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Specifications for NEC Computer Systems Division

Express5800 HX4100

Express5800 HX6100

Configuration Guide

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System Description

The NEC Express5800 HX4100 and HX6100 are high performance four-way and six-way Pentium® Pro 200MHz server systems that bring a new level of cost performance and investment protection. Two central processing unit (CPU) module slots support up to four 200MHz/512KB (HX4100) or six 200MHz/1MB (HX6100) Pentium® Pro processors. Sixteen Dual Inline Memory Module (DIMM) sockets provide up to 4GB of main memory. Error Checking and Correcting (ECC) memory technology is employed to enhance protection against fatal memory errors. Both systems are field upgradeable to Intel Pentium II Xeon processors.

The NEC Express5800 HX4100 and 6100 server systems incorporate a modular scalable architecture that integrates a 64-bit bus interface with three Peripheral Component Interconnect (PCI) buses and an Industry Standard Architecture (ISA) bus. Each system has nine PCI slots with each bus operating at burst speeds of up to 132MB/sec. and two ISA slots operating at speeds of up to 33MB/sec. The bus interface is capable of handling multiple processors with multiple cache resources in a multi-processor format.

Four standard 5.25" and two 3.5" peripheral bays can house tape back-up, CD-ROM and other media devices. A 3.5" diskette and CD-ROM drive are included with the base system, leaving three 5.25" bays and one 3.5" bay open. One to three hard disk drive cages (three standard on HX6100), each holding four 3.5" x 1.6" hot-swappable hard disks, provide over 200 gigabytes (GB) of storage capacity. A three-channel PCI Redundant Array of Inexpensive Disks (RAID) controller is available (standard on HX6100) to provide hardware support for RAID levels 0, 1 and 5 and allows hot-swapping of SCSI hard disk drives.

Up to three 420-watt hot-swap power supplies may be configured (three standard on HX6100). One or two supplies may be needed to power an HX4100 system while the third supply provides redundancy allowing normal system operation to continue should any supply fail. The systems are packaged in a 24.4" high x 17.5" wide x 26.7" deep enclosure. A rack-mount kit is available to allow mounting in a standard 19" rack.

NEC Express5800 HX4100 and HX6100 systems are monitored by an onboard Application Specific Integrated Circuit (ASIC) component for temperature out-of-range, voltage out-of-range, chassis intrusion and cooling fan status. ECC memory errors are also logged. The ASIC is managed through the included ESMPRO software. This application provides Simple Network Management Protocol (SNMP) agents for the server and a manager that runs under Microsoft Windows NT™ or Windows 95™. Using ESMPRO, administrators can monitor events reported by the server as well as check system configuration information, file system status, etc.

NEC's superior technology, Intel Pentium® Pro performance combined with the scalability of the NEC Express HX4100 and HX6100 servers and a wide array options make this system an ideal candidate for medium to large enterprise server applications. Both systems achieved record tpmC results for their class. Typical applications are: client/server application, network server application, database server application, business critical transaction application and others.

Express5800 HX4100 and HX6100 System Overview

- One CPU baseboard with two processor boards. 1-4 Pentium Pro 200MHz/512KB processors are available with HX4100 systems, 2-6 200MHz/1MB processors are available with HX6100 systems.
- Sixteen DIMM sockets allow for memory sizes ranging from 128MB (minimum) to 4GB (maximum). Error Checking and Correcting (ECC) memory technology allows for the detection and correction of all single bit errors, detection of double bit errors and detection of all errors confined to one nibble (four bits). Industry standard 168-pin EDO DIMMs are used.
- Three-channel Mylex DAC960PG-Ultra PCI RAID Controller with a choice of 4,16 or 32MB of cache. RAID is optional on HX4100 systems and standard on HX6100 systems.
- Three Peripheral Component Interconnect (PCI) busses support nine expansion slots at 132MB/sec. bandwidth for each PCI bus. Two of the three busses are peers, one is bridged.
- Two ISA bus expansion slots providing 33MB/sec. bandwidth.
- Two-channel integrated Adaptec AIC7895 Ultra/Wide, SCSI controller (one channel running in Fast/Narrow mode dedicated to the media bays and external connector, one available for first hard disk cage).
- Four 5.25" bays and two 3.5" bays for floppy, CD-ROM, tape drives and other media devices. A floppy and CD-ROM drive are installed in the base system leaving three 5.25" and one 3.5" bays available for options.
- Twelve SCSI disk drive bays in three cages (standard on HX6100) on three separate SCSI busses (four bays per bus). All drives are accessible from the front of the chassis. If RAID is configured, disks may be hot-swapped. The SCSI backplane supports SAF-TE.
- Three chassis cooling fans. Any one may fail without loss of system capability.
- Two serial ports with asynchronous EIA-232, 9-pin connectors, 16 byte FIFO per port.
- One parallel 25-pin printer port supporting ECP and EPP modes.
- One integrated Super VGA controller with 1MB of Video RAM (2MB standard on HX6100). Resolutions of 640x480 (16 million colors), 800x600 (64K colors), 1024x764 (256 colors), 1280x1024 (16 colors) are supported. Upgrade to 2MB available.
- Lockable enclosure
- Boot password and diskette lockout mode through BIOS.
- 24X internal SCSI CD-ROM drive.
- 1.44 MB, 3.5" floppy drive.
- Up to three 420-watt 120-240V 50-60Hz autoranging power supplies. Redundant power operation available depending on the number of power supplies configured. All power supplies are hot swappable.
- Two-button mouse.
- 104 style keyboard.
- Temperature, internal power, chassis intrusion, memory error and fan monitoring.

HX 4100 Base Models

All HX4100 systems include these features:

- One to four Pentium Pro 200 MHz processors
- 512 KB ECC L2 Cache per processor
- Up to 4GB ECC DIMM (16 sockets)
- Integrated Dual Wide Ultra SCSI controller
- One disk cage supporting 4 hot plug drives
- Optional expansion to 12 disk bays, up to 216GB storage
- Field Upgradeable to Pentium II Xeon
- 9 PCI (3 separate busses), 2 ISA
- Redundant cooling fans
- 1 x 420W power supply standard, redundant option
- 24X SCSI CD-ROM, 3.25" floppy drive
- Included ESMPRO server management suite
- Included ExpressBuilder CD-ROM software
- 3 year on-site next business day warranty

System	Order Number	Configuration
Base Model 1	850116021	Base System Only
Network Model 1	850116023	Base System including Windows NT Server 4.0
Enterprise Model 1	850116024	Base System including Windows NT Server Enterprise Edition

HX 6100 Base Models

All HX6100 systems include these features:

- Two to six Pentium Pro 200 MHz processors
- 1MB ECC L2 Cache per processor
- Up to 4GB using ECC DIMMs (16 sockets)
- Integrated Dual Wide Ultra SCSI controller
- 3 channel Ultra Wide RAID controller
- 3 Disk cages supporting 12 hot plug drives
- Field Upgradeable to Pentium II Xeon
- 9 PCI (3 separate busses), 2 ISA
- Redundant cooling fans
- 3 x 420W power supply standard, redundant option
- 24X SCSI CD-ROM, 3.25" floppy drive
- Included ESMPRO server management suite
- Included ExpressBuilder CD-ROM software
- 3 year on-site next business day warranty

System	Order Number	Configuration
Base Model 1	850116058	Base System Only
Enterprise Model 1	850116059	Base System including Windows NT Server Enterprise Edition

CPU Upgrade Options

HX4100 and HX6100 server systems have two specialized slots on a CPU baseboard for CPU boards. The HX4100 series systems have the CPU slots populated with CPU boards that hold two CPUs each (four processors total). HX6100 systems have two boards that have sockets for three CPUs each (six processors total). HX4100 base systems come with one 200MHz Pentium Pro processor with 512KB cache. HX6100 base systems have two 200Mhz/1MB cache processors installed.

To add additional processors, a processor upgrade kit consisting of a CPU, heat sink and voltage regulator module is available. To accomplish the upgrade, a processor is inserted into an empty zero-insertion-force (ZIF) socket (this is done in the factory if additional processors have been included as part of the initial system order). The heat sink and voltage regulator module are also appropriately installed. Mixing cache sizes in not allowed.

If a second processor is added to an HX4100, a second power supply must be configured. HX6100 systems include three power supplies.

Both systems are upgradeable to Intel Pentium II Xeon processors.

Factory installed	Field upgrade	Description
203237	203223	<i>HX4100 ONLY</i> : Second, Third or Fourth 200MHz / 512KB Pentium® Pro
203229	203217	<i>HX6100 ONLY</i> : Third, Fourth, Fifth or Sixth 200MHz / 1MB Pentium® Pro

Memory Options

All NEC Express5800 HX4100/6100 systems come with sixteen 168-pin Dual In-Line Memory Module (DIMM) sockets. Memory sizes range from 128MB to 4GB depending on the number and size of DIMMs used. Three sizes of DIMMs are currently offered: 64MB, 128MB and 256MB.

DIMMs are always installed in pairs. For instance, to configure 128 MB two 64 MB DIMMs are installed. Other than the requirement to install two DIMMs at a time, there are no special rules for installing memory.

Factory installed	Field upgrade	Description
203227	203215	128MB ECC Memory (2 x 64MB DIMM)
203230	203218	256MB ECC Memory (2 x 128MB DIMM)
203328	203224	512MB ECC Memory (2 x 256MB DIMM)

Hard Disk Options

The chassis for HX4100 and HX6100 systems has space for three disk drive cages. Each cage has four bays for hot-swap disks resulting in a total of 12 disk drive bays. Each cage includes its own SCSI backplane (bus). HX4100 base system models include one disk drive cage. HX6100 systems include three cages.

When configuring disks for HX4100 systems, the number of disks required determines how many cages are needed. If the disk/cage configuration results in more than one cage, an optional dual channel wide ultra SCSI controller must be selected **OR** if RAID is desired, an optional three-channel RAID controller. If RAID is not configured, the first disk cage is cabled to the baseboard-integrated wide ultra controller. Since each cage is on its own SCSI bus, an additional controller for that bus is needed. Also, if more than one cage is needed, a second power supply must be configured. When RAID is desired, remember to choose a cache module for the RAID card (4, 16 or 32MB are available). RAID is required to support the hot-swap disk capability. The RAID controller itself consumes one of the available PCI slots. RAID levels 0, 1 and 5 are supported. A RAID implementation requires that all disk drives have the same capacity. If mixed capacities are installed, the larger disks will appear to have the capacity of the smallest disk. **A minimum of two disks must be configured to make use of RAID features.** A RAID 5 implementation requires a minimum of three disks. All drive bays are accessible from the front of the system chassis.

HX6100 systems include three disk cages, the RAID controller, and the required second power supply. A cache module is **not** included and must be ordered.

The disks themselves are 7200 RPM, 80-pin Single Connector Attachment (SCA), Wide Ultra devices. A hot-swap disk carrier is included with each disk. It may be ordered separately.

Factory Installed	Field Upgrade	Description
203236	203222	<i>HX4100 Only:</i> Four-bay Hot Swap Disk Cage
203235	203221	4GB, 7200 RPM Disk with carrier
203240	203225	9GB, 7200 RPM Disk with carrier
203228	203216	18GB, 7200 RPM Disk with carrier
203257	203258	Adaptec 3940UW Dual-channel Wide Ultra SCSI Adapter
203247	203246	Mylex DAC960PG 3-channel Wide Ultra RAID Controller
203130	203131	4MB Cache for RAID
203132	203127	8MB Cache for RAID
203128	203129	16MB Cache for RAID
N/A	203226	Hot-swap disk carrier only

Media Devices

The NEC Express5800 HX4100/6100 system has a total of six bays for media devices. One of the two 3.5" bays is used by the standard 1.44MB floppy disk drive. Of the remaining four 5.25" bays, one is used for the standard CD-ROM drive leaving three bays open. Hard disk drives are not supported in these bays due to power and cooling constraints. All four 5.25" bays are cabled to one of the two baseboard-embedded Ultra/Wide SCSI-2 controllers running in narrow SCSI mode.

N.B. - The 4mm DAT tape stacker and DLT Tape Drive consume two bays.

Factory Installed	Field Upgrade	Description
230117	203116	12/24 GB SCSI DDS-3 4mm DAT Drive
203211	203212	12/24 GB SCSI DDS-3 4mm DAT Tape Stacker, 4 Tape Magazine
203298	203299	20/40 GB SCSI DLT Tape Drive

Network Adapters

The NEC Express5800 HX4100 and HX6100 system chassis consists of a total of eleven I/O bus slots. Among the 11 slots, 9 are PCI Bus slots and 2 are ISA Bus slots. The PCI slots are divided between three 132 MB PCI busses (Two slots on the first bus, three on the second, four on the third). A RAID controller is supplied as a standard component in HX6100 systems and occupies one of the PCI slots.

When choosing expansion cards for a system configured as a network server there are several items to consider:

1. Use the highest performance bus. Given a choice, choose the latest bus mastering PCI devices over ISA devices.
2. Avoid mixing certain PCI cards with high bus traffic ISA devices. Example: Programmed I/O ISA NICs and non-bursting PCI NICs).
3. Use state-of-the-art PCI expansion cards. Characteristics to look for include bus mastering and burst mode PCI support. Additional buffering on the expansion card is also desirable, especially with high-speed NICs. Ideally the buffering should support one or more full packets.

Factory Installed	Field Upgrade	Description
203121	203120	SMC 9432 TX 10/100 PCI Ethernet Adapter
203254	203253	3COM 905TX 10/100 PCI Ethernet Adapter
203368	203369	Intel PRO 100+ 10/100

Optional Power Supply

A maximum of three power supplies are supported for each system. When configuring HX4100 systems, if more than one processor is desired, or if more than one disk cage is desired, a second power supply is required for system operation and must be ordered.

HX6100 systems include three power supplies.

If redundant power is desired in an HX4100, a second and third power supply is required.

The system supports an automatic fail-over feature when the second (or third) power supply option is installed. The power supplies are rated at 100VAC-120VAC and 200-240VAC, 50/60Hz and automatically adjust to the input voltage (autoranging). The power supplies support hot-swap. Therefore, adding or removing any power supply does not require shut down of the system.

Factory Installed	Field Upgrade	Description
203234	203220	<i>HX4100 Only</i> : Second or Third Hot-Swap Power Supply

Other Options

Factory Installed	Field Upgrade	Description
202732	203692	<i>HX4100 Only</i> : 1MB to 2MB Video Upgrade
N/A	203251	Rack Mount Kit

Software

The following software components are certified on the NEC Express5800 HX4100 and HX6100 systems:

- Microsoft Windows NT Server 4.0
- Microsoft BackOffice Server 4.0
- Novell IntranetWare 4.11
- SCO Unix 5.0
- Unixware 7.0
- Solaris for Intel 2.6

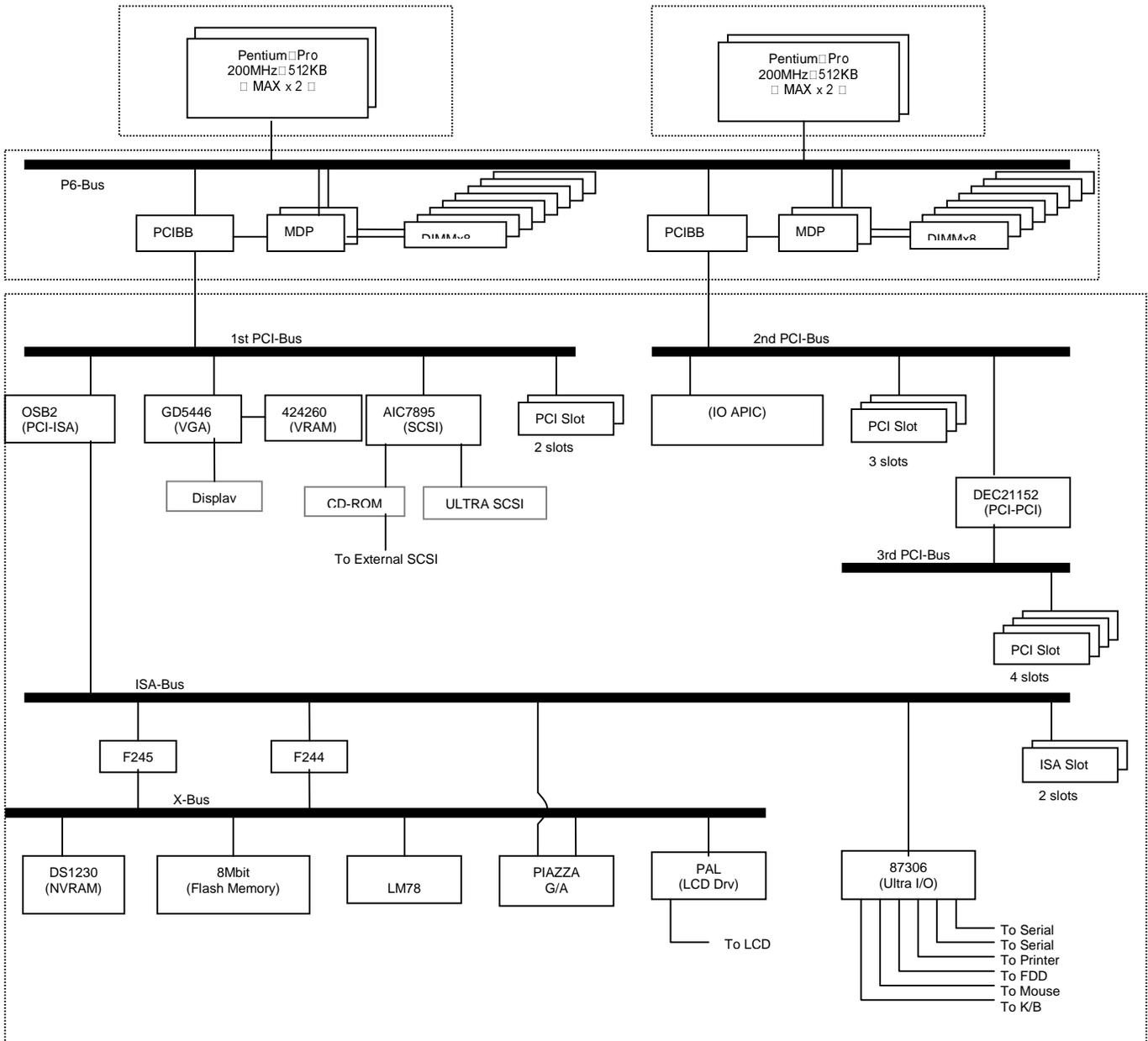
The following software components are shipped with the server:

- ESMPRO™ Server Management Software
- ExpressBuilder™ Installation Software

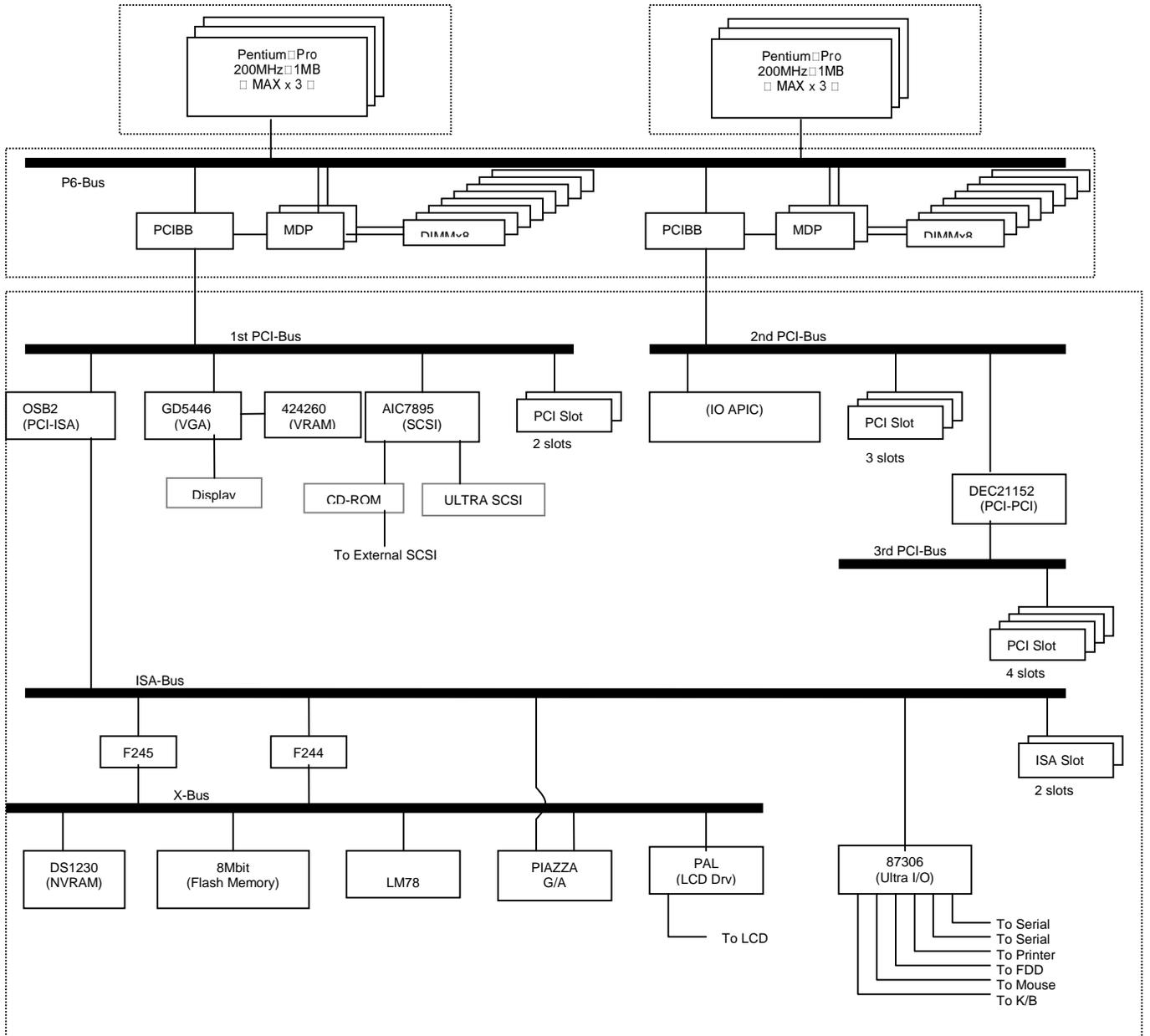
Electrical & Environmental Specifications

Item	Specifications
Power Supply	100-120, 200-240 Volts, Autoranging, hot swap 50/60 Hz
Environment	Operating Temperature: 5 to 35° C (41 to 95° F) Non-Operating Temperature: -40 to 70° C (-40 to 158° F) Operating Humidity: 20% to 80% RH non-condensing Non-Operating Humidity: 10% to 95% RH non-condensing Heat dissipation: 4400 BTU max
Dimensions and Weight	Height: 24.4 inches Width: 17.5 inches Depth: 26.7 inches Rack Mount: 14 EIA Units (14U) Weight: Approximately 170 lbs. (typical); 207 lbs. (maximum)

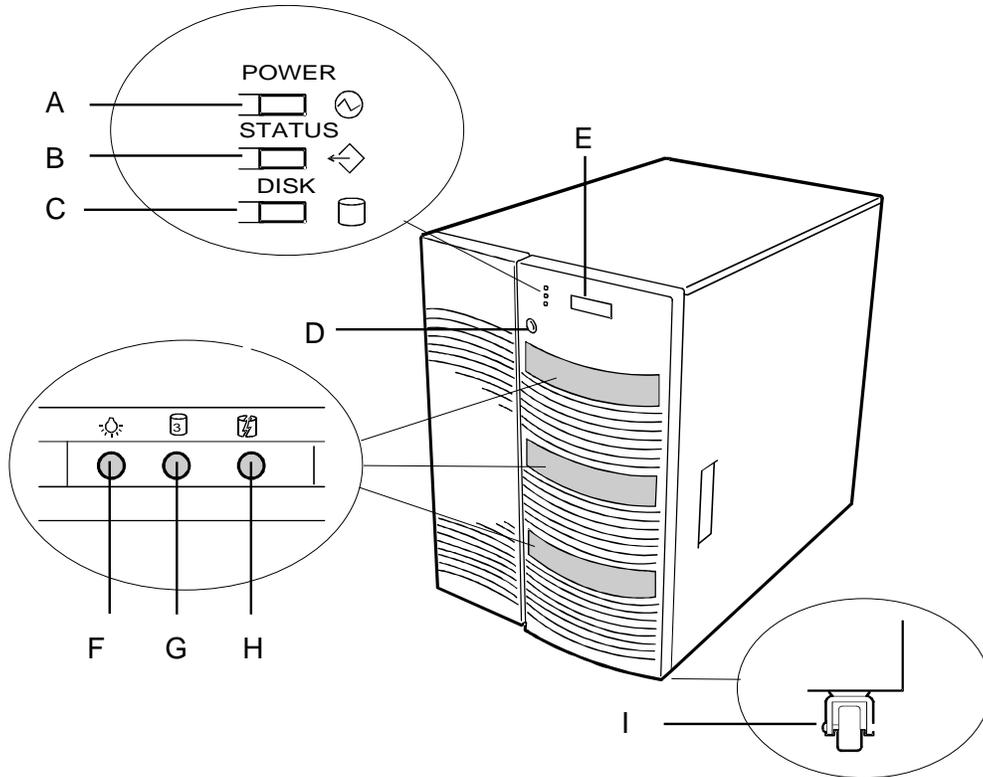
Functional Overview of the Express5800 HX4100



Functional Overview of the Express5800 HX6100

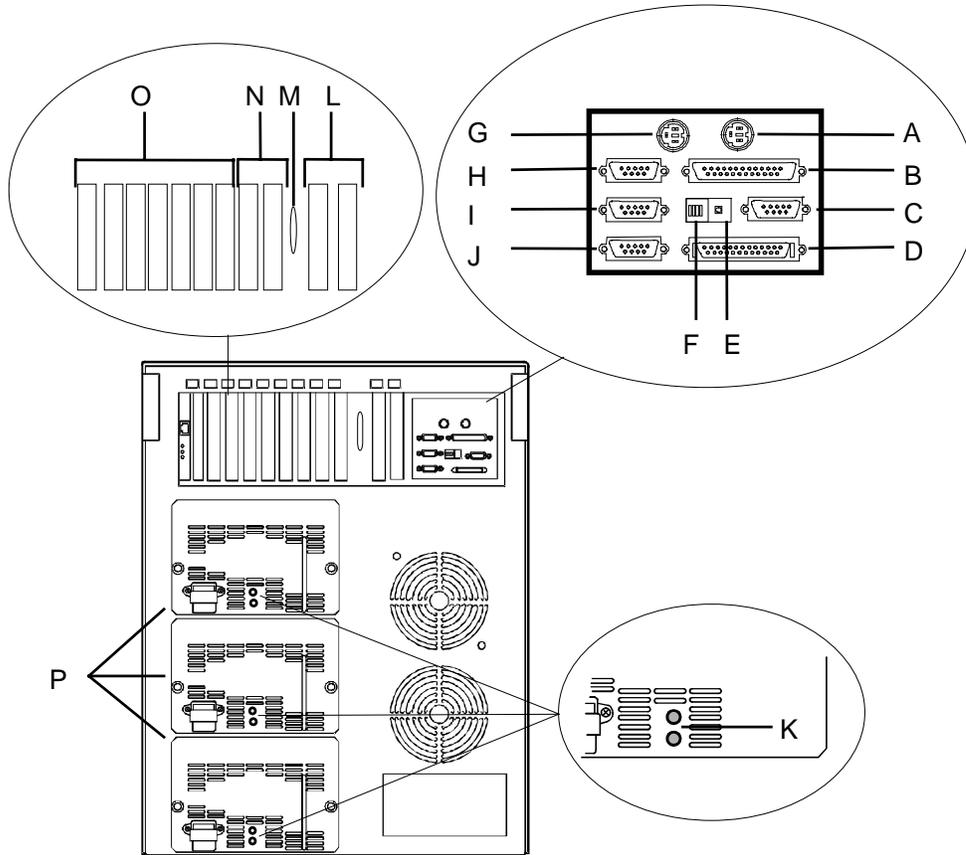


HX4100 HX6100 Front View



A	Power LED	When green, power is present in system. When off, power is turned off or power source is disrupted.
B	Status LED	When green the system is OK.
C	Disk LED	When green, internal disk drives are being accessed.
D	Key lock	Secures both front external doors.
E	LCD panel	Displays information about BIOS and system failures (error and diagnostic information).
F	Left to right:	Each drive has three LEDs visible above the bay from the front.
G	Drive	
H	present/power on; drive active; drive faulty.	
I	Casters (4)	Used when moving the server. Fixed by the caster holders.

HX4100 HX6100 Rear View



- | | | |
|---|------------------------------|--|
| A | Keyboard | PS/2-compatible 6-pin mini-DIN connector. |
| B | Printer | LPT1 25-pin parallel port connector. |
| C | VGA | VGA monitor 15-pin connector. |
| D | External-SCSI | Narrow-SCSI 50-pin connector |
| E | Dump button | See <i>Configuring Switch and Jumper Settings</i> in User's Guide. |
| F | Function select switches | See <i>Configuring Switch and Jumper Settings</i> in User's Guide. |
| G | Mouse | PS/2-compatible 6-pin mini-DIN connector. |
| H | COM1 | COM1 serial port 9-pin connector. |
| I | COM2 | COM2 serial port 9-pin connector. |
| J | — | Reserved. |
| K | Power status LEDs | Both indicators are green during normal operation. Either or both indicators go off when power supply fails. |
| L | PCI slots | Two PCI add-in board slot locations (PCI #11 and PCI #12). |
| M | Knockout | Available to route SCSI signals to peripheral boxes. |
| N | ISA slots | Two ISA add-in board slot locations (ISA #1 and ISA #2). |
| O | PCI slots | Seven PCI add-in board slot locations (PCI #21, PCI #22, PCI #23, PCI #31, PCI #32, PCI #33, and PCI #34). |
| P | Power supplies (three shown) | Refer to configuration guide for configuration rules |

Configuration and Ordering Checklist

Customer Name _____

Customer Address _____

Customer Contact Name _____

Contact Phone Number _____

Component	Factory Installed	Field Upgrade	Quantity	Unit Price	Extended Price
HX4100 Base Systems					
Base Model 1	850116021				
Network Model 1	850116023				
Enterprise Model 1	850116024				
HX6100 Base Systems					
Base Model 1	850116058				
Enterprise Model 1	850116509				
Processor Upgrades					
Second, Third or Fourth 200MHz / 512KB	203237	203223			
Third, Fourth, Fifth or Sixth 200MHz / 1MB	203229	203217			
Memory					
128MB ECC Memory (2 x 64MB DIMM)	203227	203215			
256MB ECC Memory (2 x 128MB DIMM)	203230	203218			
512MB ECC Memory (2 x 256MB DIMM)	203328	203224			
Hard Drives					
Hot Swap Disk Drive Cage	203236	203222			
4GB, 7200 RPM Disk with carrier	203235	203221			
9GB, 7200 RPM Disk with carrier	203240	203225			
18GB, 7200 RPM Disk with carrier	203228	203216			
Adaptec 3940UW Dual-channel Wide Ultra SCSI	203257	203258			
Mylex DAC960PG 3-channel Wide Ultra RAID	203247	203246			
4MB Cache for RAID	203130	203131			
8MB Cache for RAID	203132	203127			
16MB Cache for RAID	203128	203129			
Hot-swap disk carrier only	N/A	203226			
Media Devices					
12/24 GB SCSI DDS-3 4mm DAT Drive	230117	203116			
12/24 GB SCSI DDS-3 4mm DAT Tape Stacker,	203211	203212			
20/40 GB SCSI DLT Tape Drive	203298	203299			
Network Adapters					
SMC 9432 TX 10/100 PCI Ethernet Adapter	203121	203120			
3COM 905TX 10/100 PCI Ethernet Adapter	203254	203253			
Intel PRO 100+ 10/100 PCI Ethernet Adapter	203368	203369			
Optional Power Supply					
Redundant hot-swap Power Supply (HX4100)	203234	203220			
Other Options					
1MB to 2MB Video Upgrade (HX4100)	202732	202692			
Rack Mount Kit	N/A	203251			