integrated Management Log collects information about the system during Power On Self Test (POST) and from system events that occur during normal operation. In addition, the log can hold data about the system entered through the System Configuration utility as well as the Integrated Management Display utility, such as administrator contact names and phone numbers.

Remote Capabilities

Integrated Remote Console (IRC)

Compaq has developed Integrated Remote Console to allow out-of-band management capabilities such as remote console and remote reset, independent of the state of the network operating system. With the IRC function, an administrator has full text mode video and keyboard access even if the OS is down (Figure 2). The administrator now has the ability to access the server, perform diagnostics, reset the system, watch the reset process remotely, and view ASR reset sequences, regardless of whether the server OS is online or offline.

IRC complements Insight Asynchronous Management by providing an easy-to-use remote console feature while the OS is up. IRC interfaces with Insight Asynchronous Management so that both capabilities are available to the customer in an out-of-band, online, situation.

IRC gives a customer the ability to access remote servers, monitor and diagnose problems, and protect data with security features, through its combination of hardware and firmware integrated onto the server motherboard. The seamless hardware-based remote console, hardware-based remote reset, and reset sequence replay features are available to the customer whether the servers are in multiple remote locations or grouped in a centralized site, yet still away from the administrator. These features, discussed more fully in the IRC feature section, are independent of the state of the OS.

However, some customers may need even more capabilities than are present with the new IRC function. Compaq also offers the optional Compaq Remote Insight Board for customers that require access and alerting at all times, regardless of the state of the server hardware or OS.

High Availability

Intelligent Power Switch

The intelligent power system gives the user an advanced level of flexibility in powering down the server. Intelligent switch is configured using the Power Down Manager utility, and can be configured to behave in one of three ways:

1. Disable the power switch (Power Down Lock)
2. Power down as soon as the power switch is turned off
3. Graceful shutdown of the operating system when the power switch is turned off

The utility can also be used to set a delay in seconds between the time the power switch is turned off and the time the configured action occurs.

Security

Keyboard Password

The keyboard password is used to lock out the keyboard to prevent unauthorized access to Compaq servers. This effectively prevents logins or command entry until the proper password is entered.

Investment Protection

Long Operating System Life Support

Compaq understands that customers cannot always upgrade all of their servers to the latest release of operating systems as soon as they become available. To support those customers, Compaq continues to release support software and driver updates for less recent versions of operating systems, such as Windows NT 3.51, long after the newer versions are released. This provides customers with the assurance that they can take advantage of the most recent advances in the drivers, firmware and support utilities that Compaq releases.

High Availability

Memory Deallocation

For unattended recovery, ASR-2 logs the error information to the Critical Error Log, resets the server, tests all memory, and automatically deallocates any bad memory blocks that it finds.

High Availability

Memory Fault Recovery Tracking

Tracks the operations of the memory subsystem for uncorrectable errors and enables rapid recovery from actual memory failures.

High Availability

Network Interface Fault Recovery Tracking

Tracks over 20 failure indication parameters (such as alignment errors, lost frames, and frame copy errors) of Ethernet and Token Ring network interfaces. The information is available via Compaq Insight Manager, and it decreases downtime by enabling diagnosis of network interface failures.

Security

Network Server Mode

Network server mode allows system startups from hard disk or network server while the keyboard and pointing device are disabled. This provides security if the server operates unattended. In Network Server mode, the system will boot without asking for the Power-On Password. The Power-On Password must be enabled before you can enable Network Server Mode. The Power-On Password will remain in effect until Network Server Mode is deleted or disabled. If you

attempt to boot from a diskette while Network Server Mode is enabled, you must enter the Power-On Password.

High Availability

On-Line Recovery Server

On-Line Recovery Server is the implementation of the Recovery Server Option (RSO) in which two servers are paired and connected to a pair of independent storage environments. If one of the servers fails, the other server inherits the storage environment and workload of the failed server. For more information on Online Recovery Server, refer to the white paper entitled *Compaq On-Line Recovery Server* (document number ECG027/0598).

High Availability

Online Storage Controller Recovery Option (OSCRO)

Compaq Online Storage Controller Recovery Option is the implementation of Recovery Server Option (RSO) that provides mass storage controller redundancy by merging two matched SMART-2 controllers into a controller pair. In such a pair, one controller is active, and the other remains in standby mode. Should a problem occur with the active controller, the I/O traffic switches to the standby controller without loss of data or interruption of service. Working in conjunction with RAID technology, OSCRO provides extended fault tolerance for mission critical servers. OSCRO is a natural partner for PCI Hot Plug technology. Together, OSCRO and PCI Hot Plug offer a means of keeping a server running and maintaining the fault tolerant status of the server without shutting the server down.

***Note**: Online Recovery Server cannot be implemented in conjunction with Online Storage Controller Recovery Option (OSCRO), as both utilize the same type of switched interfaces to the storage environment, and the cable configurations are not compatible.*

Performance Analysis

PCI Bus Monitor

Tracks and graphs utilization of the PCI bus(es). Part of the Compaq Insight Management product.

High Availability

PCI Hot Plug

PCI Hot Plug technology defines a new standard for high availability in Compaq servers by allowing removal and replacement of PCI controllers without shutting down the system. PCI Hot Plug is an extension of the *PCI Local Bus Specification.* Compaq PCI Hot Plug hardware isolates each hot plug slot from all other devices on the PCI bus. By offering slot-level control, Compaq provides great flexibility. Slot level isolation eliminates interruption to other components and applications using those components, enabling the system to continue performing useful work throughout the hot replacement.

High Availability

PCI Hot Plug Add/Upgrade

PCI Hot Plug Add/Upgrade technology permits you to add new PCI controllers to the system or upgrade existing PCI controllers in the system without shutting the system down. This is an extension of the *PCI Local Bus Specification,* adding to the functionality of the PCI Hot Plug bus.

Server Maintenance

PCI Plug and Play

Compaq PCI products now support the Plug and Play standard for PCI devices, which offers a means of identifying a PCI device and the system resources it requires.

High Availability

Pre-Failure Warranty

Compaq Server products using Compaq Insight Manager Agents 2.0 or greater software are covered by the Compaq Pre-Failure Warranty. The Pre-Failure Warranty extends the advantage of Compaq's three-year limited warranty by providing coverage on many critical components, such as hard drives used in conjunction with SMART array controller, memory and Pentium Pro or Pentium II processors before they actually fail. The Pre-Failure Warranty ensures that when customers receive notification from their monitoring software that a critical server component may

fail, the component is replaced free of charge under the warranty. With the Pre-Failure Warranty, system administrators can proactively schedule downtime for maintenance and not interrupt critical business operations that rely on these enterprise servers.

Security

Power Down Lock

Disables the power switch to prevent the server from being taken down accidentally. This feature is part of the Intelligent Power Switch functionality.

High Availability

Power Down Manager

Allows you to define the behavior of the power switch of a server locally or remotely. Options include disabling the power switch and imposing a fixed delay between the pressing of the power switch and actual shutdown.

Performance Analysis

Power Line Monitoring

Provides information about voltage and current levels in Compaq power supplies.

Security

Power On Password

Prevents use of the computer unless the password is entered. (See also Network Server Mode.) During Automatic Server Recovery (ASR), the system will not prompt for the Power-On Password, allowing ASR to perform the necessary reboots in an unattended fashion.

Server Maintenance

Power-On Error Log

Records errors that occur during Power on Self Test (POST). It allows quick determination of the cause of a server's failure to reboot. (See also Rapid Recovery Services)

High Availability

Power Safe Modules

Power Safe Modules (DC to DC converters) ensure that proper voltage is delivered to critical operational components, including the processors, the I/O boards, and the PCI buses. There are two types of power safe modules, CPU board converters and I/O system board converters.

High Availability

Power Safety Interlock

Many ProLiant servers have a built in Interlock Switch that automatically turns system power off when the case cover is removed. In addition to protecting the safety of customers by preventing access to high energy components, this feature also protects thermally sensitive components by ensuring ideal air flow throughout the server. Although the Interlock switch does prevent access to the power supply, CPU, memory and some expansion slots, it does not prevent access to hot pluggable devices.

Remote Capabilities

Power Supply Viewer

Allows you to view redundancy information of power subsystems and statistics of individual power supplies locally or remotely.

Security

Protected Power Switch

The protected power switch prevents the server from accidental shutdown due to incidental contact with the power switch cover. The switch is an oval, and in the center is a round second switch. The whole assembly can be popped out and rotated 180 degrees, making it so that only the inside switch can be operated.

Security

QuickLock

Using the QuickLock hot key combination (**Ctrl+Alt+L**) disables the keyboard and pointing device without exiting the application. The application remains in view on the monitor screen, but you cannot access it. You can change the QuickLock hot key combination if the default combination conflicts with your application software.

Online Server Maintenance

RAID Online Expansion

RAID Online Expansion provides the ability to increase the size of a RAID array by adding a new disk to the array without destroying the data held in the array. RAID Online Expansion is an integral function of the Array Configuration Utility, which is used to manage the arrays attached to SMART-2 Array Controllers.

High Availability

Redundant Fans

Some of the newest Compaq servers are equipped with redundant fans, which ensure proper airflow around temperature sensitive components in case of a single fan failure.

High Availability

Redundant Hot Plug Power Supply

Newer Compaq servers have the option of being equipped with redundant hot pluggable power supplies. These servers can accept up to three power supply units. While all units are functioning, the power supplies work together, balancing the load between the active units. If a power supply fails, the remaining unit(s) pick up the load and continue operating. The system administrator can then replace the failed power supply without shutting down the server or impacting the other power supplies.

High Availability

Redundant Power Modules

Up to three CPU board converters (Power Safe Modules) can be installed on each CPU board. This allows for two independent CPU board converters to service two independent CPUs, with the third acting as a redundant converter which operates only when one or both of the other two converters fails.

Up to two I/O system board converters (Power Safe Modules) may be installed on the system board. Both converters should be installed at all times to provide redundancy.

High Availability

Redundant Power Supply

Some Compaq servers are equipped with multiple power supplies to ensure that the server continues operating even when a power supply fails.

Remote Capabilities

Remote Alerts

Sends a pager alert to a designated individual via CIM, ASR Paging or Remote Insight Board of potential problems detected.

Remote Capabilities

Remote Alpha/Numeric Paging

Sends alpha pager alert text to a designated pager number via Remote Insight/CIM of problems detected.

Remote Capabilities

Remote Asset Management

Allows collection or setting of asset management information remotely by way of CIM.

Remote Capabilities

Remote Threshold Setting

Allows the system administrators to set alert thresholds remotely. These thresholds are used by CIM to determine when to send alert messages indicating that a problem is occurring with a server.

Remote Capabilities

Remote Diagnostics

Analyze the condition of the server remotely, using Compaq Insight Manager or Remote Insight Board.

Remote Capabilities

Remote Insight

Remote Insight offers complete hardware independence from the server, as it is essentially a "computer within a computer." Because the board has its own processor, memory, and battery backup, it can continue operating should the server have a hardware fault or lose power.

Because of the on-board battery back-up, the enhanced alerting features of Remote Insight (alphanumeric paging, Insight Manager alerts) are available at all times, even in the case of power outages.

Remote Insight provides seamless PPP integration so that the customer can move between Insight Manager/SNMP management and the resident remote console application without any loss of connection, regardless of server condition.

In addition, Remote Insight captures critical information through enhanced video sequence replay, which includes failure sequences as well as reset sequences. The enhanced abilities allow two generations of reset sequence data to be stored and preserved by the on-board battery during power outages.

The optional Remote Insight board offers the most complete out-of-band server management solution. If a server goes down due to a hardware fault, software fault, or even a power outage, the administrator can be alerted and can access Remote Insight to bring the server back up. More complete information about Remote Insight is available in the technology brief titled "Compaq Remote Insight Product Overview," document number 078A/0496.

Remote Capabilities

Remote SSD Updates

The Compaq SSD version 2.01(and later versions) for Microsoft Windows NT 4.0 Setup utility features two new interfaces with the ability to perform remote driver and utility installations, updates, removals, and configurations across a network. The Remote Setup feature uses a “push” implementation in which drivers and utilities are “pushed” from the local computer to the remote computer. This “push” implementation allows administrators to configure one or more remote computers connected to a network, from a local computer.

The two new types of interfaces and their features, are the following:

- **Graphical User Interface (GUI)** provides a visual representation of SSD software components relative to hardware present in the system. The GUI interface allows you to install, update, and remove components through either an Express or Custom setup process. Custom is the default setup configuration. You can also perform both local and remote component modifications, however only one computer at a time can be modified.
- **Command Line Interface** allows you to install, remove, and update SSD software components via the command line. The command line interface is useful for silent and batch installations or updates to software components. The batch ability allows for simultaneous update of software components on several computers. Command line activities are reported to a log file instead of to the screen.

The new SSD Setup v2.01 is no longer constrained to the local machine. The options available for local Setup are now also available for Remote Setup. For more information, refer to the white paper entitled *Remote Driver and Utility Installation with Compaq Support Software for Microsoft Windows NT 4.0 (SSD) Version 2.01* (document number ECG031/0298).

Server Maintenance

Revision History Table

Stores board revision information in non-volatile memory. It logs the system board revision first, then logs other boards that support the Revision History Table, such as the SMART-2 Array Controller, Fast Wide SCSI-2 controller, and NetFlex-2 ENET-TR controller. When you upgrade your server or add new expansion boards, the revision history table records this information. As you troubleshoot server problems, you can use this information to determine if a change to the server configuration has caused the server problem.

Security

Serial/Parallel Interface Control

Unauthorized transfer of data through the integrated serial and parallel ports is blocked by this feature.

High Availability

Server Failure Notification

Server failure notification sends a pager alert to notify a system administrator of a server malfunction. Part of the Automatic Server Recovery (ASR) functionality.

High Availability

Server Recovery Notification

Server recovery notification sends a pager alert to notify a system administrator of a server malfunction recovery. Part of the Automatic Server Recovery-2 (ASR-2) functionality.

Offline Server Maintenance

SmartStart Compaq Integration Maintenance Utility (CIMU)

With SmartStart 3.0 Compaq introduced a new set of functionality for effective setup and maintenance of Novell NetWare and Microsoft Windows NT servers called Integration Management. Through Integration Management, system administrators set up a server to act as the Integration Server that services the production servers.

The Compaq Integration Maintenance Utility is used to apply software updates from the Integration Server to the production servers.

Offline Server Maintenance

SmartStart

SmartStart is the server configuration and software integration tool from Compaq that aids in the installation of Compaq servers by simplifying the process of loading the operating system and installing any specialized device drivers and support utilities.

Remote Capabilities

Software Updates via Internet

Compaq offers the updates to Compaq software to customers at no cost through easily navigated web pages. These updates are available for all of the operating systems Compaq supports. The web pages are updated regularly, ensuring Compaq customers always have access to the software and firmware needed to keep their Compaq systems running at peak effectiveness.

High Availability

Standby Recovery Server

Standby Recovery Server is an implementation of the Recovery Server Option (RSO). With Standby Recovery Server, two servers are paired and connected to a single storage environment, and one of the servers is active while the other remains in standby mode. If the active server fails, the standby takes the place of the active server. For more information on Standby Recovery Server, refer to the white paper entitled *Compaq Standby Recovery Server* (document number ECG026/0598).

***Note**: Standby Recovery Server cannot be implemented in conjunction with Online Storage Controller Recovery Option (OSCRO).*

High Availability

Storage Automatic Reconstruction

Automatically reconstructs data to an online spare drive or a replacement drive connected to an array controller if a drive failure occurs. To use the reconstruction feature you must have your drive configured for Drive Mirroring (RAID 1) or Distributed Data Guarding (RAID 5). Reconstruction reduces downtime by allowing rapid recovery to full system operation if a drive fails.

High Availability

Storage Fault Recovery Tracking

Tracks over twelve failure parameters (such as timeouts, spin-up, and self test errors) of the SMART-2 Array Controller, the Fast-Wide SCSI-2 controller, and their attached hot pluggable drives. These parameters are used to accurately pinpoint failed storage subsystem components. They enable rapid recovery from controller or hard drive failures.

Online System Maintenance

Survey Parameter Capture Utility

Compaq Survey Utility builds upon the service tool known as Inspect. Inspect has long been used from a service aspect to capture comprehensive hardware configuration information. The key advantage of Compaq Survey Utility over Inspect, however, is that it takes this comprehensive reporting functionality and now delivers it in an on-line format. The on-line capability means that customers with servers running business-critical applications will no longer be required to take their server off-line to collect the critical information needed during a service call. Not only can Compaq Survey Utility be run while the server is on-line, but also can be initially installed without ever having to reboot the server. This makes it truly an on-line service tool.

Compaq Survey Utility not only captures most of the hardware information that is gathered today by Inspect, but it goes a step further and gathers details about the operating system parameters (including NetWare NLMs loaded, NT Services running, etc.). By combining hardware and software configuration capture, Compaq Survey Utility delivers a comprehensive view of the server with the ease and simplicity of a single tool.

Another key benefit of Compaq Survey Utility is its ability to identify recent configuration changes. Each time a configuration snapshot is taken it is stored in a file on the server. At the next snapshot interval, this latest file is automatically compared to the baseline configuration. Any significant changes that have occurred are highlighted and the output file is automatically updated to reflect the latest configuration, as well as differences relative to the baseline. Recent configuration changes are often the source of the problems that manifest on the server. The ability to quickly generate comprehensive configuration snapshot and highlight specific changes enables problem resolution time to be significantly reduced.

The information gathered by Compaq Survey Utility is accessible locally at the host server console. From the console, the administrator can initiate an updated snapshot, view the Survey Utility file on-line, and generate a new output file based on comparing different saved sessions. The output file can also be printed. In addition to user initiated snapshots, the Survey Utility tool automatically generates and stores updated snapshots upon server reboot as well as at user

specified time intervals. This automatic update mechanism helps to ensure that the latest information and change histories are always recorded and available when needed.

Offline Server Maintenance

System Partition

The System Partition is a special partition created on Compaq disks by SmartStart. This partition contains diagnostic tools and utilities, including the System Configuration Utility. The System Partition varies in size from 2MB up to about 36MB, and is not directly accessible from operating systems, such as Windows NT, without the use of the System Partition Administration Utility.

Online Server Maintenance

System Partition Administration Utility

Used to access and update the System Partition.

Server Maintenance

System Serial Number

Compaq has designed the backplane of the computer with an additional serial EEPROM. When the factory builds the computer, it is assigned the serial number. That serial number is burned into the EEPROM. The system serial number can be obtained during asset queries, both local and remote.

Performance Analysis

System Uptime Monitor (SUM)

Tracks the availability statistics of the system.

High Availability

Temp Detect and Shutdown

This feature of ASR-2 allows the operating system to detect when the temperature of the system exceeds the caution level. Accompanying data in the log notes if an auto-shutdown sequence is invoked by the operating system.

Online Server Maintenance

Temperature Monitor via I_2C

Utilizes Inter-Integrated Circuit (I_2C) bus technology to report temperature events for critical components.

Online Server Maintenance

Voltage/Current Monitoring

Tracks voltage and current changes with Compaq power supplies.

High Availability

Windows NT HAL Recovery

The Support Software for Microsoft Windows NT 4.0 includes as one of the available features the ability to retain a redundant copy of the Windows NT Hardware Abstraction Layer (HAL) which can be brought into service in the event that the default HAL becomes corrupt. This provides a means of recovering from what would otherwise be a catastrophic corruption problem without the need to re-install the operating system.

APPENDIX B - INDUSTRY PARTNERSHIPS

Compaq/Microsoft Frontline Partnership

The principle goal of the Frontline Partnership has been to formalize the existing relationship that has existed for more than a decade between Compaq and Microsoft. This relationship enables both companies to expand joint efforts to accelerate the development of new technology and bring our customers and the computing industry to new levels of ease of use and integration.

The Frontline Partnership extends far beyond the walls of both companies' headquarters. Some of the key areas that the Frontline Partnership focuses on include:

- ***Joint Development:*** Compaq and Microsoft continue to work together closely in the development of innovative new solutions that deliver record-breaking performance and value.
- ***Technical Support:*** By providing joint training, technical tools, information databases and dedicated personnel, Compaq and Microsoft provide superior customer service and support to our mutual customers.
- ***Joint Marketing:*** Through joint seminars, shows, account briefings, communications and messaging, the Frontline Partnership marketing programs help communicate the value of the partnership to our customers.
- ***Joint Testing:*** Compaq and Microsoft solutions are tested extensively to ensure performance and reliability and offer our customers confidence in their choice of a Compaq/Microsoft solution.
- ***Joint Training:*** Compaq and Microsoft personnel are provided with sales and technical training to insure the proper level of expertise in communicating the advantages of our joint solutions. This training is provided to groups ranging from corporate technical support teams to field sales and engineering as well as our resellers and solution providers.

Compaq Novell Enterprise Computing Partnership

In 1989, Compaq created the market for networks by introducing the industry's first network operating system (NOS): Novell NetWare, and the first PC server: the Compaq SystemPro. The integration of these two powerful, evolving technologies still dominates the marketplace today. Building on this foundation, Compaq and Novell are using standard Internet technology to turn traditional networks into powerful, easily manageable Intranets.

Compaq and Novell also have joined forces in a worldwide alliance that provides one of the most responsive, integrated approaches to technical support in the industry. Over the last decade, we have continually refined our escalation methodology and enhanced the reciprocal training of technical support staff. This ensures efficient resolution of compatibility issues, reduces duplication of effort, and speeds issue resolution. The bottom line: when you need answers fast, Compaq and Novell deliver them.

Enterprise computing is entering a new era, and Compaq and Novell are engineering the shape of tomorrow today. With projects that support open solutions, interoperability and high availability, we will deliver solutions that are not yet possible with existing technology.

- Compaq and Novell support the JavaSoft initiative by Sun Microsystems. Novell provides a Java execution environment for intraNetWare and will enable NDS for the Internet so you will be able to reap the additional benefits of open standards technology.
- Compaq is driving the development of an open standards specification of hot-plug PCI technology, which has brought to market the industry's first open, recognized hot-pluggable network and I/O controller boards. Novell fully supports this effort, which is based on open standards and will dramatically increase uptime for mission-critical environments.
- Compaq and Novell are working together to bring you clustering solutions that deliver unprecedented levels of scaleable performance and high availability.

Compaq and Novell have a long history as engineering and marketing partners, some of the more visible examples are:

- Joint development of SFT III introduces the first high availability solution
- SmartStart integration of NetWare 3.12, intraNetWare
- intraNetWare for Small Business promotional bundle
- Novell is first to market with support for PCI Hot Plug
- Joint Marketing Funds

TABLE 13 : COMPAQ NOVELLL PARTNERSHIP ENGINEERING MILESTONES

Dates	Engineering Milestones
1988 – 1989	§ EISA Solutions (NE3200, Drive Array, OS Configurations, >16MB RAM, etc.) § Expanded Disk Capacity for NetWare 3.x
1989 – 1990	§ Disk Optimizations and Fault Tolerance Options § Hardware striping for optimization § Software mirroring
1992	§ Highly optimized, modular SCSI software architecture
1990 – 1991	§ Server Fault Tolerance Features and High Speed Mirrored Server Link § Asynchronous Point to Point Protocol Solution § Automatic Server Recovery § SmartStart Novell NetWare Products § Networking devices characterization and optimization for Compaq drivers and Novell ODI stack
1994 – 1996	§ Multiprocessing Architecture & Optimizations § Hardware assisted tool for optimization analysis
1996 - 1997	§ Hot Plug PCI, I_2O, Clustering

Compaq SCO Partnership

Compaq understands that many customers have a significant investment in UNIX that requires continued support and expansion. The Compaq SCO Partnership enables Compaq to work closely with the industry leading Intel-based UNIX developer to ensure that the latest Compaq products and features are made available to UNIX environments. Through close cooperation with SCO, Compaq has even released some product enhancements in the UNIX environment before they became available in any other environments.

The Compaq SCO Partnership is committed to providing customers with all the benefits of a flexible, easily deployed, enterprise-level UNIX system on industry standard servers at price points significantly lower than those of RISC UNIX systems.

The relationship between Compaq and SCO includes several key initiatives that benefit customers, including:

- **Joint marketing:** Combines worldwide joint marketing funds to deliver joint seminars, trade show participation, account briefings, communications, and more. For example, Compaq

participated in SCO's recent Quarterly Business Briefing seminars focusing on new solutions in computer telephony for VARs. This program covered 28 cities in the summer of 1997.

- **Joint engineering and development:** Focuses on strategic planning and development of integrated solutions with faster time to market, easier implementation and maintenance, enhanced availability, manageability and scalability, and improved price-performance. For example, SmartStart, Compaq's intelligent integration tool, allows customers to get their SCO UNIXware systems up and running quickly and effortlessly; and Insight Manager, Compaq's system management tool, controls hundreds of server parameters and alerts customers to potential system failures. In addition, Compaq and SCO are working together on such leading technologies as PCI Hot-Plug, SCO UNIXware system clustering, and intelligent I/O.
- **Joint service/support programs:** Dedicated personnel at Compaq and SCO share technical tools and information to better help customers with technical issues. Compaq and SCO joint solutions are supported through their Technical Support Alliance, Engineering Services Agreement, and Service and Support Programs provided by Compaq's worldwide network of service partners.
- **Joint testing:** Establishes a program in which SCO and Compaq solutions are tested extensively in a laboratory environment before customer delivery, ensuring that customers get highly integrated, fully tuned solutions that meet their business needs.

Compaq is the largest supplier of SCO UNIX systems, with a greater than 20 percent share of the worldwide SCO UNIX market. SCO has a 25 percent share of the worldwide UNIX server market and 78 percent of the UNIX on X86 worldwide server market. In addition, Compaq, Intel, and SCO are working closely together to develop UNIX operating system support for future 64-bit Intel processors.

Compaq SAP Partnership

Compaq and SAP work closely together to offer a tightly integrated, tested and optimized R/3 platform. Compaq's R/3 solutions offer customers a low TCO with a high level of service and support.

Compaq delivers all the components -- powerful ProLiant platforms, strategic alliances and programs with SAP and Microsoft, and customizable service and support programs -- necessary to meet the most demanding business-critical requirements of customers deploying R/3 solutions on Windows NT.

- ***Competency Centers***: Located in Houston, Walldorf, Munich and Tokyo, Compaq SAP Competency Centers are dedicated to testing, piloting and optimizing R/3 on Windows NT solutions. Compaq has also supplied systems and expertise to assist its partners worldwide in establishing their own SAP Competency Centers, including the new Microsoft/SAP Competency Center in Redmond, WA.
- ***Customized Service and Support***: To maximize application availability, Compaq provides world-class service and support programs that customers can tailor to their server environment and specific business needs. Services include vendor management for R/3 environments, 7x24 on-site response, system health check services, remote management services, enhanced hardware/software technical support, and on-site or local spare parts inventories. Compaq also works with resellers, systems integrators, consultants and service providers to provide each with the tools and resources needed to optimize, integrate and fully implement R/3 solutions for Compaq servers and Windows NT.
- ***Technology Leadership***: Compaq was the first company to demonstrate failover capabilities for SAP's R/3 using a preliminary version of the Microsoft Wolfpack clustering extensions, which occurred at the SAP/Microsoft Technical Education Conference in December. Compaq was also the first company to support failover capability in R/3 and Windows NT environments with Compaq's Online Recovery Server and Standby Recovery Server.
- ***SAP certification***: Compaq received the SAP 1995 Award of Achievement and was the first hardware vendor to be certified for R/3 Windows NT. Because of its reliable platform, proven

engineering expertise, and success and credibility in the market, Compaq has been approved by SAP to perform its own self-certification for future platforms.

Compaq Cheyenne Partnership

Building upon the significant success of the existing OEM relationship between Compaq and Cheyenne, the companies have announced an Enterprise Storage Management Alliance. This strategic alliance aims at providing customers with the power of seamlessly integrated and optimized enterprise storage and storage management solutions.

Compaq and Cheyenne will provide robust storage management solutions with manageability, automation, scalability, availability and performance characteristics that will enable customers to migrate from proprietary systems to standards-based open systems. The two companies will provide integrated "end-to-end" storage solutions for workstations and servers in the emerging distributed enterprise. Jointly targeting the market for application storage management, Compaq and Cheyenne will deliver storage and storage management solutions that are vertically integrated with databases, applications, web servers and messaging systems.

Compaq Oracle Partnership

Compaq and Oracle have been working together since 1989 to deliver high performance solutions by optimizing Oracle databases for Compaq platforms. The results of this work are apparent today as evidenced by the just-released world record TPC-D performance benchmark achieved by the recently introduced Compaq ProLiant 6000 server running Oracle Enterprise Server 7.3.3 on Microsoft's Windows NT. Compaq is the only vendor with two 100GB TPC-D results under $1,000,000 and is the only vendor to have two 100GB TPC-D results using Windows NT. This performance demonstrates that Compaq servers running Oracle for Windows NT provide an ideal solution for companies implementing data marts.

Compaq, the leading server provider, and Oracle, the leading database provider, work together to develop low-cost, high-performance, highly available database solutions that you can deploy with confidence. We have made a major investment with the creation of a joint products division to better address our customer's needs. The Compaq/Oracle products division is comprised of engineers, technical analysts and performance experts to provide a streamlined solution, jointly developed, tested and optimized for easy deployment.

Our relationship combines Oracle's experience in highly available, scaleable clustering solutions with Compaq’s leadership in the Windows NT environment

Compaq and Oracle offer unified worldwide customer support for their products. Support analysts from both companies are cross-trained on each other’s products. This allows customers to deploy Compaq/Oracle solutions with the confidence of knowing that these products are jointly supported. Last year, Compaq and Oracle reinforced this commitment by signing a Global Technical Support Agreement (GTSA), designed to meet customers' growing distributed enterprise computing needs by allowing them to confidently deploy mission critical applications for high availability.

APPENDIX C - SERVER FAMILY SUPPORTED FEATURES

	System Pro	System Pro LT	System Pro XL	ProSignia	ProSignia 200 5/166	ProSignia 200 6/XXX	ProSignia 300	ProSignia 500	ProSignia VS	ProLiant800	ProLiant850R	ProLiant1000	ProLiant1200	ProLiant1500	ProLiant1600	ProLiant2000	ProLiant2500	ProLiant3000	ProLiant4000	ProLiant4500	ProLiant5000	ProLiant5500	ProLiant6000	ProLiant6500	ProLiant7000
High Availability																									
Non-Stop Computing Features																									
Advanced Network Control Utility				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Cluster Verification Utility				NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Hot Spare CPU			√											√	√	√	√	√	√	√	√	√	√	√	√
On-Line Recovery Server Option					√	√	√	√		√	√		√	√	√	√	√	√	√	√	√	√	√	√	√
Online Storage Controller Recovery Option					NT	NT	NT	NT		NT	NT		NT	NT	NT		NT	NT			NT	NT	NT	NT	NT
Redundant Fans																	√				√	√	√	√	√
Redundant Hot Plug Power Supply													√		√			√				√	√	√	√
Redundant Power Modules																		√			√		√	√	√
Redundant Power Supply													√	√	√	√		√		√	√	√	√	√	√
Standby Recovery Server Option					√	√	√	√		√	√		√	√	√	√	√	√	√	√	√	√	√	√	√
Rapid Recovery Features																									
ASR				√			√	√				√				√			√						
ASR-2					√	√			√	√	√		√	√	√		√	√		√	√	√	√	√	√
Fan Failure Detect & Shutdown					√	√	√	√		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Hot Pluggable Drives											√	√	√	√	√	√	√		√	√	√	√	√	√	√
Hot Plug Fans																								√	√
Hot Plug Keyboard													√		√		√	√				√	√	√	√
PCI Hot Plug																								√	√
PCI Hot Plug Add/Upgrade																								Nw	Nw
Server Failure Notification				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Server Recovery Notification				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Temp detect/shutdown					√	√				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Windows NT HAL Recovery					√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Fault Prevention Features																									
ECC Memory			√		√	√	√	√		√	√		√	√	√	√	√	√	√	√	√	√	√	√	√
Power Down Manager																						√	√	√	√
Memory Deallocation			√	√								√		√					√	√					
Power Safe Modules																					√	√	√	√	√
Power Safety Interlock						√						√	√	√	√	√	√	√	√	√	√	√	√	√	√
Pre-Failure Warranty					√	√	√	√		√	√		√	√	√	√	√	√	√	√	√	√	√	√	√

	System Pro	System Pro LT	System Pro XL	ProSignia	ProSignia 200 5/166	ProSignia 200 6/XXXr	ProSignia 300	ProSignia 500	ProSignia VS	ProLiant 800	ProLiant 850R	ProLiant 1000	ProLiant 1200	ProLiant 1500	ProLiant 1600	ProLiant 2000	ProLiant 2500	ProLiant 3000	ProLiant 4000	ProLiant 4500	ProLiant 5000	ProLiant 5500	ProLiant 6000	ProLiant 6500	ProLiant 7000
Life Cycle Cost Reduction																									
Online Server Maintenance																									
Asset Tag Number	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Correctable Logging			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√	√	√	√
Hobbs Meter													√		√						√	√	√	√	√
Power Line Monitoring																							√	√	√
RAID Online Expansion	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
RTC Battery Monitor														√			√				√	√	√	√	√
Survey Parameter Capture			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
System Partition Admin Utility				NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
System Serial Number		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Temperature Monitor with Digital Output																		√					√	√	√
Voltage/Current Monitoring																		√					√	√	√
Off-line Server Maintenance																									
Boot Block ROM			√	√					√			√	√	√	√	√	√	√	√	√	√	√	√	√	√
CD-ROM Boot				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Configurable Boot Order				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Critical Error Log			√	√	√	√	√	√	√	√	√	√		√		√	√		√	√	√	√	√	√	√
DOS CPR				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Drive Firmware Upgrade				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Failure/Status LEDs												√	√	√	√	√	√	√		√	√	√	√	√	√
Fibre Fault Isolation Utility				NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Flashable ROM			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Intelligent Power Switch																							√	√	√
PCI Plug and Play					√	√	√	√		√	√		√	√	√		√	√			√	√	√	√	√
Power-On Error Log													√		√		√	√					√	√	√
Revision History Table					√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
SmartStart			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
System Partition	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Remote Capabilities																									
Compaq Insight Manager			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
CIM Alerts	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Info Messenger	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Integrated Management Display													√		√		√	√				√	√	√	√
Integrated Management Log													√		√		√	√				√	√	√	√
Integrated Remote Console (IRC)						√				√	√		√		√		√	√				√	√	√	√

	System Pro	System Pro LT	System Pro XL	ProSignia	ProSignia 200 5/166	ProSignia 200 6/XXXr	ProSignia 300	ProSignia 500	ProSignia VS	ProLiant 800	ProLiant 850R	ProLiant 1000	ProLiant 1200	ProLiant 1500	ProLiant 1600	ProLiant 2000	ProLiant 2500	ProLiant 3000	ProLiant 4000	ProLiant 4500	ProLiant 5000	ProLiant 5500	ProLiant 6000	ProLiant 6500	ProLiant 7000
Life Cycle Cost Reduction (Continued)																									
Remote Capabilities (Continued)																									
Remote Alpha/Numeric Paging			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Remote Diagnostics	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Remote Insight					√	√	√	√		√	√		√	√	√		√	√	√	√	√	√	√	√	√
Remote NT SSD Upgrade					NT	NT	NT	NT		NT	NT		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Remote Threshold Setting			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
SmartStart CIMU					√	√	√	√		√	√		√	√	√	√	√	√	√	√	√	√	√	√	√
Software Updates via Internet	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Investment Protection																									
Long O/S Life Support	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Industry Standard Components	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Ultra Wide-SCSI-3 Support						√				√	√		√		√		√	√			√	√	√	√	√
Performance Tracking and Information																									
EISA Bus Monitor												√	√	√	√	√	√	√	√	√	√	√	√	√	√
Memory Fault Recovery Tracking					√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
NIC Fault Recovery Tracking					√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PCI Bus Monitor													√		√			√			√	√	√	√	√
Storage Fault Recovery Tracking			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Security																									
Administrative Password			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
CD lock				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Configuration (NVRAM) Lock	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Diskette Drive Control	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Diskette Write Control	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Front Bezel Keylock										√		√	√	√	√	√	√	√	√	√	√	√	√	√	√
Keyboard Password				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Network Server Mode	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Power on Password	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Power Down Lock																							√	√	√
Protected Power Switch					√	√				√	√														
QuickLock	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Serial/Parallel Interface Control	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√