xSeries Reference (xREF)

including

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IntelliStation™ / xSeries™ / BladeCenter™

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This document is available at:
http://www.ibm.com/servers/eserver/education/xseries/xref.html

IBM® Type-model	Processor	GHz[1]	FSB MHz	Memory	Disk and rpm	Disk controllers	Optical	Graphics adapter and memory	Slots x bays	Firewire F/R USBF/R	Preload[17]	Available date
6220-20U	Pentium®4	2.8	800	256MB	40.0GB[2] EIDE 7.2K	EIDE	CD-ROM	Quadro4™ 280NVS 64MB	4x3	0/0/2/4	XP Pro	Aug 2003
6220-24U	Pentium 4	2.8	800	512MB	80.0GB SATA 7.2K	EIDE	CD-ROM	Quadro4 580XGL 64MB	4x3	0/0/2/4	XP Pro	Aug 2003
6220-40U	Pentium 4	3.2	800	256MB	40.0GB EIDE 7.2K	EIDE	CD-ROM	Quadro4 280NVS 64MB	4x3	0/0/2/4	XP Pro	Aug 2003
6220-44U	Pentium 4	3.2	800	512MB	80.0GB SATA 7.2K	EIDE	CD-ROM	Quadro4 580XGL 64MB	4x3	0/0/2/4	XP Pro	Aug 2003

Processor Proc. Upg/L2 cache Implementation	**Intel**® **Pentium 4 at 2.8 or 3.2GHz with 800MHz frontside bus** (FSB) / All support Hyper-Threading technology **No SMP Support / 512KB** std and max / at processor speed Motherboard contains one mPGA478B socket (processor/L2 cache in FC-PGA2), four DIMM sockets, one 8X AGP slot, ethernet controller, five total PCI slots (two PCI slots on extender board, some have SCSI controller)
Memory - std / max Memory - features	**256MB** or **512MB** std / 4GB[13] max / one slot used / three slots available / **PC2700** 333MHz unbuffered 184-pin ECC CL2.5 DDR-SDRAM UDIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / **Error Checking and Correcting (ECC)** DIMMs and memory controller
Graphics controller (one of following)	• **NVIDIA Quadro4™ 280NVS** (entry 3D) / (see IntelliStation Graphics sheet for specs) • **NVIDIA Quadro4 580XGL** (entry 3D)
IDE disk controller Cables Disk - features	Four Ultra ATA ports / ATA-100 / integrated in I/O Controller Hub 5 / four 40-pin connectors on planar Two Serial ATA ports / ATA-150 / integrated in I/O Controller Hub 5 / seven 7-pin connectors on planar *EIDE models:* Two EIDE cables (one 2-drop cable to CD-ROM, one 2-drop 40-pin EIDE cable or 7-pin SATA cable) *Some:* EIDE ATA-100 or SATA ATA-150 / 7200 rpm / 9.0 ms seek; *All:* S.M.A.R.T.[5]
Rack support Chipset	Not available **Intel 875P chipset** / 82875P MCH (Memory Controller Hub) for AGP 8X slot and ICH5 / I/O Controller Hub (ICH5) for PCI 2.2 bus (four slots and one Mini-PCI slot), ethernet, ATA-100 EIDE, USB, Low Pin Count Interface / SMC 47M102 Super I/O off LPC
Gigabit ethernet Diskette drive Optical drive IEEE 1394 (FireWire) Audio Rear ports Front ports Systems mgmt	One gigabit 10/100/1000 ethernet controller / Intel Kenai II CSA / full gigabit ethernet MAC and PHY layer functions / chip on planar / PCI 2.2 32-bit 33MHz / full duplex / Wake on LAN® / Alert Standard Format 1.0 None (USB floppy optional) Ultra ATA / 48X/20X Max[6] CD-ROM Not enabled (purchase of 3rd party mini-PCI card will enable ports) Soft audio AC '97 v2.2 interface via ICH4 (AD1885) / internal speaker (use of audio line out requires powered speakers) Four USB (Ver 2.0), two 9-pin serial, parallel, keyboard, mouse, ethernet, audio line in, audio line out, mic in / 6-pin 1394 Two USB (Ver 2.0), audio line out (stereo), mic in / 4-pin 1394 FireWire Monitoring and alerting of thermal, fans, and voltage faults / Winbond® W83791D
Keyboard / mouse Cooling fans Power supply	IBM 104-key keyboard (6-pin PS/2) / IBM three button mouse (6-pin PS/2 conn) Two or three variable speed fans (pwr supply, rear, processor) / not redundant or hot-swap / third fan operates based on heat 200 watts / universal / auto sensing / built-in overload and surge protection

Desktop

Stealth black

| Optical | ② |
| | ③ |
○○□ □

Bay ① 5.25", HH 1.6", access,   optical
Bay ②3.5", SL 1", no access, disk
Bay ③3.5", SL 1", no access, open

Slot 1: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 2: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 3: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 4: fullsize, AGP 8X (1.5v)
 - used by std AGP graphics adapter

Options and Accessories

256MB PC2700 CL2.5 ECC DDR-SDRAM	06P4053
512MB PC2700 CL2.5 ECC DDR-SDRAM	06P4054
1GB PC2700 CL2.5 ECC DDR-SDRAM	06P4055
IBM USB Portable Diskette Drive	05K9276
IBM 40GB 7.2K-rpm EIDE ATA-100 HDD	22P7157
IBM 80GB 7.2K-rpm EIDE ATA-100 HDD	09N4226
IBM 120GB 7.2K-rpm EIDE ATA-100 HDD	09N4231
IBM 80GB S-ATA 7.2K-RPM HDD	09N4253
IBM 160GB S-ATA 7.2K-RPM HDD	09N4254
IBM ThinkVision L200P 20.1inLCD Black A/D	6736-HB0
IBM T221 22.2inLCD Black Digital	9503-DG3
Other options at **ibm.com**/pc/us/accessories	

Weight and Dimensions
↪ H 4.1" x W 14.2" x D 16.2"
↪ H 104mm x W 360mm x D 412mm
↪ 20.0 lb to 22.0 lb (9.07kg to 9.98kg)

• *Maximum internal disk capacity*[13]:
 EIDE: 240GB (2 disks x 120GB)
 SATA: 320GB (2 disks x 160GB)
• Removable left side panel
• Configuration/Setup Utility: F1 at startup
• Product Recovery Program: F11 at startup
• Network Boot: F12 at startup
• Adv Config Power Interface (ACPI) 1.0a
• DMI 2.2-compliant

Preload with Windows XP Professional[17]
Microsoft® Windows® XP Professional
- Free license for Lotus® SmartSuite®
- Free license for Lotus Notes® Client
✧ Device Drivers CD
✧ IBM IntelliStation Documentation CD
• Disk-to-Disk Recovery (in service partition)

SECURITY
• U-bolt anchoring feature (U-bolt is optional; supports optional padlock)
• Security slot (for attachment of optional cable lock such as Kensington cable lock)
• Side cover key lock
• Cover tamper detect switch
• Secure fixed DASD
• Power-on password
• Administrator password
• Keyboard/mouse password
• Boot sequence control
• Boot without keyboard or mouse
• Diskette boot inhibit and write-protect
• Disable mouse
• Diskette, disk, serial port, parallel port I/O control
• Secure access openings
• VPD stored in EEPROM
• Write protection control for EEPROM
• IBM Security Solutions

LIMITED WARRANTY[3]
➭ **3 year parts and labor**
➭ **International Warranty Service**[3]
➭ **On site, 8 am through 5 pm, Mon through Fri excluding holidays, next business day response time**
➭ **On site warranty service upgrade options**[7] **available as ServicePac options at ibm.com/services/its/us/ source/wamomxeu.pdf**
➭ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

IBM Type-model	Processor GHz[1]	FSB MHz	Memory	Disk and rpm	Disk controllers	Optical	Graphics adapter and memory	Slots x bays FireWire	Preload[17]	Available date
6230-20U	Pentium®4 2.8	800	256MB	40.0GB[2] EIDE 7.2KEIDE		CD	Quadro4™ 280NVS 64MB	6x7	XP Pro	Aug 2003
6230-25U	Pentium 4 2.8	800	512MB	36.4GB U320 10K	Ultra320, EIDE	CD	Quadro4 580XGL 64MB	6x7	XP Pro	Aug 2003
6230-27U	Pentium 4 2.8	800	512MB	40.0GB EIDE 7.2KEIDE		CD-RW	Quadro4 980XGL 128MB	6x7 1394	XP Pro	Aug 2003
6230-34U	Pentium 4 3.0	800	512MB	40.0GB EIDE 7.2KEIDE		CD-RW	Quadro4 580XGL 64MB	6x7	XP Pro	Aug 2003
6230-36U	Pentium 4 3.0	800	1GB	36.4GB U320 10K	Ultra320, EIDE	CD-RW	Quadro FX 1000 128MB	6x7 1394	XP Pro	Aug 2003
6230-38U	Pentium 4 3.0	800	512MB	36.4GB U320 10K	Ultra320, EIDE	CD-RW	Quadro4 980XGL 128MB	6x7 1394	XP Pro	Aug 2003
6230-39U	Pentium 4 3.0	800	1GB	36.4GB U320 10K	Ultra320, EIDE	CD-RW	Quadro FX 3000 256MB	6x7 1394	XP Pro	Aug 2003
6230-41U	Pentium 4 3.2	800	512GB	80.0GB SATA 7.2KEIDE		CD	Quadro4 280NVS 64MB	6x7 1394	XP Pro	Aug 2003
6230-46U	Pentium 4 3.2	800	1GB	80.0GB SATA 7.2KEIDE		CD-RW	Quadro FX 1000 128MB	6x7 1394	XP Pro	Aug 2003
6230-49U	Pentium 4 3.2	800	1GB	36.4GB U320 10K	Ultra320, EIDE	CD-RW	Quadro FX 3000 256MB	6x7 1394	XP Pro	Aug 2003
✍ 6230-2PU	Pentium 4 2.8	800	256MB	None	EIDE	None	Quadro4 280NVS 64MB	6x7	DOS2K	Aug 2003
✍ 6230-3PU	Pentium 4 3.0	800	256MB	None	EIDE	None	Quadro4 280NVS 64MB	6x7	DOS2K	Aug 2003
✍ 6230-4PU	Pentium 4 3.2	800	256MB	None	EIDE	None	Quadro4 280NVS 64MB	6x7	DOS2K	Aug 2003

Processor	**Intel® Pentium 4 at 2.8, 3.0 or 3.2GHz with 800MHz frontside bus** (FSB) / all support Hyper-Threading technology
Proc. Upg/L2 cache	**No SMP Support / 512KB** std and max / at processor speed
Implementation	Motherboard contains one mPGA478B socket (processor/L2 cache in FC-PGA2), four DIMM sockets, one 8X AGP slot, ethernet controller, five total PCI slots (two PCI slots on extender board, some have SCSI controller)

Memory - std / max	**256MB** to **1GB** std / 4GB[13] max / one or two slots used / two or three slots available / **PC2700** 333MHz unbuffered 184-pin ECC
Memory - features	CL2.5 DDR-SDRAM UDIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / **Error Checking and Correcting (ECC)** DIMMs and memory controller

Graphics controller (one of following)	• **NVIDIA Quadro4™ 280NVS** (advanced 2D) / (see IntelliStation Graphics sheet for specs) • **NVIDIA Quadro4 580XGL** (entry 3D) • **NVIDIA Quadro4 980XGL** (advanced 3D) • **NVIDIA Quadro FX 1000** (advanced 3D) • **NVIDIA Quadro FX 3000** (exreme 3D)

IDE disk controller	Four Ultra ATA ports / ATA-100 / integrated in I/O Controller Hub 5 / four 40-pin connectors on planar Two Serial ATA ports / ATA-150 / integrated in I/O Controller Hub 5 / two 7-pin connectors on planar
SCSI disk controller	*SCSI models:* **Adaptec® AIC-7901** / single channel **Ultra320 SCSI controller** (LVD 320MB/sec) / on extender board / 32-bit 33MHz PCI 2.2 / one 68-pin internal connector on extender board / no external SCSI connector / one 16-bit channel (internal only)
Cables	*EIDE models:* Two EIDE cables (one 2-drop cable to CD-ROM, one 2-drop 40-pin EIDE cable or 7-pin SATA cable) *SCSI models:* One 4-drop 16-bit 68-pin LVD SCSI cable from extender to int disks bays, one 2-drop EIDE cable (to optical)
Disk - features	*Some:* EIDE ATA-100 or SATA ATA-150 / 7200 rpm / 9.0 ms seek; *Some:* Ultra320 SCSI / 10K rpm / 4.7 ms; *All:* S.M.A.R.T.[5]

Rack support	4U[17] rack mount support via tower-to-rack kit option
Chipset	**Intel 875P chipset** / 82875P MCH (Memory Controller Hub) for AGP 8X slot and ICH5 / I/O Controller Hub (ICH5) for PCI 2.2 bus (six slots and one Mini-PCI slot), SCSI (some models), ethernet, ATA-100 EIDE, USB, Low Pin Count Interface / SMC 47M102 Super I/O off LPC

Gigabit ethernet	One gigabit 10/100/1000 ethernet controller / Intel Kenai II CSA / full gigabit ethernet MAC and PHY layer functions / chip on planar / PCI 2.2 32-bit 33MHz / full duplex / Wake on LAN®
Diskette drive	3.5" 1.44MB diskette drive
Optical drive	*One of following:* 48X/24X/48X Max[6,19] CD-RW, or 48X/20X Max[6] CD-ROM
IEEE 1394 (FireWire)	*Some:* FireWire controller on planar / 1394A, 400Mbps, 6-pin port on rear, 4-pin port on front
Audio	Soft audio AC '97 v2.2 interface via ICH5 / internal speaker (use of audio line out requires powered speakers)
Rear ports	Four USB (Ver 2.0), two 9-pin serial, parallel, keyboard, mouse, ethernet, audio line in, audio line out, mic in / *some:* 6-pin 1394
Front ports	Two USB (Ver 2.0), audio line out (stereo), mic in / *some:* 4-pin 1394 FireWire
Systems mgmt	Monitoring and alerting of thermal, fans, and voltage faults / Winbond® W83791D
Keyboard / mouse	IBM 104-key keyboard (6-pin PS/2) / IBM three button mouse (6-pin PS/2 conn)
Cooling fans	Three variable speed fans (pwr supply, rear, processor) / not redundant or hot-swap
Power supply	340 watts / universal / auto sensing / built-in overload and surge protection

Bay layout
Optical ② diskette ④ disk ⑥ ⑦ **Mini-tower** **Stealth black**

Bay ① 5.25", HH 1.6", access, optical
Bay ② 5.25", HH 1.6", access, open
Bay ③ 3.5", SL 1", access, diskette
Bay ④ 3.5", SL 1", access, open
Bay ⑤ 3.5", SL 1", no access, disk
Bay ⑥ 3.5", SL 1", no access, open
Bay ⑦ 3.5", SL 1", no access,open
- N/A on models with FX 1000/3000

Slot 1: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 2: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 3: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 4: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 5: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 6: fullsize, AGP 8X (1.5v)
 - used by std AGP graphics adapter
Slot : Mini PCI type III - FireWire (some)

⇨ Metal cage for disk bays 5, 6, and 7 rotates out of chassis
⇨ Two front stabilizing feet
⇨ Handle grip on top
⇨ H 17.375" x W 6.5" x D 19.0"
⇨ H 441mm x W 165mm x D 483mm
⇨ 36 lb to 42 lb (16.3kg to 19.1kg)
• *Maximum internal disk capacity[13]:*
 SCSI: 587.2GB (4 disks x 146.8GB)
 EIDE: 360GB (3 disks x 120GB)
 SATA: 320GB (2 disks x 160GB)
• Removable left side panel
• Configuration/Setup Utility: F1 at startup
• Product Recovery Program: F11 at startup
• SCSISelect Utility: CTRL+A at startup
• Network Boot: F12 at startup
• Adv Config Power Interface (ACPI) 1.0a
• DMI 2.2-compliant

256MB PC2700 CL2.5 ECC DDR-SDRAM	06P4053
512MB PC2700 CL2.5 ECC DDR-SDRAM	06P4054
1GB PC2700 CL2.5 ECC DDR-SDRAM	06P4055
IBM 36.4GB 10K rpm Ultra320 SCSI HDD	32P0723
IBM 73.4GB 10K rpm Ultra320 SCSI HDD	32P0724
IBM 80GB 7.2K-rpm EIDE ATA-100 HDD	09N4226
IBM 120GB 7.2K-rpm EIDE ATA-100 HDD	09N4231
IBM 80GB S-ATA 7.2K-RPM HDD	09N4253
IBM 160GB S-ATA 7.2K-RPM HDD	09N4254
IBM 4Ux20D Tower-to-Rack Conversion Kit	09N4300
IBM ThinkVision L200P 20.1inLCD Black A/D	6736-HB0
IBM T221 22.2inLCD Black Digital	9503-DG5
Other options at **ibm.com/pc/us/accessories**	

Preload with Windows XP Professional[17]
Microsoft® Windows® XP Professional
- Free license for Lotus® SmartSuite®
- Free license for Lotus Notes® Client
✧ Device Drivers CD
✧ IBM IntelliStation Documentation CD
• Disk-to-Disk Recovery (in service partition)

SECURITY
• U-bolt anchoring feature (U-bolt is optional; supports optional padlock)
• Security slot (for attachment of optional cable lock such as Kensington cable lock)
• Side cover key lock
• Cover tamper detect switch
• Secure fixed DASD
• Power-on password
• Administrator password
• Keyboard/mouse password
• Boot sequence control
• Boot without keyboard or mouse
• Diskette boot inhibit and write-protect
• Disable mouse
• Diskette, disk, serial port, parallel port I/O control
• Secure access openings
• VPD stored in EEPROM
• Write protection control for EEPROM
• IBM Security Solutions

LIMITED WARRANTY[3]
➥ **3 year parts and labor**
➥ **International Warranty Service**[3]
➥ **On site, 8 am through 5 pm, Mon through Fri excluding holidays, next business day response time**
➥ **On site warranty service upgrade options**[7] **available as ServicePac options at ibm.com/services/its/us/ source/wamomxeu.pdf**
➥ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

See footnotes for important warranty information
US models announced July 29, 2003

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✍ The following models are available through **ibm.com** only and must be configured with additional hardware and software before purchase.

IBM® Type-model	Processor	GHz[1]	FSB MHz	Memory	Disk and rpm	Disk controllers	Optical	Graphics adapter and memory	Slots x bays	FireWire	Preload[17]	Available date
6221-10U	1 x Xeon™	2.4	533	512MB	40.0GB[2] EIDE 7.2K	Ultra320, EIDE	CD	Millennium G450 DVI-I 32MB	6x6		XP Pro	Dec 2002
6221-22U	1 x Xeon	2.67	533	512MB	40.0GB EIDE 7.2K	Ultra320, EIDE	CD	Quadro4 280NVS 64MB	6x6		XP Pro	Dec 2002
✂ 6221-29U	2 x Xeon	2.67	533	512MB	36.4GB U320 10K	Ultra320, EIDE	Combo	Quadro4 280NVS 64MB	6x6	1394	XP Pro	Dec 2002
6221-33U	1 x Xeon	2.8	533	512MB	36.4GB U320 10K	Ultra320, EIDE	CD	Quadro4 280NVS 64MB	6x6		XP Pro	Dec 2002
✂ 6221-36U	1 x Xeon	2.8	533	1GB	36.4GB U320 10K	Ultra320, EIDE	CD-RW	Quadro4 980XGL 128MB	6x6	1394	XP Pro	Dec 2002
✂ 6221-37U	1 x Xeon	2.8	533	1GB	36.4GB U320 10K	Ultra320, EIDE	Combo	Wildcat 4™ 7110 256MB	6x6	1394	XP Pro	Dec 2002

Processor	**1** or **2 x Intel® Xeon at 2.4, 2.67, or 2.8B GHz with 533MHz frontside bus (FSB)**
L2 cache	**512KB** std and max / at processor speed
Processor upgrade	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 604-pin micro-PGA2 ZIF sockets, four DIMM slots, seven slots (one PCI 2.2, four PCI-X, one Mini PCI, one AGP), and integrated SCSI and ethernet
Memory - std / max	**512MB** or **1GB** std / **8GB**[13] max / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] /
Memory - features	2-way memory interleave / dual channel / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
Graphics controller (one of following)	• **Matrox® Millennium G450 DVI-I** (entry 2D) / AGP 4X adapter / MGA G450F GPU / 32MB 150MHz DDR-SDRAM / dual RAMDAC [360/232MHz] / dual head support / one DVI-I connector (ships with one cable with two DB-15 analog conns)
	• **NVIDIA™ Quadro4 280NVS** (high-perf 2D) / AGP 8X adapter / NV18LT 275MHz GPU / 64MB 200MHz DDR-SDRAM / dual 350MHz RAMDACs / dual head: 2048x1536x16M each monitor / LFH60 connector for std cable with two DB-15 analog
	• **NVIDIA Quadro4 980XGL** (advanced 3D) / AGP 8X adapter / 128MB 325MHz DDR-SDRAM / dual 350MHz RAMDACs / dual head: 2048x1536x16M each monitor / two DVI-I connectors (ships with two DVI-I to DB-15 dongles)
	• **3DLabs Wildcat4™ 7110** (extreme 3D) / AGP 8X Pro 50 adapter / 256MB total DDR-SDRAM (128MB frame buffer, 128MB texture buffer) / dual RAMDAC [320/280MHz] / dual head support (up to two digital or analog monitors) / two DVI-I connectors (ships with two DVI-I to analog DB-15 adapters for analog monitor attachment)
IDE disk controller	Enhanced IDE busmaster / ATA-100 / integrated in I/O Controller Hub 4 / two connectors on planar
SCSI disk controller	**LSI Logic® 53C1030 / dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** (Embedded Mirroring)
SCSI channels and cables	Two 16-bit channels (one internal and one external) / *Internal channel:* one 3-drop 16-bit 68-pin LVD SCSI cable from systemboard to internal disks bays; *External channel:* Models 29U/37U have one 1-drop 16-bit 68-pin LVD SCSI cable from systemboard to rear external 68-pin connector (cable available as option part number 24P7929)
Cables	*EIDE models:* Two EIDE cables (one 2-drop cable to CD-ROM, one 2-drop cable to EIDE disk)
	SCSI models: One or two SCSI cables (listed above), one 2-drop EIDE cable (to optical)
Disk - features	*Some:* 40.0GB EIDE / ATA-100 / 7200 rpm / 9.0 ms seek; *Some:* 36.4GB Ultra320 SCSI / 10K rpm / 4.7 ms; *All:* S.M.A.R.T.[5]
Rack support	4U[4] rack mount support via tower-to-rack kit option
Chipset	**Intel E7505 chipset** / E7505 MCH (Memory Controller Hub) for AGP 8X slot, P64H2, ICH4 / P64H2 for two PCI-X buses (Bus A for slots 2 and 3 and ethernet controller; Bus B for slots 4 and 5 and SCSI controller) / I/O Controller Hub (ICH4) for PCI 2.2 bus (one slot and one Mini PCI slot), ATA-100 EIDE, USB, Low Pin Count Interface / NS PC87366 Super I/O off LPC interface
Gigabit ethernet	One gigabit 10/100/1000 ethernet controller / Broadcom BCM5703i / full gigabit ethernet MAC and PHY layer functions / chip on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format 1.0 / one rear RJ-45 port
Diskette drive	3.5" 1.44MB diskette drive
Optical drive	*One of following:* 48X-20X[6] CD-ROM, 32X/10X/40X/16X Max[6,19] CD-RW/DVD-ROM Combo, or 40X/24X/40X Max[6] CD-RW
IEEE 1394 (FireWire)	*Some:* FireWire controller in Mini PCI slot / 1394A, 400Mbps, 6-pin port on rear, 4-pin port on front, no cables included
Audio	Soft audio AC '97 v2.2 interface via ICH4 (AD1885) / internal speaker (use of audio line out requires powered speakers)
Rear ports	Two USB (Ver 2.0), two 9-pin serial, parallel, keyboard, mouse, ethernet, audio line in, audio line out, mic in / *some:* 6-pin 1394
Front ports	Two USB (Ver 2.0), audio line out (stereo), mic in / *some:* 4-pin 1394 FireWire
Systems mgmt	Monitoring and alerting of thermal, fans, and voltage faults / Winbond® W791D
Keyboard / mouse	IBM 104-key keyboard (6-pin PS/2) / IBM three button mouse (6-pin PS/2 conn)
Cooling fans	Three variable speed fans (power supply, two in rear) / not redundant or hot-swap
Power supply	425 watts / universal / auto sensing / built-in overload and surge protection

SECURITY
- U-bolt anchoring feature (U-bolt is optional; supports optional padlock)
- Security slot (for attachment of optional cable lock such as Kensington cable lock)
- Cover key lock
- Cover tamper detect switch
- Secure fixed DASD
- Power-on password
- Administrator password
- Keyboard/mouse password
- Boot sequence control
- Boot without keyboard or mouse
- Diskette boot inhibit and write-protect
- Disable mouse
- Diskette, disk, serial port, parallel port I/O control
- Secure access openings
- VPD stored in EEPROM
- Write protection control for EEPROM
- IBM Security Solutions

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 ┌──────────────┐
 │   Optical    │
 │      ②       │
 │  ┌────────┐  │
 │  diskette  │
 │ ⑥⑤④      │
 │  d         │
 │  i s k     │
 └──────────────┘
  Mini-tower
  Raven
  black
```

Bay ① 5.25", HH 1.6", access, optical
Bay ② 5.25", HH 1.6", access, open
Bay ③ 3.5", SL 1", access, diskette
Bay ④ 3.5", SL 1", no access, disk
Bay ⑤ 3.5", SL 1", no access, open
Bay ⑥ 3.5", SL 1", no access, open

Slot 1: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
 - N/A on models with Wildcat4 7110 vid
Slot 2: fullsize, 64-bit 100MHz, PCI-X 1.0
Slot 3: fullsize, 64-bit 100MHz, PCI-X 1.0
Slot 4: fullsize, 64-bit 100MHz, PCI-X 1.0*
Slot 5: fullsize, 64-bit 100MHz, PCI-X 1.0
Slot 6: Mini PCI type III - FireWire (some)
Slot: fullsize, AGP 8X (1.5v)
 - used by std AGP graphics adapter
* Extended slot

- Metal cage for disk bays 4,5,6 rotates out of chassis
- Two front stabilizing feet
- Handle grip on top
- H 17.375" x W 6.5" x D 19.375"
- H 441mm x W 165mm x D 492mm
- 36 lb to 45.8 lb (16.3kg to 20.8kg)
- *Maximum internal disk capacity*[13]:
  SCSI: 438GB (3 disks x 146GB)
  EIDE: 240GB (2 disks x 120GB)
- Removable left side panel
- BIOS Setup Utility via F1 at startup
- LSI Configuration Utility near startup by pressing CTRL+C
- Product Recovery Program via F11 at startup
- Adv Config Power Interface (ACPI) 1.0a
- DMI 2.2-compliant

Xeon 2.4GHz/512KB L2 Cache Proc Upgrade	24P7468
Xeon 2.67GHz/512KB L2 Cache Proc Upgrade	59P5109
Xeon 2.8GHz/512KB L2 Cache Proc Upgrade	59P5110
256MB PC2100 CL2.5 ECC DDR-SDRAM x4	33L5037
512MB PC2100 CL2.5 ECC DDR-SDRAM x4	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5039
2GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5040
IBM 73.4GB 15K rpm Ultra320 SCSI HDD	32P0733
IBM 146GB 10K rpm Ultra320 SCSI HDD	32P0725
IBM 120GB 7.2K rpm ATA-100 EIDE HDD	09N4231
IBM 4Ux20D Tower-to-Rack Conversion Kit	09N4300

Other options at **ibm.com**/pc/us/accessories

Preload with Windows XP Professional[17]

Microsoft® Windows® XP Professional
- Free license for Lotus® SmartSuite®
- Free license for Lotus Notes® Client
- Device Drivers and IBM Enhanced Diagnostics CD
- IBM IntelliStation Documentation CD
- Disk-to-Disk Recovery (in service partition)

LIMITED WARRANTY[3]
- **3 year parts and labor**
- **International Warranty Service**[3]
- **On site, 8 am through 5 pm, Mon through Fri excluding holidays, next business day response time**
- **On site warranty service upgrade options**[7] **available as ServicePac options at ibm.com/services/its/us/ source/wamomxeu.pdf**
- **24x7**[14] **toll-free support for warranty issues during the warranty period**[1]

See footnotes for important warranty information
US models announced November 19, 2002
US model 36U withdrawn effective March 25, 2003; others withdrawn effective April 25, 2003

(6221) © IBM Corp. November 2002

IBM® Type-model	Processor	GHz[1]	FSB MHz	Memory	Disk and rpm	Disk controllers	Optical	Graphics adapter and memory	Slots x bays	FireWire	Preload[17]	Available date
6221-38U	1 x Xeon™	2.8B	533	1GB	36.4GB[2] U320 10K	Ultra320, EIDE	CD-RW	Quadro4 980XGL 128MB	6x6	1394	XP Pro	Apr 2003
6221-40U	1 x Xeon	3.06	533	512MB	40.0GB EIDE 7.2K	Ultra320, EIDE	CD	Millennium G450 DVI-I 32MB	6x6		XP Pro	Apr 2003
6221-42U	1 x Xeon	3.06	533	512MB	40.0GB EIDE 7.2K	Ultra320, EIDE	CD	Quadro4 280NVS 64MB	6x6		XP Pro	Apr 2003
6221-46U	1 x Xeon	3.06	533	1GB	36.4GB U320 10K	Ultra320, EIDE	Combo	Quadro4 980XGL 128MB	6x6	1394	XP Pro	Apr 2003
6221-47U	1 x Xeon	3.06	533	1GB	36.4GB U320 10K	Ultra320, EIDE	CD-RW	Wildcat4 7110 256MB	6x6	1394	XP Pro	Apr 2003
6221-48U	1 x Xeon	3.06	533	1GB	36.4GB U320 10K	Ultra320, EIDE	Combo	Quadro FX 1000 128MB	6x6	1394	XP Pro	Apr 2003
6221-49U	2 x Xeon	3.06	533	1GB	36.4GB U320 10K	Ultra320, EIDE	DVD	Quadro4 280NVS 64MB	6x6	1394	XP Pro	Apr 2003
☎ 6221-4PU	1 x Xeon	3.06	533	512MB	(none) open-bay	Ultra320, EIDE	None	Quadro4 280NVS 64MB	6x6		DOS lic	Apr 2003

Processor	**1 or 2 x Intel® Xeon at 2.8B or 3.06 GHz with 533MHz frontside bus (FSB)**
L2 cache	**512KB** std and max / at processor speed
Processor upgrade	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 604-pin micro-PGA2 ZIF sockets, four DIMM slots, seven slots (one PCI 2.2, four PCI-X, one Mini PCI, one 8X AGP), and integrated SCSI and ethernet
Memory - std / max	**512MB** or **1GB** std / **8GB**[13] max / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] /
Memory - features	2-way memory interleave / dual channel / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
Graphics controller (one of following)	• **Matrox® Millennium G450 DVI-I** (entry 2D) (see 6221-November 2002 sheet for specs) • **NVIDIA™ Quadro4 280NVS** (high performance 2D) (see 6221-November 2002 sheet for specs) • **NVIDIA Quadro4 980XGL** (advanced 3D) / AGP 8X adapter / 128MB 325MHz DDR-SDRAM / dual 350MHz RAMDACs / dual two 2048x1536x16M each monitor / two DVI-I connectors (ships with two DVI-I to DB-15 dongles) • **3DLabs Wildcat4**™ **7110** (extreme 3D) / AGP 8X adapter / 256MB total DDR-SDRAM (128MB frame buffer, 128MB texture buffer) / dual RAMDAC [320/280MHz] / dual head support (up to two digital or analog monitors) / two DVI-I connectors (ships with two DVI-I to analog DB-15 adapters for analog monitor attachment) • **NVIDIA Quadro FX 1000** (advanced 3D) / AGP 8X adapter / 128MB 800Mhz DDR-SDRAM / dual 400Mhz RAMDACs / dual head: 2048x1536x16M each monitor / two DVI-I connectors (ships with two DVI-I to DB-15 dongles)
IDE disk controller	Enhanced IDE busmaster / ATA-100 / integrated in I/O Controller Hub 4 / two connectors on planar
SCSI disk controller	**LSI Logic® 53C1030** / **dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** (Embedded Mirroring)
SCSI channels and cables	Two 16-bit channels (one internal and one external) / *Internal channel:* one 3-drop 16-bit 68-pin LVD SCSI cable from systemboard to internal disks bays; *External channel:* Models 29U/37U have one 1-drop 16-bit 68-pin LVD SCSI cable from systemboard to rear external 68-pin connector (cable available as option part number 24P7929)
Cables	*EIDE models:* Two EIDE cables (one 2-drop cable to CD-ROM, one 2-drop cable to EIDE disk) *SCSI models:* One or two SCSI cables (listed above), one 2-drop EIDE cable (to optical)
Disk - features	*Some:* 40.0GB EIDE / ATA-100 / 7200 rpm / 9.0 ms seek; *Some:* 36.4GB Ultra320 SCSI / 10K rpm / 4.7 ms; *All:* S.M.A.R.T.[5]
Rack support	4U[4] rack mount support via tower-to-rack kit option
Chipset	**Intel E7505 chipset** / E7505 MCH (Memory Controller Hub) for AGP 8X slot, P64H2, ICH4 / P64H2 for two 64-bit PCI-X buses (Bus A for slots 2 and 3 and ethernet controller; Bus B for slots 4 and 5 and SCSI controller) / I/O Controller Hub (ICH4) for PCI 2.2 bus (one slot and one Mini PCI slot), ATA-100 EIDE, USB, Low Pin Count Interface / NS PC87366 Super I/O off LPC interface
Gigabit ethernet	One gigabit 10/100/1000 ethernet controller / Broadcom BCM5703i / full gigabit ethernet MAC and PHY layer functions / chip on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format 1.0 / one rear RJ-45 port
Diskette / Optical drives	3.5" 1.44MB diskette drive and one of the following: 48X-20X[6] CD-ROM, 48X/24X/48X/16X Max[6,19] CD-RW/DVD-ROM Combo, 48X/24X/48X Max[6] CD-RW or 16X Max[6] DVD-ROM
IEEE 1394(FireWire)	*Some:* FireWire controller in Mini PCI slot / 1394A, 400Mbps, 6-pin port on rear, 4-pin port on front
Audio	Soft audio AC '97 v2.2 interface via ICH4 (AD1885) / internal speaker (use of audio line out requires powered speakers)
Rear ports	Two USB (Ver 2.0), two 9-pin serial, parallel, keyboard, mouse, ethernet, audio line in, audio line out, mic in / *some:* 6-pin 1394
Front ports	Two USB (Ver 2.0), audio line out (stereo), mic in / *some:* 4-pin 1394 FireWire
Systems mgmt	Monitoring and alerting of thermal, fans, and voltage faults / Winbond® W791D
Keyboard / mouse	IBM 104-key keyboard (6-pin PS/2) / IBM three button mouse (6-pin PS/2 conn)
Cooling fans	Three variable speed fans (power supply, two in rear) / not redundant or hot-swap
Power supply	425 watts / universal / auto sensing / built-in overload and surge protection

SECURITY		
• U-bolt anchoring feature (U-bolt is optional; supports optional padlock)		
• Security slot (for attachment of optional cable lock such as Kensington cable lock)		
• Cover key lock		
• Cover tamper detect switch		
• Secure fixed DASD		
• Power-on password		
• Administrator password		
• Keyboard/mouse password		
• Boot sequence control		
• Boot without keyboard or mouse		
• Diskette boot inhibit and write-protect		
• Disable mouse		
• Diskette, disk, serial port, parallel port I/O control		
• Secure access openings		
• VPD stored in EEPROM		
• Write protection control for EEPROM		
• IBM Security Solutions		

Bay ① 5.25", HH 1.6", access, optical
Bay ② 5.25", HH 1.6", access, open
Bay ③ 3.5", SL 1", access, diskette
Bay ④ 3.5", SL 1", no access, disk
Bay ⑤ 3.5", SL 1", no access, open
Bay ⑥ 3.5", SL 1", no access, open

Slot 1: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
 - N/A on models with Wildcat4 7110 vid
Slot 2: fullsize, 64-bit 100MHz, PCI-X 1.0
Slot 3: fullsize, 64-bit 100MHz, PCI-X 1.0
Slot 4: fullsize, 64-bit 100MHz, PCI-X 1.0*
Slot 5: fullsize, 64-bit 100MHz, PCI-X 1.0
Slot 6: Mini PCI type III - FireWire (some)
Slot: fullsize, AGP 8X (1.5v)
 - used by std AGP graphics adapter
 * Extended slot

Mini-tower

Raven black

⇨ Metal cage for disk bays 4,5,6 rotates out of chassis
⇨ Two front stabilizing feet
⇨ Handle grip on top
⇨ H 17.375" x W 6.5" x D 19.375"
⇨ H 441mm x W 165mm x D 492mm
⇨ 36 lb to 45.8 lb (16.3kg to 20.8kg)

• *Maximum internal disk capacity*[13]:
 SCSI: 438GB (3 disks x 146GB)
 EIDE: 240GB (2 disks x 120GB)
• Removable left side panel
• BIOS Setup Utility via F1 at startup
• LSI Configuration Utility near startup by pressing CTRL+C
• Product Recovery Program via F11 at startup
• Adv Config Power Interface (ACPI) 1.0a
• DMI 2.2-compliant

Xeon 2.8BGHz/512KB L2 Cache Proc Upgrade	59P5110
Xeon 3.06GHz/512KB L2 Cache Proc Upgrade	24P8123
512MB PC2100 CL2.5 ECC DDR-SDRAM x4	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5039
2GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5040
IBM 73.4GB 15K rpm Ultra320 SCSI HDD	32P0733
IBM 146GB 10K rpm Ultra320 SCSI HDD	32P0725
IBM 120GB 7.2K rpm ATA-100 EIDE HDD	09N4231
IBM ThinkVision L200P 20.1inLCD Black A/D	6736-HB0
IBM T221 22.2inLCD Black Digital	9503-DG3
IBM 4Ux20D Tower-to-Rack Conversion Kit	09N4300
Other options at **ibm.com/pc/us/accessories**	

Preload with Windows XP Professional[17]

Microsoft® Windows® XP Professional
- Free license for Lotus® SmartSuite®
- Free license for Lotus Notes® Client
✧ Device Drivers and IBM Enhanced Diagnostics CD
✧ IBM IntelliStation Documentation CD
• Disk-to-Disk Recovery (in service partition)

LIMITED WARRANTY[3]

➭ **3 year parts and labor**
➭ **International Warranty Service**[3]
➭ **On site, 8 am through 5 pm, Mon through Fri excluding holidays, next business day response time**
➭ **On site warranty service upgrade options**[7] **available as ServicePac options at ibm.com/services/its/us/ source/wamomxeu.pdf**
➭ **24x7**[14] **toll-free support for warranty issues during the warranty period**[1]

See footnotes for important warranty information
US models announced March 18, 2002
☎ US model available only through **ibm.com** and must be configured with additional hardware and software before purchase

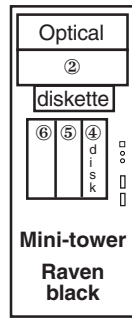| IBM® Type-model	Processor	GHz[1]	FSB MHz	Memory	Disk and rpm	Disk controllers	Optical	Graphics adapter and memory	Slots x bays	FireWire	Preload[17]	Available date
6221-52U	1 x Xeon™	3.2	533	512MB	40.0GB[2] EIDE 7.2K	Ultra320,EIDE	CD	Quadro4 280NVS 64MB	6x6	1394	XP Pro	Oct 2003
6221-53U	1 x Xeon	3.2	533	512MB	40.0GB EIDE 7.2K	Ultra320,EIDE	CD-RW	Quadro4 980XGL 128MB	6x6	1394	XP Pro	Oct 2003
6221-56U	1 x Xeon	3.2	533	512MB	36.4GB U320 10K	Ultra320,EIDE	CD-RW	Quadro4 980XGL 128MB	6x6	1394	XP Pro	Oct 2003
6221-57U	1 x Xeon	3.2	533	1GB	36.4GB U320 10K	Ultra320,EIDE	Combo	Quadro FX 1000 128MB	6x6	1394	XP Pro	Oct 2003
6221-58U	2 x Xeon	3.2	533	1GB	40.0GB EIDE 7.2K	Ultra320,EIDE	Combo	Quadro FX 1000 128MB	6x6	1394	XP Pro	Oct 2003
6221-59U	1 x Xeon	3.2	533	1GB	36.4GB U320 10K	Ultra320,EIDE	Combo	Quadro FX 3000 256MB	6x6	1394	XP Pro	Oct 2003
☎ 6221-5PU	1 x Xeon	3.2	533	512MB	(none) open-bay	Ultra320,EIDE	None	Quadro4 280NVS 64MB	6x6	1394	DOS lic	Oct 2003

Processor	**1** or **2 x Intel**® **Xeon** at 3.2 GHz with 533MHz frontside bus (FSB)
L2 cache	**512KB** standard and maximum / at processor speed
L3 cache	**1MB** standard and maximum / at processor speed
Processor upgrade	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 604-pin micro-PGA2 ZIF sockets, four DIMM slots, seven slots (one PCI 2.2, four PCI-X, one Mini PCI, one 8X AGP), and integrated SCSI and ethernet
Memory - std / max	**512MB** or **1GB** std / 8GB[13] max / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-
Memory - features	SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
Graphics controller (one of following)	(see IntelliStation Graphics sheet for full graphics specifications) • **NVIDIA**™ **Quadro4 280NVS** • **NVIDIA Quadro4 980XGL** • **NVIDIA Quadro FX 1000** • **NVIDIA Quadro FX 3000**
IDE disk controller	Enhanced IDE busmaster / ATA-100 / integrated in I/O Controller Hub 4 / two connectors on planar
SCSI disk controller	**LSI Logic**® **53C1030** / **dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** (Embedded Mirroring)
SCSI channels and cables	Two 16-bit channels (one internal and one external) / *Internal channel:* one 3-drop 16-bit 68-pin LVD SCSI cable from systemboard to internal disks bays; *External channel:* Models 29U/37U have one 1-drop 16-bit 68-pin LVD SCSI cable from systemboard to rear external 68-pin connector (cable available as option part number 24P7929)
Cables	*EIDE models:* Two EIDE cables (one 2-drop cable to CD-ROM, one 2-drop cable to EIDE disk) *SCSI models:* One or two SCSI cables (listed above), one 2-drop EIDE cable (to optical)
Disk - features	*Some:* 40.0GB EIDE / ATA-100 / 7200 rpm / 9.0 ms seek; *Some:* 36.4GB Ultra320 SCSI / 10K rpm / 4.7 ms; *All:* S.M.A.R.T.[5]
Rack support	4U[4] rack mount support via tower-to-rack kit option
Chipset	**Intel E7505 chipset** / E7505 MCH (Memory Controller Hub) for AGP 8X slot, P64H2, ICH4 / P64H2 for two 64-bit PCI-X buses (Bus A for slots 2 and 3 and ethernet controller; Bus B for slots 4 and 5 and SCSI controller) / I/O Controller Hub (ICH4) for PCI 2.2 bus (one slot and one Mini PCI slot), ATA-100 EIDE, USB, Low Pin Count Interface / NS PC87366 Super I/O off LPC interface
Gigabit ethernet	One gigabit 10/100/1000 ethernet controller / Broadcom BCM5703i / full gigabit ethernet MAC and PHY layer functions / chip on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format 1.0 / one rear RJ-45 port
Diskette / Optical drives	3.5" 1.44MB diskette drive and one of the following: 48X-20X[6] CD-ROM, 48X/24X/48X/16X Max[6,19] CD-RW/DVD-ROM Combo or 48X/24X/48X Max[6] CD-RW
IEEE 1394(FireWire)	FireWire controller in Mini PCI slot / 1394A, 400Mbps, 6-pin port on rear, 4-pin port on front
Audio	Soft audio AC '97 v2.2 interface via ICH4 (AD1885) / internal speaker (use of audio line out requires powered speakers)
Rear ports	Two USB (Ver 2.0), two 9-pin serial, parallel, keyboard, mouse, ethernet, audio line in, audio line out, mic in / 6-pin 1394
Front ports	Two USB (Ver 2.0), audio line out (stereo), mic in / 4-pin 1394
Systems mgmt	Monitoring and alerting of thermal, fans, and voltage faults / Winbond® W791D
Keyboard / mouse	IBM 104-key keyboard (6-pin PS/2) / IBM three button mouse (6-pin PS/2 conn)
Cooling fans	Three variable speed fans (power supply, two in rear) / not redundant or hot-swap
Power supply	425 watts / universal / auto sensing / built-in overload and surge protection

Bay ① 5.25", HH 1.6", access, optical
Bay ② 5.25", HH 1.6", access, open
Bay ③ 3.5", SL 1", access, diskette
Bay ④ 3.5", SL 1", no access, disk
Bay ⑤ 3.5", SL 1", no access, open
Bay ⑥ 3.5", SL 1", no access, open

Slot 1: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 2: fullsize, 64-bit 100MHz, PCI-X 1.0
Slot 3: fullsize, 64-bit 100MHz, PCI-X 1.0
Slot 4: fullsize, 64-bit 100MHz, PCI-X 1.0*
Slot 5: fullsize, 64-bit 100MHz, PCI-X 1.0
Slot 6: Mini PCI type III - FireWire
Slot: fullsize, AGP 8X (1.5v)
 - used by std AGP graphics adapter
 * Extended slot

Mini-tower

Raven black

⇨ Metal cage for disk bays 4,5,6 rotates out of chassis
⇨ Two front stabilizing feet
⇨ Handle grip on top
⇨ H 17.375" x W 6.5" x D 19.375"
⇨ H 441mm x W 165mm x D 492mm
⇨ 36 lb to 45.8 lb (16.3kg to 20.8kg)

• *Maximum internal disk capacity*[13]: *SCSI:* 438GB (3 disks x 146GB) *EIDE:* 240GB (2 disks x 120GB)
• Removable left side panel
• BIOS Setup Utility via F1 at startup
• LSI Configuration Utility near startup by pressing CTRL+C
• Product Recovery Program via F11 at startup
• Adv Config Power Interface (ACPI) 1.0a
• DMI 2.2-compliant

Preload with Windows XP Professional[17]

Microsoft® Windows® XP Professional
- Free license for Lotus® SmartSuite®
- Free license for Lotus Notes® Client
✧ Device Drivers and IBM Enhanced Diagnostics CD
✧ IBM IntelliStation Documentation CD
• Disk-to-Disk Recovery (in service partition)

SECURITY

• U-bolt anchoring feature (U-bolt is optional; supports optional padlock)
• Security slot (for attachment of optional cable lock such as Kensington cable lock)
• Cover key lock
• Cover tamper detect switch
• Secure fixed DASD
• Power-on password
• Administrator password
• Keyboard/mouse password
• Boot sequence control
• Boot without keyboard or mouse
• Diskette boot inhibit and write-protect
• Disable mouse
• Diskette, disk, serial port, parallel port I/O control
• Secure access openings
• VPD stored in EEPROM
• Write protection control for EEPROM
• IBM Security Solutions

LIMITED WARRANTY[3]

➥ **3 year parts and labor**
➥ **International Warranty Service**[3]
➥ **On site, 8 am through 5 pm, Mon through Fri excluding holidays, next business day response time**
➥ **On site warranty service upgrade options[7] available as ServicePac options at ibm.com/services/its/us/ source/wamomxeu.pdf**
➥ **24x7[14] toll-free support for warranty issues during the warranty period[1]**

Xeon 3.2GHz/1MB L3 Cache Proc Upgrade	13N0691
512MB PC2100 CL2.5 ECC DDR-SDRAM x4	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5039
2GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5040
IBM 36.4GB 10K rpm Ultra320 SCSI HDD	32P0723
IBM 73.4GB 10K rpm Ultra320 SCSI HDD	32P0724
IBM 146GB 10K rpm Ultra320 SCSI HDD	32P0725
IBM 120GB 7.2K rpm ATA-100 EIDE HDD	09N4231
IBM ThinkVision L200P 20.1inLCD Black A/D	6736-HB0
IBM T221 22.2inLCD Black Digital	9503-DG3
IBM 4Ux20D Tower-to-Rack Conversion Kit	09N4300
Other options at **ibm.com/pc/us/accessories**	

See footnotes for important warranty information
US models announced October 7, 2003

(6221C) © IBM Corp. October 2003

☎ US model available only through **ibm.com** and must be configured with additional hardware and software before purchase

Graphics Adapter	Matrox® Millennium G450 DVI-I	NVIDIA Quadro4™ 200NVS	NVIDIA Quadro4™ 280NVS	NVIDIA Quadro4™ 580XGL	NVIDIA Quadro4™ 980XGL	NVIDIA Quadro™ FX 1000	3DLabs Wildcat4™ 7110	NVIDIA Quadro™ FX 3000
Category	Entry 2D	High-Perf 2D	Advanced 2D	Entry 3D	Advanced 3D	Advanced 3D	Extreme 3D	Extreme 3D
Total Memory	32MB	64MB	64MB	64MB	128MB	128MB	256MB*	256MB
Memory Type	150Mhz DDR-SDRAM	166Mhz SDRAM	200Mhz DDR-SDRAM	275Mhz DDR-SDRAM	325Mhz DDR-SDRAM	300Mhz DDR2-SDRAM	166/200Mhz DDR-SDRAM	800Mhz DDR-SDRAM
RAMDAC Detail	Dual 360/232Mhz	Dual 350Mhz	Dual 350Mhz	Dual 350Mhz	Dual 350Mhz	Dual 400Mhz	Dual 320/280Mhz	Dual 400Mhz
Graphics Pipeline	256-bit	128-bit	128-bit	128-bit	128-bit	128-bit	128-bit	256-bit
Supported Bus	AGP 4X	AGP 4X	AGP 8X	AGP 8X	AGP 8X	AGP 8X	AGP 8X	AGP 8X
Maximum Displays	Two Analog One Digital	Two	Two	Two	Two	Two	Two	Two
Supported Displays Analog - Digital CRT - Flat Panel -	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes
Max Analog Resolution	2048x1536x32 @ 66Hz	2048x1536x32 @ 60 Hz	2048x1536x32 @ 60 Hz	2048x1536x32 @ 60 Hz	2048x1536x32 @ 60 Hz	2048x1536x32 @ 85 Hz	2048x1536x32 @ 60 Hz	2048x1536x32 @ 85 Hz
Max Digital Resolution	1600x1200x32 @ 60Hz	1280x1024x32 @ 60 Hz	1280x1024x32 @ 60 Hz	1280x1024x32 @ 60 Hz	1600x1200x32 @ 60 Hz 2048x1536x32 @ 41 Hz 3840x2400x32 @ 13 Hz	1600x1200x32 @ 60 Hz 2048x1536x32 @ 41 Hz 3840x2400x32 @ 13 Hz	2048x1536x32 @ 30 Hz	1600x1200x32 @ 60 Hz 2048x1536x32 @ 41 Hz 3840x2400x32 @ 24 Hz
Connectors	One DVI-I	One LFH60	One LFH60	One LFH60	Two DVI-I, One 3-pin stereo	Two DVI-I, One 3-pin stereo	Two DVI-I, One 3-pin stereo	*Two DVI-I, One 3-pin stereo
Cables Included	One DVI-I -to- Dual DB-15 cable included	One LFH-to-Dual DB-15 cable included, LFH-to-Dual DVI-I optional	One LFH-to-Dual DB-15 cable included, LFH-to-Dual DVI-I optional	One LFH-to-Dual DB-15 cable included, LFH-to-Dual DVI-I optional	Two DVI-I -to- DB-15 cables included	Two DVI-I -to- DB-15 cables included	Two DVI-I -to- DB-15 cables included	Two DVI-I -to- DB-15 cables included
Other							*128MB frame buffer memory and 128MB texture buffer memory Does not support Linux OS	*One single-link DVI-I and One dual-link DVI-I

NOTE: Four-head and/or TV-in graphics adapters available by special bid

Warranty information: For a copy of applicable product warranties, write to: Warranty Information, P.O. Box 12195, RTP, NC, 27709, Attn: Dept JDJA/B203. IBM makes no representation or warranty regarding third party products or services.

[1] MHz/GHz only measures microprocessor internal clock speed; many factors affect application perfomance.

[2] MB/GB/TB = 1 million/billion/trillion bytes when referring to storage capacity. Accessible capacity is less; up to 3GB is used in service partition.

[3] For terms and conditions or a copy of IBM's Statement of Limited Warranty, call 1 800 772-2227 in the U.S. Copies available upon request. Telephone support may be subject to additional charges. For onsite labor, IBM will attempt to diagnose and resolve the problem remotely before sending a technician. International Warranty Service is available in any country in which this product is sold and serviced. Service delivery methods and parts availability vary by country, may be different from that in the country of purchase, and are subject to change without notice. Fees and restrictions may apply in some countries.

[4] A single "U", or rack unit, is 1.75" or 44.45mm.

[5] S.M.A.R.T. stands for Self-Monitoring, Analysis and Reporting Technology.

[6] CD and DVD drives speeds are variable and are often less than the maximum.

[7] These services are available for machines normally used for business, professional, or trade purposes, rather than personal, family or household purposes. Not all machine types and models are covered. Service period begins with the equipment date of purchase. Service must be purchased during the original limited product warranty period. Service levels are response time objectives and are not guarantees. A service technician is scheduled to arrive at your location within two or four business hours or the next business day (depending on service) after remote problem determination is completed. For the 9x5x4-hour service, calls dispatched after 1:00 p.m. local time, you can expect the service technician to arrive by the morning of the next business day. For non-critical service requests, a service technician will arrive by the end of the following business day. If the machine problem turns out to be a Customer Replaceable Unit (CRU), IBM will express ship the part to you for quick replacement. Onsite 24x7x2-hour service is not available in all locations. External peripherals, such as racks, tape drives, and channel controllers, require their own, separate service coverage, they are not covered under the attached Machine. Service activation is required immediately following purchase. For ThinkPad notebooks requiring LCD or other component replacement, IBM may choose to perform service at the depot repair center. For failing non-IBM components, customer must provide replacement part unless IBM has a Technical Support Agreement with the manufacturer. Service does not cover accessories, supply items and certain parts such as batteries, frames and covers. Not available in all states; call your IBM representative for details.

[8] Subject to conditions.

[9] Some software may differ from retail version (if any) and may not include user manuals or all program functionality. Software license agreements may apply.

[10] Updated drivers and hot-swap services for certain operating systems may be required to support PCI hot-swap functions.

[11] Fire GL1, Fire GL2 and Fire GL4 are trademarks of ATI Technologies, Inc., and are used under license.

[12] Installation of 2GB RDIMMs requires BIOS and diagnostic firmware version 1.08 or later. When more than 8GB of memory is installed, the integrated SCSI controller must be disabled.

[13] Maximum memory and internal hard disk capacities may require the replacement of standard component with largest supported component available.

[14] Response times may vary. May exclude some holidays. Telephone support may be subject to additional charges.

[15] IBM makes no respresentations or warranties regarding non-IBM products and services that are ServerProven, including but not limited to the implied warranties of merchantability and fitness for particular purpose. These products are offered and warranted by third parties, not IBM.

[16] Asset ID allows your computer to be scanned by various radio frequency emitting devices which must be purchased separately from independent companies.

[17] Some software may differ from its retail version (if available), and may not include user manual or all program functionality. Software license agreements may apply.

[18] Diskettes and hard copy documentation available at extra charge.

[19] For combination drives, maximum possible speeds only are given in the following order: CD read, CD write, CD re-write, DVD read.

[20] Statement of direction and subject to availability.

IBM® Type-model	Processor	GHz[1]	L2 cache	FSB MHz	Memory	Disk	Disk controller	Extender board controllers	PCI slots x bays	Hot-swap disk bays	Ethernet	Available date
✂ 8480-93X	Celeron®	1.8	128KB	400	256MB	40GB[2] EIDE 7200 rpm	EIDE	Graphics	5 x 7	None (fixed)	Gigabit	Dec 2002
✂ 8480-94X	Celeron	1.8	128KB	400	128MB	40GB EIDE 7200 rpm	EIDE	Graphics	5 x 7	None (fixed)	Gigabit	Feb 2003
8480-95X	Celeron	2.0	128KB	400	128MB	40GB EIDE 7200 rpm	EIDE	Graphics	5 x 7	None (fixed)	Gigabit	July 2003

Positioning	*Value Leader (VL); uniprocessor, entry server designed to meet small business needs and budgets*
Processor(s)	**Intel® Celeron at 1.8GHz or 2.0Ghz with 400MHz frontside bus** (FSB)
L2 cache	**128KB** std and max / ECC / full speed
Implementation	Motherboard contains one mPGA478 socket (processor/L2 cache in FC-PGA2), two DIMM sockets, three PCI slots, one AGP slot, ethernet controller, connector for extender board (two PCI slots and graphics controller)
SMP support	No SMP support / no processor upgrade
Memory	**256MB** / 2GB[13] max / two 184-pin gold-plated DIMM sockets / one socket used / **PC2100 266MHz ECC DDR-SDRAM** / **Error Checking and Correcting (ECC)** DIMMs and ECC memory controller / industry std / unbuffered / CAS Latency 2.5 (CL2.5)
SCSI disk controller	None standard
IDE disk controller	Enhanced IDE / ATA-100 / integrated in I/O Controller Hub / two connectors on planar
Cables	Two 2-drop EIDE cables (one cable uses one drop to CD-ROM, other cable uses one drop to disk)
Disk	40GB EIDE / ATA-100 / 7200 rpm / 9.0 ms average read seek / S.M.A.R.T.
Rack support	4U[4] rack mount support via tower-to-rack kit option
Bus slots (see below)	One PCI bus / five 32-bit 33MHz PCI 2.2 slots / one AGP 4X slot (not used) / no hot-swap Active™ PCI slots
Chipset	**Intel 845E chipset** / 82845E Memory Controller Hub (MCH) / 82801DB I/O Controller Hub (ICH4) for PCI 2.2 bus, ATA-100 EIDE, ethernet MAC, USB, Low Pin Count Interface / Firmware Hub / SMSC® LPC47M102 Super I/O for diskette, parallel, serial, keyboard, mouse
Ethernet	10/100/1000 gigabit / Broadcom® BCM 5702 or 5705 / on planar / PCI 2.2 32-bit 33MHz / full duplex / PHY and MAC layers / Preboot eXecution Environment (PXE) / Wake on LAN® / Alert Standard Format 1.0
CD-ROM / diskette	CD-ROM: 48X-20X[6] CD-ROM, IDE / *Diskette:* 3.5" 1.44MB diskette drive
Ports	*Front:* none; *Back:* two serial (9-pin), parallel, two USB (Ver 2.0), keyboard, mouse, ethernet (RJ-45), monitor (analog DB-15), microphone-in (mono), line-in (stereo), line-out (stereo)
Diagnostics	Diagnostic LEDs / error LEDs for fans and memory / server diagnostic programs stored on IBM Enhanced Diagnostics CD
Systems mgmt cntrl	Winbond® W83791 / chip on planar / monitors system and processor temperature, fan speed and failure, and voltages / **support for optional Remote Supervisor Adapter** (provides continuous health monitoring and control)
Graphics controller	SVGA / ATI® RageXL / on extender board / 4MB SDRAM std/max / PCI 2.2 32-bit 33MHz / analog 15-pin D-Sub conn

Security	Mechanical side panel key lock / optional U-Bolt support via knockout / power-on password / boot sequence control / operation without keyboard/mouse / cover tamper detect switch	256MB PC2100 CL2.5 ECC DDR UDIMM	10K0067
		512MB PC2100 CL2.5 ECC DDR UDIMM	10K0069
		1GB PC2100 CL2.5 ECC DDR UDIMM	10K0071
		IBM 80GB 7200 rpm EIDE ATA-100 HDD	09N4226
Software	**ServerGuide**™ (CD-based automated network OS installation and configuration tool), IBM Director (system hardware mgmt software) and many utilities	40X/12X/40X Max[6] CD-RW internal (black)	22P6976
		IBM Remote Supervisor Adapter (PCI adapter)	09N7585
		IBM 4Ux20D Tower-to-Rack Kit	09N4300
		IBM PCI Ultra160 SCSI Adapter	19K4646
Keyboard / mouse	IBM 101 key keyboard / IBM mouse (both black)	IBM ServeRAID-4Lx Ultra160 SCSI Controller	06P5740
Cooling fans	Three fans (fansink, rear, pwr supply) / not redundant / not hot-swap / full speed	IBM 20/40GB TR7 Internal Tape Drive	48P7042
		IBM 40/80GB DLT1 Internal Half-High Tape Drive	24P2398
	340 watts / universal / auto switch /	IBM E54 (13.8" viewable) Color Monitor (black)	633147N
	Automatic Server Restart (ASR) / not hot-swap /	IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
Power supply	no redundancy / cooling fan in power supply (variable spd)	IBM NetBAY11 Standard Rack Cabinet	9306110
		Other options at **ibm.com**/pc/us/accessories	

Slot 1: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 2: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 3: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 4: fullsize, 32-bit 33MHz, PCI 2.2 (5v)**
Slot 5: fullsize, 32-bit 33MHz, PCI 2.2 (5v)**
Slot: fullsize, 32-bit AGP 4X (1.5v)
** on two-slot PCI extender board

CD-ROM
②
diskette
④
⑤
⑥
disk
Mini-tower
Stealth black

Bay ① 5.25", HH1.6", access, CD-ROM
Bay ② 5.25", HH1.6", access, open (no disk)
Bay ③ 3.5", SL 1", access, diskette
Bay ④ 3.5", SL 1", access, open
Bay ⑤ 3.5", SL 1", access, open
Bay ⑥ 3.5", SL 1", access, open
Bay ⑦ 3.5", SL 1", access, std disk (some)
↪ Metal cage for disk bays 5,6,7 rotate out of chassis for easy access for cabling backplane or working with disks
↪ Predictive Failure Analysis on disk(s) with IBM Director can alert the administrator of an imminent componet failure

◇ Removable left side panel
◇ Configuration/Setup Utility (in flash memory) invoked by pressing F1 at startup
◇ Advanced Configuration Power Interface (ACPI) 1.0
◇ Device Drivers and Diagnostics CD-ROM included
◇ Four stabilizing feet
◇ Handle grip on top
◇ H 18.5" x W 6.5" x D 20.0"
◇ H 470mm x W 165mm x D 508mm
◇ 35 to 42 pounds (15.9 to 19.1kg)

Maximum internal IDE disk capacity: 240GB[13] (3 disks x 80GB)
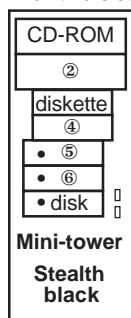
See footnotes for important warranty information
US models announced November 19, 2002, February 18, 2003 and July 1, 2003
✂ US models withdrawn effective March 25, 2003 (93X) and August 29, 2003 (94X)

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IBM® Type-model	Processor	GHz[1]	L2 cache	FSB MHz	Memory	Disk	Disk controller	Extender board controllers	PCI slots x bays	Hot-swap disk bays	Ethernet	Available date
✂ 8480-13X	Pentium® 4	1.8	512KB	400	256MB	40GB[2] EIDE 7200 rpm	EIDE	Graphics	5 x 7	None (fixed)	Gigabit	Aug 2002
✂ 8480-22X	Pentium 4	2.0	512KB	400	256MB	18.2GB Ultra160 10K	Ultra160	Graphics, SCSI	5 x 7	None (fixed)	Gigabit	Aug 2002
✂ 8480-2AX	Pentium 4	2.0	512KB	400	256MB	None	Ultra160	Graphics, SCSI	5 x 7	3 hot-swap	Gigabit	Aug 2002
✂ 8480-23X	Pentium 4	2.0	512KB	400	256MB	40GB EIDE 7200 rpm	EIDE	Graphics	5 x 7	None (fixed)	Gigabit	Aug 2002
✂ 8480-32X	Pentium 4	2.4	512KB	533	256MB	36.4GB Ultra160 10K	Ultra160	Graphics, SCSI	5 x 7	None (fixed)	Gigabit	Aug 2002
✂ 8480-3AX	Pentium 4	2.4	512KB	533	256MB	None	Ultra160	Graphics, SCSI	5 x 7	3 hot-swap	Gigabit	Aug 2002
8480-33X	Pentium 4	2.4	512KB	533	256MB	40GB EIDE 7200 rpm	EIDE	Graphics	5 x 7	None (fixed)	Gigabit	Aug 2002

Positioning	*An extremely affordable, uni-processor server that delivers value and availability for small and medium businesses*
Processor(s)	**Intel® Pentium 4 at 1.8, 2.0, or 2.4GHz with 400 or 533MHz frontside bus** (FSB)
L2 cache	**512KB** std and max / ECC / full speed
Implementation	Motherboard contains one mPGA478 socket (processor/L2 cache in FC-PGA2), two DIMM sockets, three PCI slots, one AGP slot, ethernet controller, connector for extender board (two PCI slots, graphics controller, some have SCSI controller)
SMP support	No SMP support / no processor upgrade
Memory	**256MB** / 2GB[13] max / two 184-pin gold-plated DIMM sockets / one socket used / **PC2100 266MHz ECC DDR-SDRAM** / **Error Checking and Correcting (ECC)** DIMMs and ECC memory controller / industry std / unbuffered / CAS Latency 2.5 (CL2.5)
SCSI disk controller SCSI connectors	*SCSI models:* **Adaptec® AHA-7892 / single channel Ultra160 SCSI controller** (160MB/sec) / controller on extender board / 32-bit 33MHz PCI 2.1 / one 68-pin internal connector on extender board / no external SCSI connector
IDE disk controller	Enhanced IDE / ATA-100 / integrated in I/O Controller Hub / two connectors on planar
Cables	*SCSI fixed disk models:* one 5-drop 16-bit LVD SCSI cable, one 2-drop EIDE cable *SCSI hot-swap models:* one 1-drop 16-bit LVD SCSI cable (extender board to SCSI backplane), one 2-drop EIDE cable *EIDE models:* two 2-drop EIDE cables (one cable uses one drop to CD-ROM, other cable uses one drop to disk)
Disk - features	*Some SCSI models:* 18.2GB or 36.4GB / Ultra160 SCSI / 10000 rpm / 5.2 ms read seek / S.M.A.R.T.[5] *EIDE models:* 40GB EIDE / ATA-100 / 7200 rpm / 9.0 ms read seek / S.M.A.R.T.
Rack support	4U[4] rack mount support via tower-to-rack kit option
Bus slots (see below)	One PCI bus / five 32-bit 33MHz PCI 2.2 slots / one AGP 4X slot (not used) / no hot-swap Active™ PCI slots
Chipset	**Intel 845E chipset** / 82845E Memory Controller Hub (MCH) / 82801DB I/O Controller Hub (ICH4) for PCI 2.2 bus, ATA-100 EIDE, ethernet MAC, USB, Low Pin Count Interface / Firmware Hub / SMSC® LPC47M102 Super I/O for diskette, parallel, serial, keyboard, mouse
Ethernet	10/100/1000 gigabit / Broadcom® BCM 5702 / on planar / PCI 2.2 32-bit 33MHz / full duplex / PHY and MAC layers / Preboot eXecution Environment (PXE) / Wake on LAN® / Alert Standard Format 1.0
CD-ROM / diskette	*CD-ROM:* 48X-20X[6] CD-ROM, IDE / *Diskette:* 3.5" 1.44MB diskette drive
Ports	*Front:* (none)*; Back:* two serial (9-pin), parallel, two USB (Ver 2.0), keyboard, mouse, ethernet (RJ-45), monitor (analog DB-15), microphone-in (mono), line-in (stereo), line-out (stereo)
Diagnostics	Diagnostic LEDs / error LEDs for fans and memory / server diagnostic programs stored on IBM Enhanced Diagnostics CD
Systems mgmt cntrl	Winbond® W83791 / chip on planar / monitors system and processor temperature, fan speed and failure, and voltages / **support for optional Remote Supervisor Adapter** (provides continuous health monitoring and control)
Graphics controller	SVGA / ATI® RageXL / on extender board / 4MB SDRAM std/max / PCI 2.2 32-bit 33MHz / analog 15-pin D-Sub conn

Security	Mechanical side panel key lock (locks hot-swap disks on hot-swap models) / optional U-Bolt support via knockout / power-on password / boot sequence control / operation without keyboard/mouse / cover tamper detect switch	256MB PC2100 CL2.5 ECC DDR UDIMM — 10K0067 512MB PC2100 CL2.5 ECC DDR UDIMM — 10K0069 1GB PC2100 CL2.5 ECC DDR UDIMM — 10K0071 IBM 80GB 7200 rpm EIDE ATA-100 HDD — 09N4226
Software	**ServerGuide**™ (CD-based automated network OS installation and configuration tool), IBM Director (system hardware mgmt software) and many utilities	IBM 36GB 15K Ultra160 SCSI SL HDD (not hot-swap) 06P5766 IBM 73.4GB 10K Ultra160 SCSI SL HDD(not hot-swap)06P5752 IBM 36.4GB 10K Ultra160 SCSI Hot-swap HDD — 06P5768 IBM 73.2GB 10K Ultra160 SCSI Hot-swap HDD — 06P5756
Keyboard / mouse	IBM 101 key keyboard / IBM mouse (both black)	40X/12X/40X Max[6] CD-RW internal (black) — 22P6976
Cooling fans	*Fixed disk models:* three fans (fansink, rear, pwr supply) *Hot-swap models:* four fans (fansink, two rear, pwr supply) *All:* not redundant / not hot-swap / variable speed	IBM Multi Burner — 22P6970 IBM Remote Supervisor Adapter (PCI adapter) — 09N7585 IBM 4Ux20D Tower-to-Rack Kit — 09N4300
Power supply	340 watts / universal / auto switch / Automatic Server Restart (ASR) / not hot-swap / no redundancy / cooling fan in power supply (variable spd)	IBM ServeRAID-4Lx Ultra160 SCSI Controller — 06P5740 IBM T541 15" Flat Panel Color Monitor (black) — 9512AB1 IBM NetBAY11 Standard Rack Cabinet — 9306110 Other options at **ibm.com**/pc/us/accessories

Slot 1: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 2: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 3: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 4: fullsize, 32-bit 33MHz, PCI 2.2 (5v)**
Slot 5: fullsize, 32-bit 33MHz, PCI 2.2 (5v)**
Slot: fullsize, 32-bit AGP 4X (1.5v)
** on two-slot PCI extender board

Bay ① 5.25", HH1.6", access, CD-ROM
Bay ② 5.25", HH1.6", access, open (no disk)
Bay ③ 3.5", SL 1", access, diskette
Bay ④ 3.5", SL 1", access, open
Bay ⑤ 3.5", SL 1", access, open
Bay ⑥ 3.5", SL 1", access, open
Bay ⑦ 3.5", SL 1", access, std disk (some)

```
CD-ROM
  ②
diskette
  ④
• ⑤
• ⑥
• disk
Mini-tower
Stealth
black
```

➪ *Fixed disk models:* metal cage for disk bays 5,6,7 rotate out of chassis for easy access for cabling backplane or working with disks
➪ Predictive Failure Analysis on disk(s) with IBM Director can alert the administrator of an imminent componet failure

◇ Removable left side panel
◇ Configuration/Setup Utility (in flash memory) invoked by pressing F1 at startup
◇ SCSISelect near startup by pressing CTRL+A
◇ Adv Config Power Interface (ACPI) 1.0
◇ Device Drivers and Diagnostics CD-ROM included
◇ Four stabilizing feet
◇ Handle grip on top
◇ H 18.5" x W 6.5" x D 20.0"
◇ H 470mm x W 165mm x D 508mm
◇ 35 to 42 pounds (15.9 to 19.1kg)

Maximum internal SCSI disk capacity[13]: 587.2GB (4 disks x 146.8GB)
Maximum internal IDE disk capacity[13]: 240GB (3 disks x 80GB)

LIMITED WARRANTY[3]
➡ **1 year parts and labor**
➡ **International Warranty Service**[3]
➡ **On site, 8 am-5 pm, Mon-Fri excluding holidays, next business day response time**
➡ **On site service upgrade options (in eligible locations):**[7]
  • **3 year IOR 9x5, NBD response** (ServicePac part num 69P9509)
  • **3 year IOR 9x5, 4 hr avg response** (ServicePac® part num 69P9510)
  • **3 year IOR 24x7, 4 hr avg response** (ServicePac part num 69P9511)
  • **3 year IOR 24x7, 2 hr avg response** (ServicePac part num 69P9512)
➡ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]
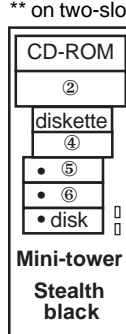
See footnotes for important warranty information
US models announced August 20, 2002
• = Hot-swap bays in some models
✂ = US models 32X and 3AX withdrawn effective June 27, 2003; others withdrawn effective February 28, 2003 or April 29, 2003

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IBM® Type-model	Processor	GHz[1]	L2 cache	FSB MHz	Memory	Disk	Disk controller	Extender board controllers	PCI slots x bays	Hot-swap disk bays	Ethernet	Available date
8480-42X	Pentium® 4	2.67	512KB	533	256MB	36.4GB[2] Ultra160 10K	Ultra160	Graphics, SCSI	5 x 7	None (fixed)	Gigabit	Feb 2003
8480-4AX	Pentium 4	2.67	512KB	533	256MB	None	Ultra160	Graphics, SCSI	5 x 7	3 hot-swap	Gigabit	Feb 2003
8480-43X	Pentium 4	2.67	512KB	533	256MB	40GB EIDE 7200 rpm	EIDE	Graphics	5 x 7	None (fixed)	Gigabit	Feb 2003
8480-52X	Pentium 4	2.8	512KB	533	256MB	36.4GB Ultra160 10K	Ultra160	Graphics, SCSI	5 x 7	None (fixed)	Gigabit	Feb 2003
8480-5AX	Pentium 4	2.8	512KB	533	256MB	None	Ultra160	Graphics, SCSI	5 x 7	3 hot-swap	Gigabit	Feb 2003
8480-53X	Pentium 4	2.8	512KB	533	256MB	40GB EIDE 7200 rpm	EIDE	Graphics	5 x 7	None (fixed)	Gigabit	Feb 2003
8480-62X	Pentium 4	3.06	512KB	533	256MB	36.4GB Ultra160 10K	Ultra160	Graphics, SCSI	5 x 7	None (fixed)	Gigabit	Sep 2003
8480-6AX	Pentium 4	3.06	512KB	533	256MB	None	Ultra160	Graphics, SCSI	5 x 7	3 hot-swap	Gigabit	Sep 2003
8480-63X	Pentium 4	3.06	512KB	533	256MB	40GB EIDE 7200 rpm	EIDE	Graphics	5 x 7	None (fixed)	Gigabit	Sep 2003

Positioning	*An extremely affordable, uni-processor server that delivers value and availability for small and medium businesses*
Processor(s)	**Intel® Pentium 4 at 2.67 or 2.8GHz with 533MHz frontside bus** (FSB)
L2 cache	**512KB** standard and maximum / ECC / full speed
Implementation	Systemboard contains one mPGA478 socket (processor/L2 cache in FC-PGA2), two DIMM sockets, three PCI slots, one AGP slot, ethernet controller, connector for extender board (two PCI slots, graphics controller, some have SCSI controller)
SMP support	No SMP support / no processor upgrade
Memory	**256MB** / 2GB[13] max / two 184-pin gold-plated DIMM sockets / one socket used / **PC2100 266MHz ECC DDR-SDRAM** / **Error Checking and Correcting (ECC)** DIMMs and ECC memory controller / industry std / unbuffered / CAS Latency 2.5 (CL2.5)
SCSI disk controller SCSI connectors IDE disk controller Cables	*SCSI models:* **Adaptec® AHA-7892 / single channel Ultra160 SCSI controller** (160MB/sec) / controller on extender board / 32-bit 33MHz PCI 2.1 / one 68-pin internal connector on extender board / no external SCSI connector Enhanced EIDE / ATA-100 / integrated in I/O Controller Hub / two connectors on planar *SCSI fixed disk models:* one 5-drop 16-bit LVD SCSI cable, one 2-drop EIDE cable *SCSI hot-swap models:* one 1-drop 16-bit LVD SCSI cable (extender board to SCSI backplane), one 2-drop EIDE cable *EIDE models:* two 2-drop EIDE cables (one cable uses one drop to CD-ROM, other cable uses one drop to disk)
Disk - features	*Some SCSI models:* 36.4GB / Ultra160 SCSI / 10000 rpm / 5.2 ms read seek / S.M.A.R.T.[5] *EIDE models:* 40GB EIDE / ATA-100 / 7200 rpm / 9.0 ms read seek / S.M.A.R.T.
Rack support Bus slots (see below) Chipset	4U[4] rack mount support via tower-to-rack kit option One PCI bus / five 32-bit 33MHz PCI 2.2 slots / one AGP 4X slot (not used) / no hot-swap Active™ PCI slots **Intel 845E chipset** / 82845E Memory Controller Hub (MCH) / 82801DB I/O Controller Hub (ICH4) for PCI 2.2 bus, ATA-100 EIDE, ethernet MAC, USB, Low Pin Count Interface / Firmware Hub / SMSC® LPC47M102 Super I/O for diskette, parallel, serial, keyboard, mouse
Ethernet	10/100/1000 gigabit / Broadcom® BCM 5702 / on planar / PCI 2.2 32-bit 33MHz / full duplex / PHY and MAC layers / Preboot eXecution Environment (PXE) / Wake on LAN® / Alert Standard Format 1.0
CD-ROM / diskette Ports	*CD-ROM:* 48X-20X[6] CD-ROM, IDE / *Diskette:* 3.5" 1.44MB diskette drive *Front:* (none); *Back:* two serial (9-pin), parallel, two USB (Ver 2.0), keyboard, mouse, ethernet (RJ-45), monitor (analog DB-15), microphone-in (mono), line-in (stereo), line-out (stereo)
Diagnostics Systems mgmt cntrl	Diagnostic LEDs / error LEDs for fans and memory / server diagnostic programs stored on IBM Enhanced Diagnostics CD Winbond® W83791 / chip on planar / monitors system and processor temperature, fan speed and failure, and voltages / **support for optional Remote Supervisor Adapter** (provides continuous health monitoring and control)
Graphics controller	SVGA / ATI® RageXL / on extender board / 4MB SDRAM std/max / PCI 2.2 32-bit 33MHz / analog 15-pin D-Sub conn

Security	Mechanical side panel key lock (locks hot-swap disks on hot-swap models) / optional U-Bolt support via knockout / power-on password / boot sequence control / operation without keyboard/mouse / cover tamper detect switch
Software	**ServerGuide™** (CD-based automated network OS installation and configuration tool), IBM Director (system hardware mgmt software) and many utilities
Keyboard / mouse Cooling fans	IBM 101 key keyboard / IBM mouse (both black) *Fixed disk models:* three fans (fansink, rear, pwr supply) *Hot-swap models:* four fans (fansink, two rear, pwr supply) *All:* not redundant / not hot-swap / variable speed
Power supply	340 watts / universal / auto switch / Automatic Server Restart (ASR) / not hot-swap / no redundancy / cooling fan in power supply (variable spd)

Option	Part
256MB PC2100 CL2.5 ECC DDR UDIMM	10K0067
512MB PC2100 CL2.5 ECC DDR UDIMM	10K0069
1GB PC2100 CL2.5 ECC DDR UDIMM	10K0071
IBM 80GB 7200 rpm EIDE ATA-100 HDD	09N4226
IBM 36GB 15K Ultra160 SCSI SL HDD (not hot-swap)	06P5766
IBM 73.4GB 10K Ultra160 SCSI SL HDD(not hot-swap)	06P5752
IBM 36.4GB 10K Ultra160 SCSI Hot-swap HDD	06P5768
IBM 73.2GB 10K Ultra160 SCSI Hot-swap HDD	06P5756
40X/12X/40X Max[6] CD-RW internal (black)	22P6976
IBM Multi Burner	22P6970
IBM Remote Supervisor Adapter (PCI adapter)	09N7585
IBM 4Ux20D Tower-to-Rack Kit	09N4300
IBM ServeRAID-4Lx Ultra160 SCSI Controller	06P5740
IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
IBM NetBAY11 Standard Rack Cabinet	9306110

Other options at **ibm.com**/pc/us/accessories

Slot 1: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 2: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 3: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 4: fullsize, 32-bit 33MHz, PCI 2.2 (5v)**
Slot 5: fullsize, 32-bit 33MHz, PCI 2.2 (5v)**
Slot: fullsize, 32-bit AGP 4X (1.5v)
** on two-slot PCI extender board

Bay ① 5.25", HH1.6", access, CD-ROM
Bay ② 5.25", HH1.6", access, open (no disk)
Bay ③ 3.5", SL 1", access, diskette
Bay ④ 3.5", SL 1", access, open
Bay ⑤ 3.5", SL 1", access, open
Bay ⑥ 3.5", SL 1", access, open
Bay ⑦ 3.5", SL 1", access, std disk (some)

CD-ROM
②
diskette
④
• ⑤
• ⑥
• disk

Mini-tower
Stealth black

➭ *Fixed disk models:* metal cage for disk bays 5,6,7 rotate out of chassis for easy access for cabling backplane or working with disks
➭ Predictive Failure Analysis on disk(s) with IBM Director can alert the administrator of an imminent componet failure

◇ Removable left side panel
◇ Configuration/Setup Utility (in flash memory) invoked by pressing F1 at startup
◇ SCSISelect near startup by pressing CTRL+A
◇ Adv Config Power Interface (ACPI) 1.0
◇ Device Drivers and Diagnostics CD-ROM included
◇ Four stabilizing feet
◇ Handle grip on top
◇ H 18.5" x W 6.5" x D 20.0"
◇ H 470mm x W 165mm x D 508mm
◇ 35 to 42 pounds (15.9 to 19.1kg)

Maximum internal SCSI disk capacity[13]: 587.2GB (4 disks x 148.6GB)
Maximum internal IDE disk capacity[13]: 240GB (3 disks x 80GB)

LIMITED WARRANTY[3]

➭ **1 year parts and labor**
➭ **International Warranty Service**[3]
➭ **On site, 8 am-5 pm, Mon-Fri excluding holidays, next business day response time**
➭ **On site service upgrade options (in eligible locations):**[7]
  • **3 year IOR 9x5, NBD response** (ServicePac part num 69P9509)
  • **3 year IOR 9x5, 4 hr avg response** (ServicePac® part num 69P9510)
  • **3 year IOR 24x7, 4 hr avg response** (ServicePac part num 69P9511)
  • **3 year IOR 24x7, 2 hr avg response** (ServicePac part num 69P9512)
➭ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

See footnotes for important warranty information
US models announced February 18, 2003 or September 9, 2003
• = Hot-swap bays in some models

(X205B) © IBM Corp. September 2003

IBM Type-model	Processor	GHz[1]	L2 cache	FSB MHz	Memory	Disk	Disk controller	Hot-swap disk bays	PCI slots x bays	Power supply number and type	Ethernet	Available date
✂ 8647-22X	1 x Xeon™	2.0	512KB	400	256MB	36.4GB[2] Ultra320 10K	Ultra320	None (4 fixed)	6 x 7	One fixed	Gigabit	Dec 2002
✂ 8647-2AX	1 x Xeon	2.0	512KB	400	512MB	None (open)	Ultra320	6 hot-swap	6 x 9	One fixed	Gigabit	Dec 2002
✂ 8647-32X	1 x Xeon	2.4B	512KB	533	256MB	36.4GB Ultra320 10K	Ultra320	None (4 fixed)	6 x 7	One fixed	Gigabit	Dec 2002
8647-3AX	1 x Xeon	2.4B	512KB	533	512MB	None (open)	Ultra320	6 hot-swap	6 x 9	One fixed	Gigabit	Dec 2002
✂ 8647-3BX	1 x Xeon	2.4B	512KB	533	512MB	None (open)	Ultra320	6 hot-swap	6 x 9	Two redundant	Gigabit	Dec 2002

Positioning	*Performance and data protection at an affordable price*
Processor(s)	**1 x Intel® Xeon at 2.0 or 2.4B GHz with 400 or 533MHz frontside bus (FSB)** / Hyper-Threading technology
SMP - L2 cache	**2-way SMP** / up to two Xeon Processors (same speed/cache size) / **512KB** std and max / at processor speed
Implementation	Systemboard contains two Intel 604-pin micro-PGA ZIF sockets, four DIMM slots, seven slots (one PCI 2.2, four PCI-X, one Mini PCI [used by graphics], one unavailable AGP), and integrated SCSI and ethernet
Memory	**256MB** or **512MB** std / 8GB[13] max / two slots used / two slots available / **PC2100** 266MHz CL2.5 registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill™** (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
IDE disk controller	Enhanced IDE busmaster / ATA-100 / integrated in I/O Controller Hub 4 / two connectors on planar
SCSI disk controller	**LSI Logic® 53C1030** / **dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** (Embedded Mirroring) / shared with optional IBM ServeRAID™-5i Controller for low-cost RAID 0, 1, 1E, 5, 00, 10, 1E0, 50 (installed only in Slot 4)
SCSI channels and cables	Two 16-bit channels (one internal and one external) / *Internal channel:* Fixed disk models: one 4-drop 16-bit 68-pin LVD SCSI cable from systemboard to internal disks bays; Hot-swap models: one 1-drop 16-bit 68-pin LVD SCSI cable to 6-bay backplane; *External channel:* cable available as option pn 32P8164 from systemboard to rear external 68-pin connector
Cables	One SCSI cable (listed above), one 2-drop EIDE cable (to CD-ROM)
Disk - features	*Some:* 36.4GB Ultra320 SCSI / 10K rpm / 4.7 ms average read seek / S.M.A.R.T.[5]
Rack support	4U[4] rack mount support via tower-to-rack kit option
Bus slots (see below)	Four 64-bit 100MHz PCI-X 1.0 / one PCI 2.2 / one Mini PCI /one AGP 8X (not available) / no hot-swap Active™ PCI slots
Chipset	**Intel E7505 chipset** / E7505 MCH (Memory Controller Hub) for AGP 8X slot, P64H2, ICH4 / P64H2 for two PCI-X buses (Bus A for slots 2 and 3 and ethernet controller; Bus B for slots 4 and 5 and SCSI controller) / I/O Controller Hub (ICH4) for PCI 2.2 bus (one slot and one Mini PCI slot), ATA-100 EIDE, USB, Low Pin Count Interface / NS PC87366 Super I/O off LPC interface
Ethernet	One gigabit 10/100/1000 ethernet controller / Broadcom BCM5703i / full gigabit ethernet MAC and PHY layer functions / chip on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format 1.0 / one rear RJ-45 port
CD-ROM / diskette	*CD-ROM:* 48X-20X[6] CD-ROM, IDE / *Diskette:* 3.5" 1.44MB diskette drive
Ports	*Front:* two USB (Ver 2.0)*; Back:* two USB (Ver 2.0), two serial (9-pin), parallel, keyboard, mouse, ethernet (RJ-45), monitor (analog DB-15), microphone-in (mono), line-in (stereo), line-out (stereo)
Diagnostics	Diagnostic LEDs / error LEDs for fans and memory / server diagnostic programs stored on IBM Enhanced Diagnostics CD
Systems mgmt cntrl	Winbond® W791D / chip on planar / monitors system and processor temperature, fan speed and failure, and voltages / **support for optional Remote Supervisor Adapter** (provides continuous health monitoring and control)
Graphics controller	SVGA / ATI® RageXL / on Mini PCI adapter / 8MB SDRAM std and max / PCI 2.2 32-bit 33MHz / analog 15-pin D-Sub conn

Security	Mechanical side panel key lock (locks hot-swap disks on hot-swap models) / optional U-Bolt support via knockout / power-on password / boot sequence control / operation without keyboard/mouse / security slot (for opt cable lock)	Xeon DP 2.0GHz/400/512KB L2 Cache Proc Upg	59P5112
		Xeon DP 2.4B GHz/533/512KB L2 Cache Proc Upg	59P5108
		256MB PC2100 CL2.5 ECC DDR-SDRAM	33L5037
		512MB PC2100 CL2.5 ECC DDR-SDRAM	33L5038
Software	**ServerGuide™** (CD-based automated network OS installation and configuration tool), IBM Director (system hardware mgmt software) and many utilities	1GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5039
		2GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5040
		IBM 73.4GB 10K Ultra320 SCSI 68-pin (not hot-swp)	32P0724
		IBM 146GB 10K Ultra320 SCSI 68-pin (not hot-swp)	32P0725
Keyboard / mouse	IBM 101 key keyboard / IBM mouse (both black, 6-pin PS/2)	IBM 36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD	06P5776
Cooling fans	Four / three for processor(s), memory, and disk bays / one power supply cage fan (even in dual power supply model)	IBM 73GB 10K Ultra320 SCSI Hot-Swap SL HDD	32P0727
	All: not redundant / not hot-swap / all variable speed	IBM 146GB 10K Ultra320 SCSI Hot-Swap SL HDD	32P0728
		40X/12X/40X Max[6] CD-RW internal (black)	22P6976
Power supply(s)	*Some:* one 425 watt std and max / not hot-swap	IBM Remote Supervisor Adapter (PCI adapter)	09N7585
	3BX: two 350 watt std and max / hot-swap / redundant	IBM 4U Extended Depth Tower-to-Rack Kit	59P4817
	All: universal / voltage-sensing / Automatic Server	IBM ServeRAID-5i Controller (adapter for Slot 4)	25P3492
	Restart (ASR) / cooling fan in power supply(s) (variable spd)	IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
		Other options at **ibm.com**/pc/us/accessories	

Slot 1: half-length, 32-bit 33MHz, PCI 2.2 (5v)
Slot 2: fullsize, 64-bit 100MHz, PCI-X 1.0 (3.3v)
Slot 3: fullsize, 64-bit 100MHz, PCI-X 1.0 (3.3v)
Slot 4: fullsize, 64-bit 100MHz, PCI-X 1.0* (3.3v) extended*
Slot 5: fullsize, 64-bit 100MHz, PCI-X 1.0 (3.3v)
Slot 6: Mini PCI type III, 32-bit 33MHz (5v) - used graphics
Slot: fullsize, AGP 8X Pro50 (1.5v) - unavailable
* Extended slot for opt IBM ServeRAID-5i

◇ Raven black color
◇ Removable left side panel
◇ Configuration/Setup Utility invoked by pressing F1 at startup
◇ BIOS Setup Utility via F1 at startup
◇ LSI Configuration Utility near startup by pressing CTRL+C
◇ DMI 2.2-compliant
◇ Adv Config Power Interface (ACPI) 1.0a
◇ *Device Driver and IBM Enhanced Diagnostics* CD-ROM included
◇ Four stabilizing feet
◇ Handle grip on top
◇ H 18.4" x W 6.5" x D 26.0"
◇ H 467mm x W 165mm x D 660mm
◇ 44 to 57 pounds (20 to 25.8kg)
▷ *Fixed disk models:* metal cage for disk bays 4,5,6,7 rotate out of chassis for easy access for cabling
▷ Predictive Failure Analysis on disk(s) with IBM Director can alert the administrator of an imminent component failure

Bay ① 5.25", HH 1.6", access, CD-ROM
Bay ② 5.25", HH 1.6", access, open
Bay ③ 3.5", SL 1", access, diskette

Hot-swap models 2AX, 3AX, and 3BX:
Six bays ④ to ⑨ 3.5", SL 1", access, hot-swp

Fixed disk models 22X and 32X:
Bay ④ 3.5", SL 1", no access, not hot-swap
Bay ⑤ 3.5", SL 1", no access, not hot-swap
Bay ⑥ 3.5", SL 1", no access, not hot-swap
Bay ⑦ 3.5", SL 1", no access, not hot-swap

```
┌──────────┐
│ CD-ROM   │
│   ②      │
│ diskette │
│ • ④      │
│ • ⑤      │
│ • ⑥      │
│ • ⑦      │
│ • ⑧      │
│ • ⑨      │
│Hot-swap  │
│models only│
└──────────┘
```

Maximum internal SCSI disk capacity[13]:
Fixed: 587.2GB (4 disks x 146.8GB)
Hot-swap: 880.8GB (6 disks x 146.8GB)

See footnotes for important warranty information   • = Hot-swap bays in some models

✂ US models withdrawn effective July 25, 2003 (32X and 3BX) and May 29, 2003
US models announced November 19, 2002

(X225A) © IBM Corp. December 2002

IBM® Type-model	Processor	GHz[1]	L2 cache	FSB MHz	Memory	Disk	Disk controller	Hot-swap disk bays	PCI slots x bays	Power supply number and type	Ethernet	Available date
8647-42X	1 x Xeon™	2.67	512KB	533	256MB	36.4GB[2] Ultra320 10K	Ultra320	None (4 fixed)	6 x 7	One fixed	Gigabit	Feb 2003
8647-4AX	1 x Xeon	2.67	512KB	533	512MB	None (open-bay)	Ultra320	6 hot-swap	6 x 9	One fixed	Gigabit	Feb 2003
8647-4BX	1 x Xeon	2.67	512KB	533	512MB	None (open-bay)	Ultra320	6 hot-swap	6 x 9	Two redundant	Gigabit	Feb 2003
8647-52X	1 x Xeon	2.8B	512KB	533	256MB	36.4GB Ultra320 10K	Ultra320	None (4 fixed)	6 x 7	One fixed	Gigabit	Feb 2003
8647-5AX	1 x Xeon	2.8B	512KB	533	512MB	None (open-bay)	Ultra320	6 hot-swap	6 x 9	One fixed	Gigabit	Feb 2003
8647-5BX	1 x Xeon	2.8B	512KB	533	512MB	None (open-bay)	Ultra320	6 hot-swap	6 x 9	Two redundant	Gigabit	Feb 2003

Processor(s) SMP - L2 Cache Implementation	**1 x Intel® Xeon at 2.67 or 2.8B GHz with 533MHz frontside bus (FSB)** / Hyper-Threading technology **2-way SMP** / up to two Xeon Processors (same speed/cache size) / **512KB** std and max / at processor speed Systemboard contains two Intel 604-pin micro-PGA ZIF sockets, four DIMM slots, seven slots (one PCI 2.2, four PCI-X, one Mini PCI [used by graphics], one unavailable AGP), and integrated SCSI and ethernet
Memory	**256MB** or **512MB** std / 8GB[13] max / two slots used / two slots available / **PC2100** 266MHz CL2.5 registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill™** (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
IDE disk controller SCSI disk controller SCSI channels and cables Cables Disk - features	Enhanced IDE busmaster / ATA-100 / integrated in I/O Controller Hub 4 / two connectors on planar **LSI Logic® 53C1030** / **dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** (Embedded Mirroring) / shared with optional IBM ServeRAID™-5i Controller for low-cost RAID 0, 1, 1E, 5, 00, 10, 1E0, 50 (installed only in Slot 4) Two 16-bit channels (one internal and one external) / *Internal channel:* Fixed disk models: one 4-drop 16-bit 68-pin LVD SCSI cable from systemboard to internal disks bays; Hot-swap models: one 1-drop 16-bit 68-pin LVD SCSI cable to 6-bay backplane; *External channel:* cable available as option pn 32P8164 from systemboard to rear external 68-pin connector One SCSI cable (listed above), one 2-drop EIDE cable (to CD-ROM) *Some:* 36.4GB Ultra320 SCSI / 10K rpm / 4.7 ms average read seek / S.M.A.R.T.[5]
Rack support Bus slots (see below) Chipset	4U[4] rack mount support via tower-to-rack kit option Four 64-bit 100MHz PCI-X 1.0 / one PCI 2.2 / one Mini PCI /one AGP 8X (not available) / no hot-swap Active™ PCI slots **Intel E7505 chipset** / E7505 MCH (Memory Controller Hub) for AGP 8X slot, P64H2, ICH4 / P64H2 for two PCI-X buses (Bus A for slots 2 and 3 and ethernet controller; Bus B for slots 4 and 5 and SCSI controller) / I/O Controller Hub (ICH4) for PCI 2.2 bus (one slot and one Mini PCI slot), ATA-100 EIDE, USB, Low Pin Count Interface / NS PC87366 Super I/O off LPC interface
Ethernet CD-ROM / diskette Ports Diagnostics Systems mgmt cntrl	One gigabit 10/100/1000 ethernet controller / Broadcom BCM5703i / full gigabit ethernet MAC and PHY layer functions / chip on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format 1.0 / one rear RJ-45 port *CD-ROM:* 48X-20X[6] CD-ROM, IDE / *Diskette:* 3.5" 1.44MB diskette drive *Front:* two USB (Ver 2.0); *Back:* two USB (Ver 2.0), two serial (9-pin), parallel, keyboard, mouse, ethernet (RJ-45), monitor (analog DB-15), microphone-in (mono), line-in (stereo), line-out (stereo) Diagnostic LEDs / error LEDs for fans and memory / server diagnostic programs stored on IBM Enhanced Diagnostics CD Winbond® W791D / chip on planar / monitors system and processor temperature, fan speed and failure, and voltages / **support for optional Remote Supervisor Adapter** (provides continuous health monitoring and control)
Graphics controller	SVGA / ATI® RageXL / on Mini PCI adapter / 8MB SDRAM std and max / PCI 2.2 32-bit 33MHz / analog 15-pin D-Sub conn

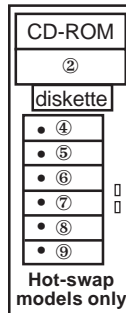|			
Security	Mechanical side panel key lock (locks hot-swap disks on hot-swap models) / optional U-Bolt support via knockout / power-on password / boot sequence control / operation without keyboard/mouse / security slot (for opt cable lock)	Xeon 2.67GHz/533/512KB L2 Cache Proc Upg Xeon 2.8B GHz/533/512KB L2 Cache Proc Upg 256MB PC2100 CL2.5 ECC DDR-SDRAM 512MB PC2100 CL2.5 ECC DDR-SDRAM	24P7861 24P8054 33L5037 33L5038
Software	**ServerGuide™** (CD-based automated network OS installation and configuration tool), IBM Director (system hardware mgmt software) and many utilities	1GB PC2100 CL2.5 ECC DDR-SDRAM DIMM 2GB PC2100 CL2.5 ECC DDR-SDRAM DIMM IBM 73.4GB 10K Ultra320 SCSI 68-pin (not hot-swp) IBM 146GB 10K Ultra320 SCSI 68-pin (not hot-swp)	33L5039 33L5040 32P0724 32P0725
Keyboard / mouse Cooling fans	IBM 101 key keyboard / IBM mouse (both black, 6-pin PS/2) Four / three for processor(s), memory, and disk bays / one power supply cage fan (even in dual power supply model) *All:* not redundant / not hot-swap / all variable speed	IBM 36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD IBM 73GB 10K Ultra320 SCSI Hot-Swap SL HDD IBM 146GB 10K Ultra320 SCSI Hot-Swap SL HDD 40X/12X/40X Max[6] CD-RW internal (black)	06P5776 32P0727 32P0728 22P6976
Power supply(s)	*Some:* one 425 watt std and max / not hot-swap *3BX:* two 350 watt std and max / hot-swap / redundant *All:* universal / voltage-sensing / Automatic Server Restart (ASR) / cooling fan in power supply(s) (variable spd)	IBM Remote Supervisor Adapter (PCI adapter) IBM 4U Extended Depth Tower-to-Rack Kit IBM ServeRAID-5i Controller (adapter for Slot 4) IBM T541 15" Flat Panel Color Monitor (black) Other options at **ibm.com**/pc/us/accessories	09N7585 59P4817 25P3492 9512AB1

Slot 1: fullsize, 32-bit 33MHz, PCI 2.2 (5v)
Slot 2: fullsize, 64-bit 100MHz, PCI-X 1.0 (3.3v)
Slot 3: fullsize, 64-bit 100MHz, PCI-X 1.0 (3.3v)
Slot 4: fullsize, 64-bit 100MHz, PCI-X 1.0* (3.3v) extended*
Slot 5: fullsize, 64-bit 100MHz, PCI-X 1.0 (3.3v)
Slot 6: Mini PCI type III, 32-bit 33MHz (5v) - used graphics
Slot: fullsize, AGP 8X Pro50 (1.5v) - unavailable
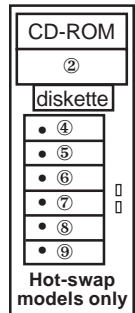* Extended slot for opt IBM ServeRAID-5i

- ◇ Raven black color
- ◇ Removable left side panel
- ◇ Configuration/Setup Utility invoked by pressing F1 at startup
- ◇ BIOS Setup Utility via F1 at startup
- ◇ LSI Configuration Utility near startup by pressing CTRL+C
- ◇ DMI 2.2-compliant
- ◇ Adv Config Power Interface (ACPI) 1.0a
- ◇ *Device Driver and IBM Enhanced Diagnostics* CD-ROM included
- ◇ Four stabilizing feet
- ◇ Handle grip on top
- ◇ H 18.4" x W 6.5" x D 26.0"
- ◇ H 467mm x W 165mm x D 660mm
- ◇ 44 to 57 pounds (20 to 25.8kg)
- ⮑ *Fixed disk models:* metal cage for disk bays 4,5,6,7 rotate out of chassis for easy access for cabling
- ⮑ Predictive Failure Analysis on disk(s) with IBM Director can alert the administrator of an imminent component failure

CD-ROM
②
diskette
● ④
● ⑤
● ⑥
● ⑦
● ⑧
● ⑨
Hot-swap models only

Bay ① 5.25", HH 1.6", access, CD-ROM
Bay ② 5.25", HH 1.6", access, open
Bay ③ 3.5", SL 1", access, diskette
Hot-swap models 4AX, 4BX, 5AX, and 5BX:
Six bays ④ to ⑨ 3.5", SL 1", access, hot-swp
Fixed disk models 42X and 52X:
Bay ④ 3.5", SL 1", no access, not hot-swap
Bay ⑤ 3.5", SL 1", no access, not hot-swap
Bay ⑥ 3.5", SL 1", no access, not hot-swap
Bay ⑦ 3.5", SL 1", no access, not hot-swap
Maximum internal SCSI disk capacity[13]:
Fixed: 587.2GB (4 disks x 146.8GB)
Hot-swap: 880.8GB (6 disks x 146.8GB)

See footnotes for important warranty information
US models announced February 18, 2003

● = Hot-swap bays in some models

IBM® Type-model	Processor	GHz[1]	L2 cache	FSB MHz	Memory	Disk	Disk controller	Hot-swap disk bays	PCI slots x bays	Power supply number and type	Ethernet	Available date
8647-62X	1 x Xeon™	3.06	512KB	533	256MB	36.4GB[2] Ultra320 10K	Ultra320	None (4 fixed)	6 x 7	One fixed	Gigabit	Jul 2003
8647-6AX	1 x Xeon	3.06	512KB	533	512MB	None (open-bay)	Ultra320	6 hot-swap	6 x 9	One fixed	Gigabit	Jul 2003
8647-6BX	1 x Xeon	3.06	512KB	533	512MB	None (open-bay)	Ultra320	6 hot-swap	6 x 9	Two redundant	Gigabit	Jul 2003

Processor(s) SMP - L2 Cache Implementation	**1 x Intel® Xeon at 3.06 GHz with 533MHz frontside bus (FSB)** / Hyper-Threading technology **2-way SMP** / up to two Xeon Processors (same speed/cache size) / **512KB** std and max / at processor speed Systemboard contains two Intel 604-pin micro-PGA ZIF sockets, four DIMM slots, seven slots (one PCI 2.2, four PCI-X, one Mini PCI [used by graphics], one unavailable AGP), and integrated SCSI and ethernet
Memory	**256MB** or **512MB** std / 8GB[13] max / two slots used / two slots available / **PC2100** 266MHz CL2.5 registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill™** (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
IDE disk controller SCSI disk controller SCSI channels and cables Cables Disk - features	Enhanced IDE busmaster / ATA-100 / integrated in I/O Controller Hub 4 / two connectors on planar **LSI Logic® 53C1030** / **dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** (Embedded Mirroring) / shared with optional IBM ServeRAID™-5i Controller for low-cost RAID 0, 1, 1E, 5, 00, 10, 1E0, 50 (installed only in Slot 4) Two 16-bit channels (one internal and one external) / *Internal channel:* Fixed disk models: one 4-drop 16-bit 68-pin LVD SCSI cable from systemboard to internal disks bays; Hot-swap models: one 1-drop 16-bit 68-pin LVD SCSI cable to 6-bay backplane; *External channel:* cable available as option pn 32P8164 from systemboard to rear external 68-pin connector One SCSI cable (listed above), one 2-drop EIDE cable (to CD-ROM) *Some:* 36.4GB Ultra320 SCSI / 10K rpm / 4.7 ms average read seek / S.M.A.R.T.[5]
Rack support Bus slots (see below) Chipset	4U[4] rack mount support via tower-to-rack kit option Four 64-bit 100MHz PCI-X 1.0 / one PCI 2.2 / one Mini PCI / one AGP 8X (not available) / no hot-swap Active™ PCI slots **Intel E7505 chipset** / E7505 MCH (Memory Controller Hub) for AGP 8X slot, P64H2, ICH4 / P64H2 for two PCI-X buses (Bus A for slots 2 and 3 and ethernet controller; Bus B for slots 4 and 5 and SCSI controller) / I/O Controller Hub (ICH4) for PCI 2.2 bus (one slot and one Mini PCI slot), ATA-100 EIDE, USB, Low Pin Count Interface / NS PC87366 Super I/O off LPC interface
Ethernet CD-ROM / diskette Ports Diagnostics Systems mgmt cntrl	One gigabit 10/100/1000 ethernet controller / Broadcom BCM5703i / full gigabit ethernet MAC and PHY layer functions / chip on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format 1.0 / one rear RJ-45 port *CD-ROM:* 48X-20X[6] CD-ROM, IDE / *Diskette:* 3.5" 1.44MB diskette drive *Front:* two USB (Ver 2.0)*; Back:* two USB (Ver 2.0), two serial (9-pin), parallel, keyboard, mouse, ethernet (RJ-45), monitor (analog DB-15), microphone-in (mono), line-in (stereo), line-out (stereo) Diagnostic LEDs / error LEDs for fans and memory / server diagnostic programs stored on IBM Enhanced Diagnostics CD Winbond® W791D / chip on planar / monitors system and processor temperature, fan speed and failure, and voltages / **support for optional Remote Supervisor Adapter** (provides continuous health monitoring and control)
Graphics controller	SVGA / ATI® RageXL / on Mini PCI adapter / 8MB SDRAM std and max / PCI 2.2 32-bit 33MHz / analog 15-pin D-Sub conn

Security	Mechanical side panel key lock (locks hot-swap disks on hot-swap models) / optional U-Bolt support via knockout / power-on password / boot sequence control / operation without keyboard/mouse / security slot (for opt cable lock)	Xeon 3.06B GHz/533/512KB L2 Cache Proc Upg	24P8122
		256MB PC2100 CL2.5 ECC DDR-SDRAM	33L5037
		512MB PC2100 CL2.5 ECC DDR-SDRAM	33L5038
		1GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5039
		2GB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5040
Software	**ServerGuide™** (CD-based automated network OS installation and configuration tool), IBM Director (system hardware mgmt software) and many utilities	IBM 73.4GB 10K Ultra320 SCSI 68-pin (not hot-swp)	32P0724
		IBM 146GB 10K Ultra320 SCSI 68-pin (not hot-swp)	32P0725
		IBM 36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD	06P5776
		IBM 73GB 10K Ultra320 SCSI Hot-Swap SL HDD	32P0727
Keyboard / mouse Cooling fans	IBM 101 key keyboard / IBM mouse (both black, 6-pin PS/2) Four / three for processor(s), memory, and disk bays / one power supply cage fan (even in dual power supply model) *All:* not redundant / not hot-swap / all variable speed	IBM 146GB 10K Ultra320 SCSI Hot-Swap SL HDD	32P0728
		40X/12X/40X Max[6] CD-RW internal (black)	22P6976
		IBM Remote Supervisor Adapter (PCI adapter)	09N7585
		IBM 4U Extended Depth Tower-to-Rack Kit	59P4817
Power supply(s)	*Some:* one 425 watt std and max / not hot-swap *6BX:* two 514 watt std and max / hot-swap / redundant *All:* universal / voltage-sensing / Automatic Server Restart (ASR) / cooling fan in power supply(s) (variable spd)	IBM ServeRAID-5i Controller (adapter for Slot 4)	25P3492
		IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
		Other options at **ibm.com**/pc/us/accessories	

Slot 1: half-length, 32-bit 33MHz, PCI 2.2 (5v)
Slot 2: fullsize, 64-bit 100MHz, PCI-X 1.0 (3.3v)
Slot 3: fullsize, 64-bit 100MHz, PCI-X 1.0 (3.3v)
Slot 4: fullsize, 64-bit 100MHz, PCI-X 1.0* (3.3v) extended*
Slot 5: fullsize, 64-bit 100MHz, PCI-X 1.0 (3.3v)
Slot 6: Mini PCI type III, 32-bit 33MHz (5v) - used graphics
Slot: fullsize, AGP 8X Pro50 (1.5v) - unavailable
* Extended slot for opt IBM ServeRAID-5i

◇ Raven black color
◇ Removable left side panel
◇ Configuration/Setup Utility invoked by pressing F1 at startup
◇ BIOS Setup Utility via F1 at startup
◇ LSI Configuration Utility near startup by pressing CTRL+C
◇ DMI 2.2-compliant
◇ Adv Config Power Interface (ACPI) 1.0a
◇ *Device Driver and IBM Enhanced Diagnostics* CD-ROM included
◇ Four stabilizing feet
◇ Handle grip on top
◇ H 18.4" x W 6.5" x D 26.0"
◇ H 467mm x W 165mm x D 660mm
◇ 44 to 57 pounds (20 to 25.8kg)
▷ *Fixed disk models:* metal cage for disk bays 4,5,6,7 rotate out of chassis for easy access for cabling
▷ Predictive Failure Analysis on disk(s) with IBM Director can alert the administrator of an imminent component failure

CD-ROM
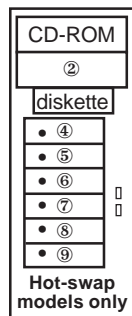Bay ① 5.25", HH 1.6", access, CD-ROM
Bay ② 5.25", HH 1.6", access, open
Bay ③ 3.5", SL 1", access, diskette

Hot-swap models 6AX and 6BX:
Six bays ④ to ⑨ 3.5", SL 1", access, hot-swp

Fixed disk models 62X:
Bay ④ 3.5", SL 1", no access, not hot-swap
Bay ⑤ 3.5", SL 1", no access, not hot-swap
Bay ⑥ 3.5", SL 1", no access, not hot-swap
Bay ⑦ 3.5", SL 1", no access, not hot-swap

diskette
④ ⑤ ⑥ ⑦ ⑧ ⑨

Hot-swap models only

Maximum internal SCSI disk capacity[13]:
Fixed: 587.2GB (4 disks x 146.8GB)
Hot-swap: 880.8GB (6 disks x 146.8GB)

See footnotes for important warranty information
US models announced July 1, 2003
• = Hot-swap bays in some models

(X225C) © IBM Corp. July 2003

IBM® Type-model	Qty x Processor	L2 cache	Memory	Memory type	Disk	SCSI controller	Mechanical	Slots x bays (hot-swap bays)	Power supply	Ethernet	Available date
✂ 8671-11X	1 x Xeon® 1.8GHz[1]	512KB	256MB	ECC	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	1 fixed	Gigabit	Jun 2002
✂ 8671-1AX	1 x Xeon 1.8GHz	512KB	512MB	Chipkill™	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	2 hot-swap	Gigabit	Jun 2002
✂ 8671-21X	1 x Xeon 2.0GHz	512KB	256MB	ECC	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	1 fixed	Gigabit	Jun 2002
✂ 8671-2AX	1 x Xeon 2.0GHz	512KB	512MB	Chipkill	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	2 hot-swap	Gigabit	Jun 2002
✂ 8671-31X	1 x Xeon 2.2GHz	512KB	256MB	ECC	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	1 fixed	Gigabit	Jun 2002
✂ 8671-3AX	1 x Xeon 2.2GHz	512KB	512MB	Chipkill	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	2 hot-swap	Gigabit	Jun 2002
8671-41X	1 x Xeon 2.4GHz	512KB	256MB	ECC	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	1 fixed	Gigabit	Jun 2002
8671-4AX	1 x Xeon 2.4GHz	512KB	512MB	Chipkill	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	2 hot-swap	Gigabit	Jun 2002

Positioning	*Universal server; two-way server using the Xeon DP processor to provide power and performance at an affordable price*
Processor(s)	**1 x Intel® Xeon™ Processor 1.8, 2.0, 2.2 or 2.4GHz** with 400MHz frontside bus / Hyper-Threading technology
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	**2-way SMP** / up to two Xeon Processors DP (same speed/cache size)
Implementation	Systemboard contains two Intel 603-pin micro-PGA ZIF sockets, six memory gold-connector DIMM slots, six PCI slots (two hot-swap Active™ PCI slots), and integrated SCSI, ethernet, graphics
Memory	**256** or **512MB** std / 12GB[13] max / two slots used / four slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2x100MHz / *256MB models:* **Error Checking and Correcting (ECC)** / corrects single-bit errors and detects 2-bit errors / *512MB models:* **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips) / Chipkill requires all 256MB or higher x4 DIMMs
SCSI disk controller	**LSI Logic® 53C1030** / **dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** with up to one hot-spare disk / shared with optional IBM ServeRAID™-6i Controller for low-cost RAID 0, 1, 1E, 5, 00, 10, 1E0, 50 (installed only in Slot 4)
SCSI channels	Two 16-bit channels / *SCSI Channel A:* 16-bit 68-pin LVD cable from controller to backplane; *Channel B:* 16-bit 68-pin interface for Bay 8 and 9 (may require a cable) or with optional 3-Pack Kit (cable included); supports external SCSI devices via external SCSI knockout in rear (cable req 32P8164) or via opt ServeRAID adapter with external connector(s)
IDE controller / cable	Enhanced IDE ATA-100 controller in CSB5 South Bridge / one connector on planar / one 1-drop IDE cable (CD-ROM)
Disk - capacity	None standard / supports 7200-15000 rpm disks / one backplane / all disk bays Ultra320-enabled
Disk - bays	Six hot-swap / 80-pin SCA-2 disks / three additional hot-swap bays with Kit 33P2751 for up to nine 15K rpm disks
Mechanical	Tower / conversion to or EIA 19" Rack (5U[4]) via optional kit for support in IBM NetBAY™ Racks
Chipset	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / two CIOB-X2 I/O Bridges (IMB2 bus to Host Bridge for PCI-X 1.0 Bus B with slots 2, 3, 4 and Ultra320 and ethernet controllers; IMB2 bus to Host Bridge for PCI-X 1.0 Bus C with slots 5 and 6) / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2 bus A with slot 1 and graphics controller, EIDE, USB, SMBus, LPC bus to Super I/O) / NS PC87417 Super I/O
Ethernet controller	10/100/1000 gigabit / Broadcom® BCM 5703 / on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format
CD-ROM / diskette	48X-20X[6] CD-ROM / IDE / 1.6" HH; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* two USB (Vers 1.1), keyboard, mouse, parallel, serial (9-pin), graphics (DB-15), ethernet (RJ-45), two RJ-45 (sys mgmt)
Front port / graphics	*Front:* one USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 Bus
Security	Power-on password / administrator password / hinged and lockable front door to cover disk bays, power button, and reset button / unattended boot / selectable boot

Systems mgmt	**IBM Integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, optional disks, fans, power supp / supports optional Remote Supervisor Adapter with 20-pin connector on planar for continuous power (no ext pwr reqd)	
Diagnostics	**Light Path Diagnostics**™ panel providing LED map to failing part (under side cover) / Information LED Panel in front	
Software	**ServerGuide**™ (CD-ROM installation and configuration utilities), IBM Director, others	

Option	Part
Xeon DP 1.8GHz/512KB L2 Cache Proc Upg	19K4642
Xeon DP 2.0GHz/512KB L2 Cache Proc Upg	33P2931
Xeon DP 2.2GHz/512KB L2 Cache Proc Upg	33P2932
Xeon DP 2.4GHz/512KB L2 Cache Proc Upg	37L3533
256MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5037
512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5040
IBM ServeRAID-6i Controller (adapter for slot 4)	71P8595
IBM Remote Supervisor Adapter (PCI adapter)	09N7585
IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
36.4GB 15K-2 80 Ultra320 SCSI Hot-Swap SL HDD	06P5776
3-Pack Ultra320 Hot-Swap Expansion Kit	33P2751
IBM 560WPower Upgrade Kit (two supplies)	33P2753
5Ux24D Tower-to-Rack Conversion Kit III	59P4211
Other options at **ibm.com**/pc/us/accessories	

Keyboard / mouse	IBM 101-key keyboard / IBM mouse (both black)
Power supply	*x1X:* std: one 560 watt / not hot-swap or redundant max: two 560 watt with optional Upgrade Kit 33P2753 *xAX:* std: two 560W / hot-swap / redundant *All:* voltage-sensing / auto-restart / fan in each power supp
Fans	Four fans and two blowers / variable speed / hot-swap / redundant / PFA / fan in each power supply

Slot 1: full, 32-bit 33MHz 5v PCI 2.2, Bus A
Slot 2: full, 64-bit 100MHz 3.3v PCI-X, not hot, Bus B
Slot 3: full, 64-bit 100MHz 3.3v PCI-X, not hot, Bus B
Slot 4: full, 64-bit 100MHz 3.3v PCI-X, not hot, Bus B*
Slot 5: full, 64-bit 133MHz 3.3v PCI-X, hot-swap, Bus C
Slot 6: full, 64-bit 133MHz 3.3v PCI-X, hot-swap, Bus C
* Extended slot for opt IBM ServeRAID-5i Controller

Bay ① 3.5", SL 1", access, diskette
Bay ② 3.5", SL 1", access, hot-swap
Bay ③ 3.5", SL 1", access, hot-swap
Bay ④ 3.5", SL 1", access, hot-swap
Bay ⑤ 3.5", SL 1", access, hot-swap
Bay ⑥ 3.5", SL 1", access, hot-swap
Bay ⑦ 3.5", SL 1", access, hot-swap
Bay ⑧ 5.25", HH 1.6" access, open**
Bay ⑨ 5.25", HH 1.6" access, open**
Bay ⑩ 5.25", HH 1.6" access, CD-ROM

5.25" HH
5.25" HH
CD-ROM
diskette

Bays 2 through 7 support 6 SL disks via SCA-2 connectors.
**Bays 8 and 9 support three 3.5"
Tower disks via 3-Pack Kit 33P2751

➪ Quick release adapter slots (no screws)
➪ Configuration/Setup Utility invoked by pressing F1 at startup
➪ LSI Logic Configuration Utility near startup by pressing CTRL+C
➪ Diagnostics (PC-Doctor™) by pressing F2 at startup
➪ ACPI 2.0-compliant
➪ Operator Information Panel (in front)
➪ Predictive failure analysis on disk options, memory, processors, VRMs, power supplies, and fans in conjunction with IBM Director can alert the system administrator of an imminent component failure
➪ Tower: H 17.31" x W 8.5" x D 27.6"
  H 440mm x W 216mm x D 700mm
➪ 74 to 101 lbs / 33.5 to 45.8 kg
➪ Stealth black color

All models: Max int disk capacity: 1.321TB[2] with nine 146.8GB SL disks with 3-Pack Ultra160 Hot-Swap Expansion Kit

See footnotes for important warranty information   • = Hot-swap   (X235) © IBM Corp. July 2002
US models announced June 11, 2002
✂ = Models withdrawn from marketing effective January or March 25, 2003; models 21X and 2AX withdrawn effective April 29, 2003

IBM® Type-model	Qty x Processor	L2 cache	L3 cache	Memory	Disk	SCSI controller	Mechanical	Slots x bays (hot-swap bays)	Power supply	Ethernet	Available date
8671-61X	1 x Xeon® 2.67GHz	512KB	0MB	512MB	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	560W fixed	Gigabit	Mar 2003
8671-6AX	1 x Xeon 2.67GHz	512KB	0MB	512MB	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	560W hot	Gigabit	Mar 2003
8671-71X	1 x Xeon 2.8BGHz	512KB	0MB	512MB	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	560W fixed	Gigabit	Mar 2003
8671-7AX	1 x Xeon 2.8BGHz	512KB	0MB	512MB	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	560W hot	Gigabit	Mar 2003
8671-81X	1 x Xeon 3.06GHz	512KB	0MB	512MB	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	660W fixed	Gigabit	May 2003
8671-8AX	1 x Xeon 3.06GHz	512KB	0MB	512MB	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	660W hot	Gigabit	May 2003
☞ 8671-G1X	1 x Xeon 3.2GHz	512KB	1MB	1GB	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	660W fixed	Gigabit	Nov 2003
☞ 8671-GAX	1 x Xeon 3.2GHz	512KB	1MB	1GB	None	2 x Ultra320	Tower	6x10 (6 hot-swap std; 9 max)	660W hot	Gigabit	Nov 2003

Positioning	*Universal server; two-way server using the Xeon processor to provide power and performance at an affordable price*
Processor(s)	Up to **1 x Intel® Xeon™ Processor 3.2 GHz** with 533MHz frontside bus / Hyper-Threading technology
L2 cache	**512KB** / all models / on die of processor / at processor speed
L3 cache	**1MB** / available on some models / on die of processor / at processor speed
SMP support	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 603-pin micro-PGA ZIF sockets, six memory gold-connector DIMM slots, six PCI slots (two hot-swap Active™ PCI slots), and integrated SCSI, ethernet, graphics

Memory	**512MB** std / 12GB max / two slots used / four slots available **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2x100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips) / Chipkill requires all 256MB or higher x4 DIMMs

SCSI disk controller	**LSI Logic® 53C1030** / **dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** with up to one hot-spare disk / shared with optional IBM ServeRAID™-6i Controller for low-cost RAID 0, 1, 1E, 5, 00, 10, 1E0, 50 (installed only in Slot 4)
SCSI channels	Two 16-bit channels / *SCSI Channel A:* 16-bit 68-pin LVD cable from controller to backplane; *Channel B:* 16-bit 68-pin interface for Bay 8 and 9 (may require a cable) or with optional 3-Pack Kit (cable included); supports external SCSI devices via external SCSI knockout in rear (cable req 32P8164) or via opt ServeRAID adapter with external connector(s)
IDE controller / cable	Enhanced IDE ATA-100 controller in CSB5 South Bridge / one connector on planar / one 1-drop IDE cable (CD-ROM)
Disk - capacity	None standard / supports 7200-15000 rpm disks / one backplane / all disk bays Ultra320-enabled
Disk - bays	Six hot-swap / 80-pin SCA-2 connectors / three additional hot-swap bays with Kit 33P2751 for up to nine 15K rpm disks

Mechanical	Tower / conversion to or EIA 19" Rack (5U[4]) via optional kit for support in IBM NetBAY™ Racks
Chipset	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / two CIOB-X2 I/O Bridges (IMB2 bus to Host Bridge for PCI-X 1.0 Bus B with slots 2, 3, 4 and Ultra320 and ethernet controllers; IMB2 bus to Host Bridge for PCI-X 1.0 Bus C with slots 5 and 6) / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2 bus A with slot 1 and graphics controller, EIDE, USB, SMBus, LPC bus to Super I/O) / NS PC87417 Super I/O

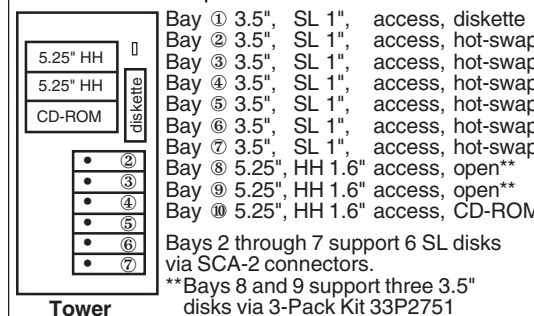|	
Ethernet controller	10/100/1000 gigabit / Broadcom® BCM 5703 / on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format
CD-ROM / diskette	48X-20X[6] CD-ROM / IDE / 1.6" HH; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* two USB (Vers 1.1), keyboard, mouse, parallel, **two** serial (9-pin), graphics (DB-15), ethernet (RJ-45), two RJ-45 (sys mgmt)
Front port / graphics	*Front:* one USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 Bus

Security	Power-on password / administrator password / hinged and lockable front door to cover disk bays, power button, and reset button / unattended boot / selectable boot

Systems mgmt	**IBM Integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, optional disks, fans, power supp / supports optional Remote Supervisor Adapter with 20-pin connector on planar for continuous power (no ext pwr reqd)
Diagnostics	**Light Path Diagnostics**™ panel providing LED map to failing part (under side cover) / Information LED Panel in front
Software	**ServerGuide**™ (CD-ROM installation and configuration utilities), IBM Director, others

Options	Part #
Xeon 2.67GHz/512KB L2 Cache Proc Upg	71P8966
Xeon 2.8BGHz/512KB L2 Cache Proc Upg	71P8967
Xeon 3.06GHZ/512KB L2 Cache Proc Upg	02R1988
Xeon 3.2GHZ/512KB L2/1MB L3 Proc Upg	23K4523
512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5040
IBM ServeRAID-6i Controller (adapter for slot 4)	71P8595
IBM Remote Supervisor Adapter (PCI adapter)	09N7585
IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
36.4GB 15K-2 80 Ultra320 SCSI Hot-Swap SL HDD	06P5776
3-Pack Ultra320 Hot-Swap Expansion Kit	33P2751
IBM 560W Hot-Swap Power Upgrade Kit*	02R1874
IBM 660W Hot-Swap Power Upgrade Kit (3.06 Only)	02R2015

Other options at **ibm.com**/pc/us/accessories
*Not backward compatible with 400Mhz FSB x235

Keyboard / mouse	IBM 101-key keyboard / IBM mouse (both black)
Power supply	*8xX, GxX:* std/max: one/two 660 watt *Rest:* std/max: one/two 560 watt *All:* voltage-sensing / auto-restart / fan in each
Fans	Four fans and two blowers / variable speed / hot-swap / redundant / PFA / fan in each power supply

Slot 1: full, 32-bit 33MHz 5v PCI 2.2, Bus A
Slot 2: full, 64-bit 100MHz 3.3v PCI-X, not hot, Bus B
Slot 3: full, 64-bit 100MHz 3.3v PCI-X, not hot, Bus B
Slot 4: full, 64-bit 100MHz 3.3v PCI-X, not hot, Bus B*
Slot 5: full, 64-bit 133MHz 3.3v PCI-X, hot-swap, Bus C
Slot 6: full, 64-bit 133MHz 3.3v PCI-X, hot-swap, Bus C
* Extended slot for opt IBM ServeRAID-5i Controller

	5.25" HH	
	5.25" HH	diskette
	CD-ROM	

Bay ① 3.5", SL 1", access, diskette
Bay ② 3.5", SL 1", access, hot-swap
Bay ③ 3.5", SL 1", access, hot-swap
Bay ④ 3.5", SL 1", access, hot-swap
Bay ⑤ 3.5", SL 1", access, hot-swap
Bay ⑥ 3.5", SL 1", access, hot-swap
Bay ⑦ 3.5", SL 1", access, hot-swap
Bay ⑧ 5.25", HH 1.6" access, open**
Bay ⑨ 5.25", HH 1.6" access, open**
Bay ⑩ 5.25", HH 1.6" access, CD-ROM

Bays 2 through 7 support 6 SL disks via SCA-2 connectors.
**Bays 8 and 9 support three 3.5" disks via 3-Pack Kit 33P2751

Tower

⮡ Quick release adapter slots (no screws)
⮡ Configuration/Setup Utility invoked by pressing F1 at startup
⮡ LSI Logic Configuration Utility near startup by pressing CTRL+C
⮡ Diagnostics (PC-Doctor™) by pressing F2 at startup
⮡ ACPI 2.0-compliant
⮡ Operator Information Panel (in front)
⮡ Predictive failure analysis on disk options, memory, processors, VRMs, power supplies, and fans in conjunction with IBM Director can alert the system administrator of an imminent component failure
⮡ Tower: H 17.31" x W 8.5" x D 27.6"
⮡ 74 to 101 pounds
⮡ Stealth black color

All models: Max int disk capacity: 1.321TB[2] with nine 146.8GB SL disks with 3-Pack Ultra160 Hot-Swap Expansion Kit

LIMITED WARRANTY[3]

⮡ **3 year parts and labor**
⮡ **International Warranty Service**[3]
⮡ **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time**[7]
⮡ **3 year on site warranty service upgrade options (in eligible locations):**[7]
  • **9 hour coverage, Mon-Fri excluding holidays, 4 hour average response** (ServicePac® part num 21P2083)
  • **24 hr x 7 day coverage, 4 hour average response** (ServicePac part number 21P2084)
  • **24 hr x 7 day coverage, 2 hour average response** (ServicePac part number 21P2085)
⮡ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

IBM® Type-model	Qty x Processor	L3 cache	Memory	ECC memory features	Disk	SCSI controller	Mech- anical	Slots x disk bays bays (std/max)		Ethernet	Available date
8685-71X	1 x Xeon™ MP 2.0GHz	1MB	512MB	Hot Spare/Chipkill™	None	2 x Ultra160	Tower	7 x10	6/12	Gigabit	Jun 2003
8685-7RX	1 x Xeon MP 2.0GHz	1MB	512MB	Hot Spare/Chipkill	None	2 x Ultra160	Rack	7 x10	6/12	Gigabit	Jun 2002
8685-72X	2 x Xeon MP 2.0GHz	1MB	1GB	Hot Spare/Chipkill	None	2 x Ultra160	Tower	7 x10	6/12	Gigabit	Nov 2003
8685-73X	2 x Xeon MP 2.0GHz	1MB	3GB	Hot Spare/Chipkill	2 x 36.4GB 10K	2 x Ultra160	Tower	7 x10	6/12	Gigabit	Nov 2003
8685-81X	1 x Xeon MP 2.5GHz	1MB	1GB	Hot Spare/Chipkill	None	2 x Ultra160	Tower	7 x10	6/12	Gigabit	Jun 2003
8685-8RX	1 x Xeon MP 2.5GHz	1MB	1GB	Hot Spare/Chipkill	None	2 x Ultra160	Rack	7 x10	6/12	Gigabit	Jun 2003
8685-91X	1 x Xeon MP 2.8GHz	2MB	1GB	Hot Spare/Chipkill	None	2 x Ultra160	Tower	7 x10	6/12	Gigabit	Jun 2003
8685-9RX	1 x Xeon MP 2.8GHz	2MB	1GB	Hot Spare/Chipkill	None	2 x Ultra160	Rack	7 x10	6/12	Gigabit	Jun 2003

Processors	**1 or 2 x Intel® Xeon™ Processor MP 2.0, 2.5, or 2.8GHz**[1] with 400MHz frontside bus / Hyper-Threading technology
L2 cache	**512KB** / on die of processor / at processor speed
L3 cache	**1MB** or **2MB** / on die of processor / at processor speed
Processor upgrade	**4-way SMP** / up to four Xeon Processors MP (same speed/cache size)
Implementation	Systemboard contains four Intel 603-pin micro-PGA ZIF sockets, one memory board slot, six Active™ PCI-X slots, one PCI slot, and integrated SCSI, ethernet, graphics

Memory	Up to **3GB** std / 24GB[13] max / two (or six on 73X) slots used / ten (or six) slots available / **PC1600** 200MHz registered 184-pin ECC DDR-SDRAM DIMMs / one memory-board std with 12 DIMM gold-connector slots / DIMMs must be installed in matched pairs or quads [a bank] / 2- or 4-way memory interleave / **Hot Spare Memory** (activated by failure of a pair or quad of DIMMs [a bank]; reqs additional memory matching failed bank) / **Active Memory™ via memory mirroring** (memory mirroring supported with any OS) and **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill™** (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)

SCSI disk controller	Adaptec® AIC-7899 / Wide Ultra160 SCSI (LVD 160MB/sec) / two channel / 64-bit 66MHz PCI 2.2 / integrated on planar
SCSI connectors	*Channel B:* 68-pin connector on planar to SCSI backplane (one-drop 16-bit LVD cable) / *Channel A:* 68-pin connector on planar for optional one-drop 16-bit LVD cable (32P8164) to rear 0.8mm VHDCI connector
IDE controller / cabling	Enhanced IDE ATA-100 controller in CSB5 South Bridge / one one-drop IDE cable from IDE controller to CD-ROM
Disk - capacity	None (or two) standard / supports up to 15,000 rpm disks / 80-pin SCA-2 connectors
Disk - bays	*Std:* six hot-swap disk bays; *max:* six additional bays (via a SCSI backplane) with optional Upgrade Kit; *All:* Ultra320-enabled

Mechanical	**EIA 19" rack (7U**[4]**) or tower** / tower models have hinged and lockable front door, side panels, casters
Rack / conversion	Rack systems supported in IBM NetBAY™ racks / kit available to convert tower to rack (use NetBAY11 for rack to tower)
Architecture / chipset	**ServerWorks® Grand Champion™ 4.0 HE** / CMIC Host Bridge (Memory Controller and I/O Bridge) and five REMCs / two CIOB-X I/O Bridges (IMB bus to Host Bridge, one with two PCI-X buses C and D, other with one PCI-X bus B and ethernet and one PCI 2.2 bus for SCSI / CSB5 South Bridge (Thin IMB to Host Bridge, one PCI 2.2 bus A, EIDE, USB, SMBus, IOAPIC, LPC bus to Super I/O) / five peer PCI buses / NS PC87417 Super I/O (diskette, keyboard, mouse)
Slots (Active™ PCI-X)	Six hot-swap PCI-X 1.0 slots[10] available with power and attention indicator lights (optical sensors control power to slot) / **hot replace, hot upgrade, hot expansion** /separated by insulative plastic dividers / 3.3 volt or universal

Ethernet controller	10/100/1000 gigabit ethernet / Broadcom® BCM 5703 / on PCI Bus B / full duplex / Wake on LAN® / Alert Standard Format 1.0
CD-ROM / diskette	*CD-ROM:* 48X-20X[6] CD-ROM, IDE (ATAPI), 1.6" HH, bootable / *Diskette drive:* 3.5" 1.44 MB diskette drive, dust cover
Rear ports	Four USB (Vers 1.1), one serial (9-pin), keyboard (PS/2), mouse (PS/2), ethernet (RJ-45), graphics (DB-15), two RJ-45 (for integrated system management processor) / no parallel port
Graphics controller	SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / up to 1280x1024 at 85Hz / 32-bit 33MHz PCI 2.2 Bus A

Security	Power-on password / administrator password / hinged and lockable front door to cover disk bays, power button, and reset button (tower only) / unattended boot / selectable boot

Systems management	**IBM integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, optional disks, fans, power supplies / supports optional Remote Supervisor Adapter with 20-pin connector on planar for maximum power (no external power req)	512MB PC1600 ECC DDR SDRAM RDIMM	33L3283
		1GB PC1600 ECC DDR SDRAM RDIMM	33L3285
		2GB PC1600 ECC DDR SDRAM RDIMM	33L3287
		Xeon MP 2.0GHz/1MB L3 Cache Proc Upg	73P8805
		Xeon MP 2.5GHz/1MB L3 Cache Proc Upg	73P8806
		Xeon MP 2.8GHz/2MB L3 Cache Proc Upg	73P8807
Diagnostics	**Light Path Diagnostics™** panel providing LED map to failing part (under top cover) / Information LED Panel in front	6-pack Ultra320 Hot-Swap Expansion Kit	32P8163
		370 Watt Hot-Swap Redundant Power Supply	31P6133
Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director, and others	IBM 7U x 26D Tower-to-Rack Conversion Kit III	32P1474
		IBM External SCSI Interface Kit (for rear SCSI)	32P8164
		Media Bay Cable Kit (2-drop SCSI to HH bays)	10K2340
Keyboard / mouse	*Tower only:* IBM 103-key keyboard / IBM mouse (both black)	IBM ServeRAID™-4H Ultra160 SCSI Adapter	37L6889
Power supply	*Std:* two 370 watt hot-swap; *Max:* four 370 watt hot-swap / redundant with four power supplies / tool-free install / universal (voltage sensing) / fans in each power supply / PFA	IBM 36.4GB 10K Ultra160 SCSI Hot-Swap SL	06P5755
		IBM 73.4GB 10K Ultra160 SCSI Hot-Swap SL	06P5756
Fans	Nine **hot-swap redundant fans** / plus fan in each power supply/ variable speed / PFA / fan failure signals diagnostic LED	IBM Remote Supervisor Adapter (PCI adapter)	09N7585
		IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
		Other options at **ibm.com**/pc/us/accessories	

➪ Tower dim: H15.5" x W17.6" x D29.8"; 104 to 150 lb
➪ Rack dim: H12.0" x W17.6" x D27.7"; 104 to 150 lb

Rack or Tower

Standard hot-swap disk bays

Diskette
CD-ROM
HH 5.25"
HH 5.25"

Optional hot-swap disk bays

➪ Black color
➪ ACPI 1.0
➪ Orange compo-nents and labels indicate hot-swap options
➪ Vital Product Data
➪ Backup BIOS

Bay ① 3.5", SL 1", access, diskette
Bay ② 5.25", HH 1.6" access, CD-ROM
Bay ③ 5.25", HH 1.6" access, open*
Bay ④ 5.25", HH 1.6" access, open*
Bays 5 to 10 (six bays):
  standard 3.5" SL 1" hot-swap disk bays
Bays 11 to 16 (six bays):
  optional 3.5" SL 1" hot-swap disk bays

Slot 1: 32-bit 33MHz 5v PCI, not hot-swap, Bus A;
  primarily for for optional Remote Supervisor Adp
Slot 2: full, 64-bit 100MHz 3.3v PCI-X, hot-swap, Bus B
Slot 3: full, 64-bit 100MHz 3.3v PCI-X, hot-swap, Bus B
Slot 4: full, 64-bit 100MHz 3.3v PCI-X, hot-swap, Bus C
Slot 5: full, 64-bit 100MHz 3.3v PCI-X, hot-swap, Bus C
Slot 6: full, 64-bit 100MHz 3.3v PCI-X, hot-swap, Bus D
Slot 7: full, 64-bit 100MHz 3.3v PCI-X, hot-swap, Bus D

➪ Setup Program is available by pressing F1 at startup; Diagnostics (PC-Doctor) by pressing F2 at startup; CTRL+A for SCSISelect Utility
➪ Removeable top cover
➪ Access adapters, memory, CPUs from top
➪ Predictive Failure Analysis®: alerts generated by mgmt processor for IBM Director for DIMM(s), processor(s),VRM(s), power supply(s), disk(s), and fans

Maximum internal disk capacity:
880GB[2] with twelve 73.4GB SL hot-swap SCSI disks

See footnotes for important warranty information

(X255C) © IBM Corp. November 2003

• = Hot-swap
US models announced June 2003 or November 2003

IBM® Type-model	Qty x Processor	L2 cache	FSB MHz	Memory	Memory type	Disk	Disk controller	Disk bays	Mech- anical	Slots x bays	Ethernet	Limited warranty[3]	Available date
✂ 8673-92X	Pentium® 4 1.8GHz	512KB	400	256MB	ECC	40GB[2] EIDE	ATA-100	2 fixed	1U[4] rack	2x4	2 x Gigabit	1 year	Aug 2002
✂ 8673-12X	Pentium 4 2.0GHz	512KB	400	256MB	ECC	40GB EIDE	ATA-100	2 fixed	1U rack	2x4	2 x Gigabit	1 year	Aug 2002
✂ 8673-13X	Pentium 4 2.0GHz	512KB	400	256MB	ECC	18.2GB SCSI	Ultra160	2 fixed	1U rack	2x4	2 x Gigabit	1 year	Aug 2002
✂ 8673-42X	Pentium 4 2.4GHz	512KB	533	256MB	ECC	40GB EIDE	ATA-100	2 fixed	1U rack	2x4	2 x Gigabit	1 year	Oct 2002
✂ 8673-43X	Pentium 4 2.4GHz	512KB	533	256MB	ECC	18.2GB SCSI	Ultra160	2 fixed	1U rack	2x4	2 x Gigabit	1 year	Oct 2002
8673-62X	Pentium 4 2.67GHz	512KB	533	256MB	ECC	40GB EIDE	ATA-100	2 fixed	1U rack	2x4	2 x Gigabit	1 year	Oct 2002
8673-63X	Pentium 4 2.67GHz	512KB	533	256MB	ECC	18.2GB SCSI	Ultra160	2 fixed	1U rack	2x4	2 x Gigabit	1 year	Oct 2002

Positioning	*A highly affordable, uni-processor, 1U rack-optimized server*
Processor(s)	**Intel® Pentium 4 at 1.8 or 2.0GHz**[1] with 400MHz frontside bus (FSB) or **2.4 or 2.67GHz** with 533MHz frontside bus (FSB)
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	No SMP support
Implementation	Systemboard contains one Intel mPGA478B socket (with Pentium 4 FC-PGA2 and heatsink), four memory DIMM slots, connector for one PCI-X slot, riser for one PCI-X slot, and integrated chipset, two EIDE connectors, ethernet, and graphics

Memory	**256MB** std / 4GB max[13] / one slot used / three slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / memory bus runs at 2 x 133MHz / **Error Checking and Correcting (ECC)** memory controller

SCSI disk controller	*SCSI models:*	**Adaptec® 29160LP / single channel Wide Ultra160 SCSI** (LVD 160MB/sec) / 64-bit 66MHz PCI adapter / one channel with up to 15 device support
SCSI connectors	*SCSI models:*	On adapter: one 68-pin SCSI connector / one 0.8mm VHDCI 68-pin external connector
IDE disk controller		Enhanced IDE busmaster / ATA-100 support / two connectors on systemboard
Cables	*SCSI models:*	one 2-drop 16-bit LVD SCSI cable, one 1-drop 40-conductor EIDE cable (connected to CD-ROM)
	EIDE models:	one 2-drop EIDE cable (to CD-ROM and disk), one 1-drop EIDE cable (to second disk bay)
Disk - features	*SCSI:*	18.2GB Ultra160 SCSI, 10K rpm, 5.2ms read seek; *EIDE:* 40GB ATA-100, 7200 rpm, 8.7ms read; *All:* S.M.A.R.T.[5]

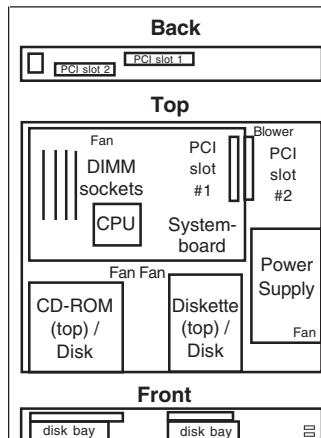|	
Mechanical	**EIA 19" Rack (1U**[4]**)** / rack-mount only / supports 16.75" deep racks for telco and colocation implementations
Architecture / chipsets	**ServerWorks® Grand Champion™ SL** / CMIC-SL (Super Lite) Host Bridge (memory controller and I/O Bridge) / one CIOB-X2 I/O Bridge (IMB bus to Host Bridge for PCI-X Bus A with slots and PCI-X Bus B with dual ethernet) / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2-based graphics controller, EIDE, USB, LPC bus to Super I/O) / National Semiconductor® PC87414 Super I/O chip (serial, keyboard, mouse, diskette)
Bus slots	(See below) two available PCI-X 1.0 / no hot-swap Active™ PCI slots

Ethernet controllers	Two gigabit 10/100/1000 ethernet ports / Broadcom® BCM5703 / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz Bus B / full duplex / PXE / Wake on LAN® / Alert Standard Format 1.0 / two rear RJ-45 ports
CD-ROM / diskette	24X-10X[6] CD-ROM / IDE; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* serial (9-pin), two ethernet (RJ-45), keyboard, mouse, analog DB-15 monitor / no parallel port
Front ports / graphics	*Front:* two USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus
Console interconnects	No system-to-system interconnect cable (separate keyboard, video, mouse ports on back)

Systems mgmt	WinBond® W83791D / on planar / monitors system and processor temperature, fan speed and failure, and voltages
Diagnostics	Diagnostics via PC-Doctor on a standard IBM Enhanced Diagnostics CD (diskette can be created) / support for optional Remote Supervisor Adapter with 20-pin conn on planar for continuous power (no external power required)

Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode
Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director™, and others

256MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5037
512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
120GB ATA-100 EIDE HDD (7200 rpm)*	09N4231
18.2GB 15K Ultra160 SCSI SL 68-pin HDD*	06P5765
36.4GB 15K Ultra160 SCSI SL 68-pin HDD*	06P5766
73.4GB 10K Ultra160 SCSI SL 68-pin HDD*	06P5752
Remote Supervisor Adapter	09N7585
ServeRAID™-4Lx Ultra160 SCSI Adapter	06P5740
IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
IBM NetBAY25 Standard Rack	9306250
IBM NetBAY42 Enterprise Rack	930842S
IBM ACT Local Console Manager	1735L04

Other options at **ibm.com**/pc/us/accessories

* *Disk not supported in all x305 systems*

Cooling fans	Five fans (three fans for system, one blower in rear, one on power supply) / variable speed / not redundant or hot-swap
Power supply	200 watt / universal / auto-sensing / auto-restart support
Prerequisites	Monitor, keyboard, mouse, rack, operating system / supports IBM ACT CAT-5 chaining solutions

Back

PCI slot 1
PCI slot 2

Top

Fan
DIMM sockets
CPU
PCI slot #1
Blower
PCI slot #2
System-board
Fan Fan
CD-ROM (top) / Disk
Diskette (top) / Disk
Power Supply
Fan

Front

disk bay   disk bay

Slot 1: halfsize, 64-bit 133MHz PCI X 1.0 (3.3v)
Slot 2: halfsize, low-profile, 64-bit 133MHz PCI X 1.0 (3.3v) - SCSI adapter in some models

Bay ① 3.5", UltraSlim 0.5", access, std diskette
Bay ② 5.25", UltraSlim 0.5", access, std CD-ROM
Bay ③ 3.5", SL 1", no access, std fixed disk
Bay ④ 3.5", SL 1", no access, open for fixed disk

⇨ Raven black front bezel
⇨ H 1.72" (1U) x W 17.3" x D 16.75"; 43.7mm x 439.9mm x425.5mm
⇨ 26 to 28.4 lbs; 11.8kg to 12.9kg (minimum to max configuration)
⇨ Configuration/Setup Utility: F1 at startup
⇨ Optional System Partition: ALT+F1 at startup
⇨ Network Boot: F12 at startup
⇨ Operator Information Panel in front
⇨ SCSISelect near startup by pressing CTRL+A (SCSI models)
⇨ Ships with Diagnostics CD, ServerGuide Setup and Installation CD, and IBM Director CD, and Broadcom Ethernet CD
⇨ Predictive Failure Analysis on disk(s) with IBM Director can alert the administrator of an imminent component failure

Maximum internal disk capacity[13] (model dependent):
146.8GB with two 73.4GB SL SCSI disks or
240GB with two 120GB EIDE disks / supports 15K rpm SCSI disks

See footnotes for important warranty information
US models announced August 20, 2002 and October 15, 2002
✂ US models withdrawn effective February 28, 2003, May 29, 2003, or September 26, 2003

(X305A) © IBM Corp. December 2002

IBM® Type-model	Qty x Processor	L2 cache	FSB MHz	Memory	Memory type	Disk	Disk controller	Disk bays	Mech- anical	Slots x bays	Ethernet	Limited warranty[3]	Available date
8673-72X	Pentium 4 2.8BGHz	512KB	533	256MB	ECC	40GB EIDE	ATA-100	2 fixed	1U rack	2x4	2 x Gigabit	1 year	May2003
8673-73X	Pentium 4 2.8BGHz	512KB	533	256MB	ECC	18.2GB SCSI	Ultra160	2 fixed	1U rack	2x4	2 x Gigabit	1 year	May2003
8673-82X	Pentium 4 3.06GHz	512KB	533	256MB	ECC	40GB EIDE	ATA-100	2 fixed	1U rack	2x4	2 x Gigabit	1 year	Sep 2003
8673-83X	Pentium 4 3.06GHz	512KB	533	256MB	ECC	36.4GB SCSI	Ultra160	2 fixed	1U rack	2x4	2 x Gigabit	1 year	Sep 2003

Positioning	*A highly affordable, uni-processor, 1U rack-optimized server*
Processor(s)	**Intel® Pentium 4 up to 2.8BGHz**[1] with 533MHz frontside bus (FSB)
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	No SMP support
Implementation	Systemboard contains one Intel mPGA478B socket (with Pentium 4 FC-PGA2 and heatsink), four memory DIMM slots, connector for one PCI-X slot, riser for one PCI-X slot, and integrated chipset, two EIDE connectors, ethernet, and graphics

Memory	**256MB** std / 4GB max[13] / one slot used / three slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / memory bus runs at 2 x 133MHz / **Error Checking and Correcting (ECC)** memory controller

SCSI disk controller	*SCSI models:* **Adaptec® 29160LP / single channel Wide Ultra160 SCSI** (LVD 160MB/sec) / 64-bit 66MHz PCI adapter / one channel with up to 15 device support
SCSI connectors	*SCSI models:* On adapter: one 68-pin SCSI connector / one 0.8mm VHDCI 68-pin external connector
IDE disk controller	Enhanced IDE busmaster / ATA-100 support / two connectors on systemboard
Cables	*SCSI models:* one 2-drop 16-bit LVD SCSI cable, one 1-drop 40-conductor EIDE cable (connected to CD-ROM) *EIDE models:* one 2-drop EIDE cable (to CD-ROM and disk), one 1-drop EIDE cable (to second disk bay)
Disk - features	*SCSI:* 18.2GB/36.4GB Ultra160 SCSI, 10K rpm, 5.2ms read seek; *EIDE:* 40GB ATA-100, 7200 rpm, 8.7ms read; *All:* S.M.A.R.T.[5]

Mechanical	**EIA 19" Rack (1U**[4]**)** / rack-mount only / supports 16.75" deep racks for telco and colocation implementations
Architecture / chipsets	**ServerWorks® Grand Champion™ SL** / CMIC-SL (Super Lite) Host Bridge (memory controller and I/O Bridge) / one CIOB-X2 I/O Bridge (IMB bus to Host Bridge for PCI-X Bus A with slots and PCI-X Bus B with dual ethernet) / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2-based graphics controller, EIDE, USB, LPC bus to Super I/O) / National Semiconductor® PC87414 Super I/O chip (serial, keyboard, mouse, diskette)
Bus slots	(See below) two available PCI-X 1.0 / no hot-swap Active™ PCI slots

Ethernet controllers	Two gigabit 10/100/1000 ethernet ports / Broadcom® BCM5703 / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz Bus B / full duplex / PXE / Wake on LAN® / Alert Standard Format 1.0 / two rear RJ-45 ports
CD-ROM / diskette	24X-10X[6] CD-ROM / IDE; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* serial (9-pin), two ethernet (RJ-45),keyboard, mouse, analog DB-15 monitor / no parallel port
Front ports / graphics	*Front:* two USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus
Console interconnects	No system-to-system interconnect cable (separate keyboard, video, mouse ports on back)

Systems mgmt	WinBond® W83791D / on planar / monitors system and processor temperature, fan speed and failure, and voltages
Diagnostics	Diagnostics via PC-Doctor on a standard IBM Enhanced Diagnostics CD (diskette can be created) / support for optional Remote Supervisor Adapter with 20-pin conn on planar for continuous power (no external power required)

Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode
Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director™, and others

256MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5037
512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
120GB ATA-100 EIDE HDD (7200 rpm)*	09N4231
18.2GB 15K Ultra160 SCSI SL 68-pin HDD*	06P5765
36.4GB 15K Ultra160 SCSI SL 68-pin HDD*	06P5766
73.4GB 10K Ultra160 SCSI SL 68-pin HDD*	06P5752
Remote Supervisor Adapter	09N7585
ServeRAID™-4Lx Ultra160 SCSI Adapter	06P5740
IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
IBM NetBAY25 Standard Rack	9306250
IBM NetBAY42 Enterprise Rack	930842S
IBM ACT Local Console Manager	1735L04

Other options at **ibm.com**/pc/us/accessories
* *Disk not supported in all x305 systems*

Cooling fans	Five fans (three fans for system, one blower in rear, one on power supply) / variable speed / not redundant or hot-swap
Power supply	200 watt / universal / auto-sensing / auto-restart support
Prerequisites	Monitor, keyboard, mouse, rack, operating system / supports IBM ACT CAT-5 chaining solutions

Back

PCI slot 1
PCI slot 2

Slot 1: halfsize, 64-bit 133MHz PCI X 1.0 (3.3v)
Slot 2: halfsize, low-profile, 64-bit 133MHz PCI X 1.0 (3.3v) - SCSI adapter in some models

Top

Fan / DIMM sockets / CPU / Blower / PCI slot #1 / PCI slot #2 / System-board / Fan Fan / CD-ROM (top) / Disk / Diskette (top) / Disk / Power Supply / Fan

Bay ① 3.5", UltraSlim 0.5", access, std diskette
Bay ② 5.25", UltraSlim 0.5", access, std CD-ROM
Bay ③ 3.5", SL 1", no access, std fixed disk
Bay ④ 3.5", SL 1", no access, open for fixed disk
⇨ Raven black front bezel
⇨ H 1.72" (1U) x W 17.3" x D 16.75"; 43.7mm x 439.9mm x425.5mm
⇨ 26 to 28.4 lbs; 11.8kg to 12.9kg (minimum to max configuration)
⇨ Configuration/Setup Utility: F1 at startup
⇨ Optional System Partition: ALT+F1 at startup
⇨ Network Boot: F12 at startup
⇨ Operator Information Panel in front
⇨ SCSISelect near startup by pressing CTRL+A (SCSI models)
⇨ Ships with Diagnostics CD, ServerGuide Setup and Installation CD, and IBM Director CD, and Broadcom Ethernet CD
⇨ Predictive Failure Analysis on disk(s) with IBM Director can alert the administrator of an imminent component failure
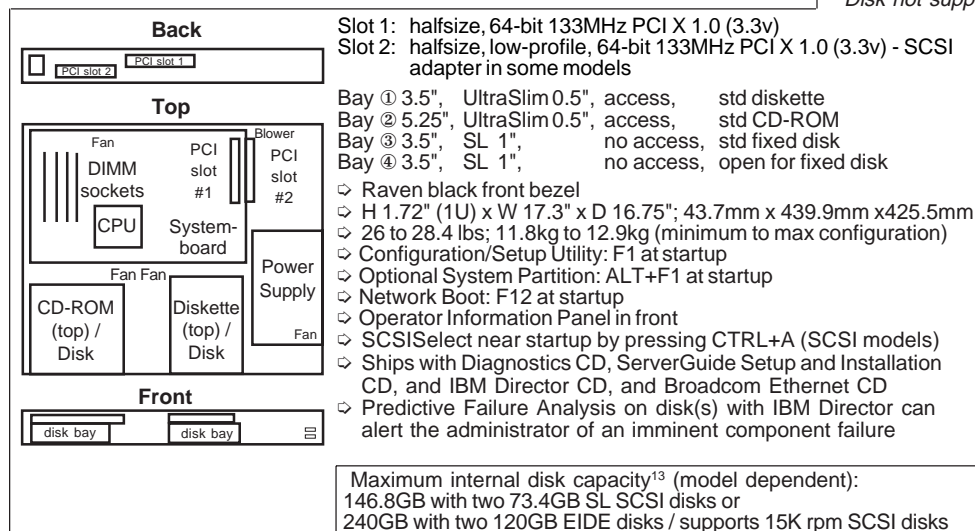
Front

disk bay   disk bay
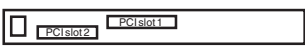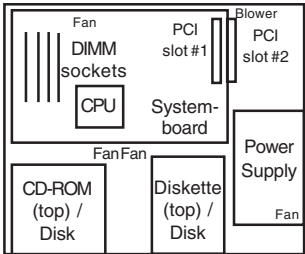
LIMITED WARRANTY[3]

⇨ **1 year parts and labor**
⇨ **International Warranty Service**[3]
⇨ **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time**[7]
⇨ **On site service upgrade options (in eligible locations):**[7]
  • **3 year IOR 9x5, NBD avg response** (ServicePac® part num 69P9505)
  • **3 year IOR 9x5, 4 hr avg response** (ServicePac part num 69P9506)
  • **3 year IOR 24x7, 4 hr avg response** (ServicePac part num 69P9507)
  • **3 year IOR 24x7, 2 hr avg response** (ServicePac part num 69P9508)
⇨ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

Maximum internal disk capacity[13] (model dependent):
146.8GB with two 73.4GB SL SCSI disks or
240GB with two 120GB EIDE disks / supports 15K rpm SCSI disks

See footnotes for important warranty information
US models announced May 13, 2003 or September 9, 2003

IBM® Type-model	Processor	Memory	Disk	Disk controller	Mechanical	Slots x bays	Hot-swap disk bays	Ethernet	Power supply	Available date
8673-4AX	Pentium 4® 2.4Ghz[1]	256MB	36.4GB[2]	Ultra 160	1U[4] rack	2 slots x 4 bays	None	2 x Gigabit	DC power	Mar 2003

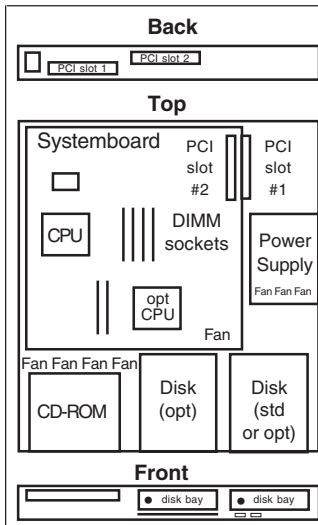*DC power models are designed for network infrastructures requiring network equipment to support DC power environments*

Positioning	*A compact yet expandable ulta-thin 1U server that is remarkably affordable*
Processor	**Intel® Pentium 4 2.4Ghz with 533MHz frontside bus**
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	**No SMP** support
Processor upgrade	None supported
Implementation	Systemboard contains one Intel mPGA478B socket (with Pentium 4 FC-PGA2 and heatsink), four memory DIMM slots, connector for one PCI-X slot, riser for one PCI-X slot, and integrated chipset, two EIDE connectors, ethernet, and graphics

Memory - std / max	**256MB** std / 4GB max[13]
Memory - sockets	4 sockets / 3 available / **ECC** (Error Checking and Correcting) DDR DIMMs and ECC memory controller
Memory - features	**PC2100 266MHz** registered 184-pin gold-plated DIMM
Memory - support	Supports unbuffered SDRAM ECC DIMMs / mixing of memory sizes

SCSI disk controller	**Adaptec® 29160LP / single channel Wide Ultra160 SCSI** (LVD 160MB/sec) / 64-bit 66MHz PCI adapter / 15 device
SCSI Connectors	On adapter: one 68-pin SCSI connector / one 0.8mm VHDCI 68-pin external connector
Cables	one 2-drop 16-bit LVD SCSI cable, one 1-drop 40-conductor EIDE cable (connected to CD-ROM)
Disk - features	36.4GB Ultra160 SCSI, 10K rpm, 5.2ms read seek

Architecture / chipsets	**ServerWorks® Grand Champion™ SL** / CMIC-SL (Super Lite) Host Bridge (memory controller and I/O Bridge) / one CIOB-X2 I/O Bridge (IMB bus to Host Bridge for PCI-X Bus A with slots and PCI-X Bus B with dual ethernet) / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2-based graphics controller, EIDE, USB, LPC bus to Super I/O) / National Semiconductor® PC87414 Super I/O chip (serial, keyboard, mouse, diskette)
Mechanical	**EIA 19" Rack (1U[4])** / rack-mount only / supported in IBM NetBAY™ Rack products (rack requires vented front door)

Ethernet controllers	Two gigabit 10/100/1000 ethernet ports / Broadcom® BCM5703 / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz Bus B / full duplex / PXE / Wake on LAN® / Alert Standard Format 1.0 / two rear RJ-45 ports
CD-ROM / diskette	24X-10X[6] CD-ROM / IDE; *Diskette*: 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* serial (9-pin), two ethernet (RJ-45),keyboard, mouse, analog DB-15 monitor / no parallel port
Front ports/graphics	*Front:* two USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus
Console interconnects	No system-to-system interconnect cable (separate keyboard, video, mouse ports on back)

Systems mgmt	WinBond® W83791D / on planar / monitors system and processor temperature, fan speed and failure, and voltages
Diagnostics	Diagnostics via PC-Doctor on a standard IBM Enhanced Diagnostics CD (diskette can be created)

Graphics controller	SVGA / PCI bus / ATI® Rage XL(on planar) / 8MB SDRAM std and max / DDC2B / analog 15-pin D-shell
Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode
Software[9]	**ServerGuide™** (CD-ROM instillation and configuration utilities), IBM Director™, and others

OPTIONS

256MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5037
512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
18.2GB 15K Ultra160 SCSI SL 68-pin HDD	06P5765
36.4GB 10K Ultra160 SCSI SL 68-pin HDD	06P5751
36.4GB 15K Ultra160 SCSI SL 68-pin HDD	06P5766
73.4GB 10K Ultra160 SCSI SL 68-pin HDD	06P5752
Remote Supervisor Adapter	09N7585
ServeRAID™-4Lx Ultra160 SCSI Adapter	06P5740
IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
IBM NetBAY25 Standard Rack	9306250
IBM NetBAY42 Enterprise Rack	930842S
NetBAY ACT Local Console Manager	1735L04
Other options at **ibm.com**/pc/us/accessories	

Keyboard / mouse	None standard
Cooling fans	Five fans (three fans for system, one blower in rear, one on power supply) / variable speed / not redundant or hot-swap
Power supply	**200 watt (-48 to -60 V dc [direct current])** / auto-sensing supports dual input sources (two power sources) / not redundant / not hot-swap / auto-restart support
Prerequisites	Appropriate dc power source and customer supplied wiring, monitor, keyboard, mouse, rack with perforated door, operating system

Back

PCI slot 2   PCI slot 1

Top

Fan | Blower
DIMM sockets | PCI slot #1 | PCI slot #2
CPU | System-board | Power Supply
Fan Fan
CD-ROM (top) / Disk | Diskette (top) / Disk | Fan

Front

disk bay   disk bay

Slot 1: halfsize, 64-bit 133MHz PCI X 1.0 (3.3v)
Slot 2: halfsize, low-profile, 64-bit 133MHz PCI X 1.0 (3.3v) - SCSI adapter in some models

Bay ① 3.5", UltraSlim 0.5", access, std diskette
Bay ② 5.25", UltraSlim 0.5", access, std CD-ROM
Bay ③ 3.5", SL 1", no access, std fixed disk
Bay ④ 3.5", SL 1", no access, open for fixed disk

⇨ Raven black front bezel
⇨ H 1.72" (1U) x W 17.3" x D 16.75"; 43.7mm x 439.9mm x425.5mm
⇨ 26 to 28.4 lbs; 11.8kg to 12.9kg (minimum to max configuration)
⇨ Configuration/Setup Utility: F1 at startup
⇨ Optional System Partition: ALT+F1 at startup
⇨ Network Boot: F12 at startup
⇨ Operator Information Panel in front
⇨ SCSISelect near startup by pressing CTRL+A (SCSI models)
⇨ Ships with Diagnostics CD, ServerGuide Setup and Installation CD, and IBM Director CD, and Broadcom Ethernet CD
⇨ Predictive Failure Analysis on disk(s) with IBM Director can alert the administrator of an imminent component failure

Maximum internal disk capacity[13] (model dependent):
146.8GB with two 73.4GB SL SCSI disks
Supports 15K rpm SCSI disks

LIMITED WARRANTY[3]

⇨ **1 year parts and labor**
⇨ **International Warranty Service**[3]
⇨ **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time**[7]
⇨ **On site service upgrade options (in eligible locations):**[7]
- **3 year IOR 9x5, NBD avg response** (ServicePac® part num 69P9505)
- **3 year IOR 9x5, 4 hr avg response** (ServicePac part num 69P9506)
- **3 year IOR 24x7, 4 hr avg response** (ServicePac part num 69P9507)
- **3 year IOR 24x7, 2 hr avg response** (ServicePac part num 69P9508)
⇨ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

See footnotes for important warranty information
US model announced February 18, 2003

IBM @server™ 325 (8835)

IBM® Type-model	Qty x Processor	Proc. Speed	L2 Cache	Memory	Memory type	Disk	Disk controller	Hot-swap or fixed disk bays	Slots x bays	Ethernet	Limited warranty[3]	Available date
8835-21X	1 x Opteron™ 240	1.4Ghz[1]	1MB	1GB	Chipkill	None (open)	Ultra320	2 hot-swap	2x3	2 x Gigabit	1 year	Oct 2003
8835-22X	1 x Opteron 240	1.4Ghz	1MB	1GB	Chipkill	80GB[2] EIDE	EIDE	2 fixed	2x3	2 x Gigabit	1 year	Oct 2003
8835-31X	1 x Opteron 242	1.6Ghz	1MB	1GB	Chipkill	None (open)	Ultra320	2 hot-swap	2x3	2 x Gigabit	1 year	Oct 2003
8835-32X	1 x Opteron 242	1.6Ghz	1MB	1GB	Chipkill	80GB[2] EIDE	EIDE	2 fixed	2x3	2 x Gigabit	1 year	Oct 2003
8835-51X	1 x Opteron 246	2.0Ghz	1MB	1GB	Chipkill	None (open)	Ultra320	2 hot-swap	2x3	2 x Gigabit	1 year	Oct 2003
8835-52X	1 x Opteron 246	2.0Ghz	1MB	1GB	Chipkill	80GB[2] EIDE	EIDE	2 fixed	2x3	2 x Gigabit	1 year	Oct 2003
8835-5DX	2 x Opteron 246	2.0Ghz	1MB	2GB	Chipkill	36.4GB 10K	Ultra320	2 hot-swap	2x3	2 x Gigabit	1 year	Oct 2003

Processor(s)	**Up to 2 x AMD® Opteron™ 246** with 800Mhz HyperTransport technology / 64-bit x86 Instruction set / 32-bit compatible
L2 cache	**1MB** / on die of processor / at processor speed (no L3 cache)
SMP support	**2-way SMP** / up to two Opteron Processors (same speed/cache size required)
Implementation	Systemboard contains two AMD Socket 940 micro-PGA ZIF sockets, six memory DIMM slots, two 64-bit 100Mhz PCI-X slots, integrated SCSI, ethernet, graphics / AMD Opteron HyperLink bus interface
Memory	**Up to 2GB** std / 12GB max[13] (when 2GB DIMMs become available) / four slots enabled with uni-processor, six with dual / two slots used (four slots used in 5DX model) / four slots available (two avail. in 5DX) / **PC2700** 333MHz registered 184-pin ECC DDR-SDRAM DIMMs / six DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill™** (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
SCSI disk controller	*All (not used on EIDE models):* **LSI Logic® 53C1020** / **Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X Bus B / supports **RAID-1 mirroring** (Embedded Mirroring) with two SCSI disks in front bays / one 16-bit internal channel / 16-bit 68-pin LVD cable from systemboard to backplane for two disks / no external connector
IDE controller / cable	*All:* Enhanced IDE ATA-100 controller in CSB5 South Bridge / two connectors on planar / one 1-drop IDE cable (CD-ROM) *EIDE models:* One 2-drop EIDE cable to two disk bays (primary) / one 1-drop EIDE cable to CD-ROM (secondary)
Disk - capacity	*SCSI models:* 36.4GB supports up to 15000 rpm disks; *EIDE models:* 80GB / 7200 rpm / ATA-100 / 8.7ms seek
Disk - bays	*SCSI models:* two hot-swap / 80-pin SCA-2 connectors / filler panels in each disk bay / all disk bays Ultra320-enabled
Mechanical	**EIA 19" Rack (1U[4])** / rack-mount only / supported in 26" deep racks such as the IBM NetBAY™ Rack products
Architecture / chipsets	**AMD® 8131 PCI-X Bridge Chip** providing two PCI-X bridges running at 100Mhz (bridge A for SCSI and Ethernet; bridge B for PCI-X expansion slots) / **8111 I/O HyperTransport Bridge Chip** supporting a 200 Mhz double-pumped HyperTransport clock (PCI, AC '97, Ethernet, SMBus, USB, EIDE, LPC to BIOS and Super I/O) / National Semiconductor® PC87366 Super I/O chip
Bus slots	(See below) two available PCI-X 1.0 / no hot-swap Active™ PCI slots
Ethernet controllers	Two gigabit 10/100/1000 ethernet ports / Broadcom BCM5704 / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz Bus B / full duplex / Wake on LAN® / Alert Standard Format 1.0 / two rear RJ-45 ports
CD-ROM/diskette/kbd	24X-10X[6] CD-ROM / IDE / *Diskette and keyboard:* none (USB diskette and keyboard optional); legacy not supported
Rear ports	*Rear:* two USB (Vers 1.1), serial (9-pin), two ethernet (RJ-45) / parallel port not supported
Front ports / graphics	*Front:* two USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 Bus A
Console interconnects	C2T Interconnect™ cabling not supported / NetBay Local Console Manager (LCM), NetBay Remote Console Manager (RCM), and USB Conversion Option (UCO) are supported

Systems mgmt	Standard MS-9549 QLogic system management / connector on planar / optional Remote Supervisor Adapter II card supported
Diagnostics	Diagnositc LEDs for fans, memory DIMMs and processors only / Light Path Diagnostics not supported
Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode
Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director™, and others
Cooling fans	Eight fans (five for system, three inside power supply) / variable speed / not redundant or hot-swap
Power supply	411 watt / universal / auto-sensing / auto-restart support
Prerequisites	Monitor, keyboard, mouse, rack, disk (some), operating sys.

Opteron 240 Processor Upgrade	24P8189
Opteron 242 Processor Upgrade	24P8190
Opteron 246 Processor Upgrade	13N0700
512MB PC2700 CL2.5 ECC DDR-SDRAM RDIMM	73P2266
1GB PC2700 CL2.5 ECC DDR-SDRAM RDIMM	73P2267
2GB PC2700 CL2.5 ECC DDR-SDRAM RDIMM	N/A
80GB ATA-100 EIDE HDD*	09N4226
120GB ATA-100 EIDE HDD*	09N4231
36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD*	32P0734
73.4GB 15K Ultra320 SCSI Hot-Swap SL HDD*	32P0735
Remote Supervisor Adapter II	59P2984
USB Portable Diskette Drive	05K9276
NetBAY ACT Local Console Manager (LCM)	1735L04
NetBAY Remote Console Manager (RCM)	1735R16
1.5M USB Conversion Option	73P5832
Disk not supported in all e325 systems	

Back

PCI slot 1   PCI slot 2

Top

Systemboard   PCI slot #2   PCI slot #1
CPU   DIMM sockets   Power Supply   Fan Fan Fan
opt CPU   Fan
Fan Fan Fan Fan
CD-ROM   Disk (opt)   Disk (std or opt)

Front

• disk bay   • disk bay

Slot 1: half-length, 64-bit 100MHz PCI X 1.0 (3.3v); Bus C
Slot 2: full-length, 64-bit 100MHz PCI X 1.0 (3.3v); Bus C

Bay ① 5.25", UltraSlim 0.5", access, std CD-ROM
Bay ② 3.5", SL 1", access, std fixed or hot-swap disk
Bay ③ 3.5", SL 1", access, open for fixed or hot-swap disk

⇨ Stealth black color front bezel
⇨ Utility tray in front slides out from under middle bay (USB devices)
⇨ H 1.72" (1U) x W 17.3" x D 25.7"; 43.7mm x 439.9mm x653.3mm
⇨ 26 to 32 lbs; 11.8kg to 14.6kg (minimum to max configuration)
⇨ Configuration/Setup Utility: F1 at startup
⇨ System Partition Boot: ALT+F1 at startup
⇨ Network Boot: F12 at startup
⇨ Operator Information Panel in front
⇨ LSI Logic Configuration Utility: CTRL+C at startup
⇨ Includes one line cord (9 ft universal interrack HV cable with IEC plug)
⇨ Predictive Failure Analysis® on processor(s), voltage regulator modules, memory, fans, power supply, and disk options

Maximum internal disk capacity[13] (model dependent):
293.6GB with two 146.8GB SL SCSI disks or
240GB with two 120GB EIDE disks

LIMITED WARRANTY[3]
➥ **1 year parts and labor**
➥ **International Warranty Service[3]**
➥ **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time[7]**
➥ **On site service upgrade options (in eligible locations):[7]**
  • **1 year IOR 9x5, 4 hr avg response** (ServicePac® part num 69P9399)
  • **2 year IOR 24x7, 4 hr avg response** (ServicePac part num 96P2119)
  • **2 year IOR 24x7, 2 hr avg response** (ServicePac part num 96P2120)
  • **3 year IOR 24x7, 4 hr avg response** (ServicePac part num 69P9507)
  • **3 year IOR 9x5, NBD response** (ServicePac part num 69P9506)
  • **Other ServicePac options at ibm.com/services/its/us/ source/wamomxeu.pdf**
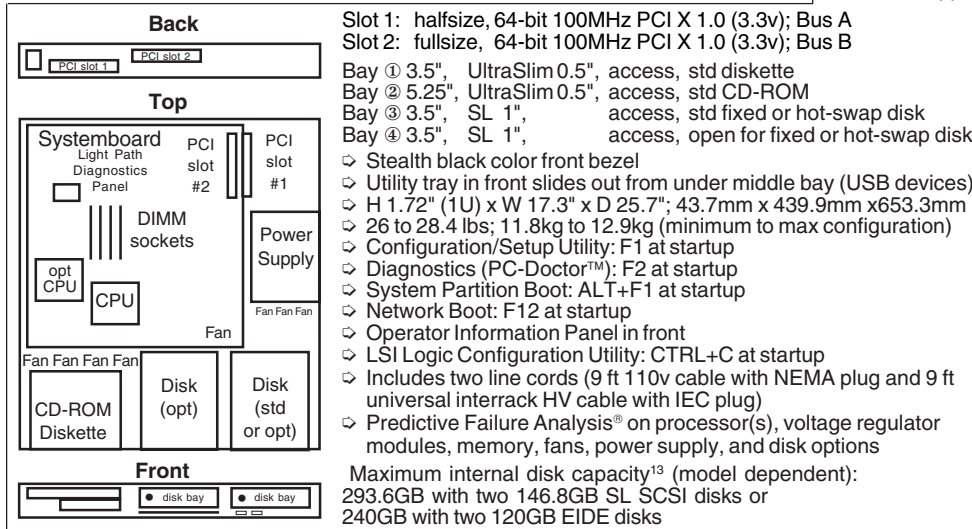➥ **24x7[14] toll-free support for warranty issues during the warranty period[3]**

See footnotes for important warranty information
• = Hot-swap in some models
US models announced August 5, 2003

(X325A) © IBM Corp. August 2003

IBM® Type-model	Qty x Processor	L2 cache	FSB MHz	Memory	Memory type	Disk	Disk controller	Hot-swap or fixed disk bays	Slots x bays	Ethernet	Limited warranty[3]	Available date
8830-11X	1 x Xeon 2.8B GHz	512KB	533✍	512MB	Chipkill	None (open)	Ultra320	2 hot-swap	2x4	2 x Gigabit	1 year	May 2003
8830-12X	1 x Xeon 2.8B GHz	512KB	533✍	512MB	Chipkill	40GB[2] EIDE	EIDE	2 fixed	2x4	2 x Gigabit	1 year	May 2003
☞ 8830-21X	1 x Xeon 3.06 GHz	512KB	533✍	512MB	Chipkill	None (open)	Ultra320	2 hot-swap	2x4	2 x Gigabit	1 year	Apr 2003
☞ 8830-22X	1 x Xeon 3.06 GHz	512KB	533✍	512MB	Chipkill	40GB[2] EIDE	EIDE	2 fixed	2x4	2 x Gigabit	1 year	May 2003

Positioning	*A highly manageable, ultra-dense 1U, 2-way server that delivers performance computing in space-constrained environments*
Processor(s)	**1 x Intel® Xeon 2.8B or 3.06GHz**[1] with 533MHz frontside bus / Hyper-Threading technology
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 603-pin micro-PGA ZIF sockets, four memory DIMM slots, connector for one PCI-X slot, riser for one PCI-X slot, and integrated SCSI, ethernet, graphics
Memory	**512MB** std / 8GB max[13] / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
SCSI disk controller	*All (not used on EIDE models):* **LSI Logic® 53C1020** / **Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X Bus B / supports **RAID-1 mirroring** (Embedded Mirroring) with two SCSI disks in front bays / one 16-bit internal channel / 16-bit 68-pin LVD cable from systemboard to backplane for two disks / no external connector
IDE controller / cable	*All:* Enhanced IDE ATA-100 controller in CSB5 South Bridge / two connectors on planar / one 1-drop IDE cable (CD-ROM) *EIDE models:* One 2-drop EIDE cable to two disk bays / one 1-drop EIDE cable to CD-ROM
Disk - capacity	*SCSI models:* none standard / supports up to 15000 rpm disks; *EIDE models:* 40GB / 7200 rpm / ATA-100 / 8.7ms seek
Disk - bays	*SCSI models:* two hot-swap / 80-pin SCA-2 connectors / filler panels in each disk bay / **all HD bays Ultra320-enabled**
Mechanical	**EIA 19" Rack (1U[4])** / rack-mount only / supported in 26" deep racks such as the IBM NetBAY™ Rack products
Architecture / chipsets	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / one CIOB-X2 I/O Bridge (IMB2 bus to Host Bridge for PCI-X Bus A with slot 1 and dual ethernet and PCI-X Bus B with slot 2 and Ultra320 / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2 Bus C with graphics controller, EIDE, USB, SMBus, LPC bus to Super I/O) / National Semiconductor® PC87417 Super I/O chip
Bus slots	(See below) two available PCI-X 1.0 / no hot-swap Active™ PCI slots
Ethernet controllers	Two gigabit 10/100/1000 ethernet ports / Broadcom BCM5703 / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz Bus A / full duplex / Wake on LAN® / Alert Standard Format 1.0 / two rear RJ-45 ports
CD-ROM / diskette	24X-10X[6] CD-ROM / IDE; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* one USB (Vers 1.1), C2T in, C2T out, serial (9-pin), two ethernet (RJ-45), one RS-485 (sys mgmt) / no parallel port
Front ports / graphics	*Front:* two USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus
Console interconnects	C2T Interconnect™ cable (10 inch, 245mm) is standard (Keyboard Video Mouse (KVM) chaining cable) / one Cable Chain Technology Cable Kit required at end of chain (a cable with separate keyboard, mouse, monitor connectors)
Systems mgmt	**IBM Integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, memory, optional disks, fans, power supply / support for optional Remote Supervisor Adapter with 20-pin conn on planar for continuous pwr (no ext pwr req)
Diagnostics	**Light Path Diagnostics**™ (LED lights indicate failing component) and on-board diagnostics (via PC-Doctor in BIOS)
Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode
Software	**ServerGuide**™ (CD-ROM installation and configuration utilities), IBM Director™, and others
Cooling fans	Eight fans (five for system, three on power supply) / variable speed / not redundant or hot-swap
Power supply	332 watt / universal / auto-sensing / auto-restart support
Prerequisites	Monitor, keyboard, mouse, rack, disk (some), operating sys, one Cable Chain Technology (C2T) Kit per chain of servers or NetBAY ACT CAT-5 chaining solutions

Xeon 2.4GHz/512KB L2 Cache Proc Upg	59P5102
Xeon 2.8GHz/512KB L2 Cache Proc Upg	02R8958
Xeon 2.8BGHz/512KB L2 Cache Proc Upg	73P6382
512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5040
80GB ATA-100 EIDE HDD*	09N4226
36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD*	06P5776
73.4GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD*	06P5756
Remote Supervisor Adapter	09N7585
xSeries Cable Chain Technology Cable Kit (2 meter breakout cable and 2 meter KVM chaining cable)	06P4792
NetBAY ACT Local Console Manager	1735L04

* Disk not supported in all x335 systems

Back

```
PCI slot 1    PCI slot 2
```

Top

```
Systemboard        PCI       PCI
Light Path         slot      slot
Diagnostics        #2        #1
Panel
                              Power
DIMM                          Supply
sockets
opt
CPU
      CPU             Fan Fan Fan
                   Fan
Fan Fan Fan Fan
CD-ROM     Disk      Disk
Diskette   (opt)     (std
                     or opt)
```

Front

```
disk bay    disk bay
```

Slot 1: halfsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus A
Slot 2: fullsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus B

Bay ① 3.5", UltraSlim 0.5", access, std diskette
Bay ② 5.25", UltraSlim 0.5", access, std CD-ROM
Bay ③ 3.5", SL 1", access, std fixed or hot-swap disk
Bay ④ 3.5", SL 1", access, open for fixed or hot-swap disk

- ➪ Stealth black color front bezel
- ➪ Utility tray in front slides out from under middle bay (USB devices)
- ➪ H 1.72" (1U) x W 17.3" x D 25.7"; 43.7mm x 439.9mm x653.3mm
- ➪ 26 to 28.4 lbs; 11.8kg to 12.9kg (minimum to max configuration)
- ➪ Configuration/Setup Utility: F1 at startup
- ➪ Diagnostics (PC-Doctor™): F2 at startup
- ➪ System Partition Boot: ALT+F1 at startup
- ➪ Network Boot: F12 at startup
- ➪ Operator Information Panel in front
- ➪ LSI Logic Configuration Utility: CTRL+C at startup
- ➪ Includes two line cords (9 ft 110v cable with NEMA plug and 9 ft universal interrack HV cable with IEC plug)
- ➪ Predictive Failure Analysis® on processor(s), voltage regulator modules, memory, fans, power supply, and disk options

Maximum internal disk capacity[13] (model dependent):
293.6GB with two 146.8GB SL SCSI disks or
240GB with two 120GB EIDE disks

See footnotes for important warranty information
• = Hot-swap in some models

(X335B) © IBM Corp. April 2003

☞ US models announced April 15, 2003; previous models on February 18, 2003
✍ 533Mhz FSB models may use 400Mhz FSB processors. 400Mhz FSB models may not use 533Mhz FSB processors.

IBM® Type-model	Qty x Processor	L2 cache	Memory	Memory type	Disk	Disk controller	Hot-swap or fixed disk bays	Mech- anical	Slots x bays	Ethernet	Limited warranty[3]	Available date
✂ 8676-41X	1 x Xeon™ 2.0GHz	512KB	512MB	Chipkill™	None (open)	Ultra320	2 hot-swap	1U[4] rack	2x4	2 x Gigabit	3 year	Aug 2002
✂ 8676-42X	1 x Xeon 2.0GHz	512KB	512MB	Chipkill	40GB[2] EIDE	EIDE	2 fixed	1U rack	2x4	2 x Gigabit	3 year	Aug 2002
8676-61X	1 x Xeon 2.4GHz	512KB	512MB	Chipkill	None (open)	Ultra320	2 hot-swap	1U rack	2x4	2 x Gigabit	3 year	Aug 2002
8676-62X	1 x Xeon 2.4GHz	512KB	512MB	Chipkill	40GB EIDE	EIDE	2 fixed	1U rack	2x4	2 x Gigabit	3 year	Aug 2002

Positioning	*A highly manageable, ultra-dense 1U, 2-way server that delivers performance computing in space-constrained environments*
Processor(s)	**1 x Intel® Xeon 2.0 or 2.4GHz**[1] with 400MHz frontside bus / Hyper-Threading technology
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 603-pin micro-PGA ZIF sockets, four memory DIMM slots, connector for one PCI-X slot, riser for one PCI-X slot, and integrated SCSI, ethernet, graphics

Memory	**512MB** std / 8GB max[13] / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)

SCSI disk controller	*All (not used on EIDE models):* **LSI Logic® 53C1020** / **Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X Bus B / supports **RAID-1 mirroring** (Embedded Mirroring) with two SCSI disks in front bays / one 16-bit internal channel /16-bit 68-pin LVD cable from systemboard to backplane for two disks/ no external connector
IDE controller / cable	*All:* Enhanced IDE ATA-100 controller in CSB5 South Bridge / two connectors on planar / one 1-drop IDE cable (CD-ROM) *EIDE models:* One 2-drop EIDE cable to two disk bays / one 1-drop EIDE cable to CD-ROM
Disk - capacity	*SCSI models:* none standard / supports up to 15000 rpm disks; *EIDE models:* 40GB / 7200 rpm / ATA-100 / 8.7ms seek
Disk - bays	*SCSI models:* two hot-swap / 80-pin SCA-2 connectors / filler panels in each disk bay / **all disk bays Ultra320-enabled**

Mechanical	**EIA 19" Rack (1U**[4]**)** / rack-mount only / supported in 26" deep racks such as the IBM NetBAY™ Rack products
Architecture / chipsets	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / one CIOB-X2 I/O Bridge (IMB2 bus to Host Bridge for PCI-X Bus A with slot 1 and dual ethernet and PCI-X Bus B with slot 2 and Ultra320 / CSB5 South Bridge (Thin IMB bus to Host Bridge for PCI 2.2 Bus C with graphics controller, EIDE, USB, SMBus, LPC bus to Super I/O) / National Semiconductor® PC87417 Super I/O chip
Bus slots	(See below) two available PCI-X 1.0 / no hot-swap Active™ PCI slots

Ethernet controllers	Two gigabit 10/100/1000 ethernet ports / Broadcom BCM5703 / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz Bus A / full duplex / Wake on LAN® / Alert Standard Format 1.0 / two rear RJ-45 ports
CD-ROM / diskette	24X-10X[6] CD-ROM / IDE; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* one USB (Vers 1.1), C2T in, C2T out, serial (9-pin), two ethernet (RJ-45), one RS-485 (sys mgmt) / no parallel port
Front ports / graphics	*Front:* two USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus
Console interconnects	C2T Interconnect™ cable (10 inch, 245mm) is standard (Keyboard Video Mouse (KVM) chaining cable) / one Cable Chain Technology Cable Kit required at end of chain (a cable with separate keyboard, mouse, monitor connectors)

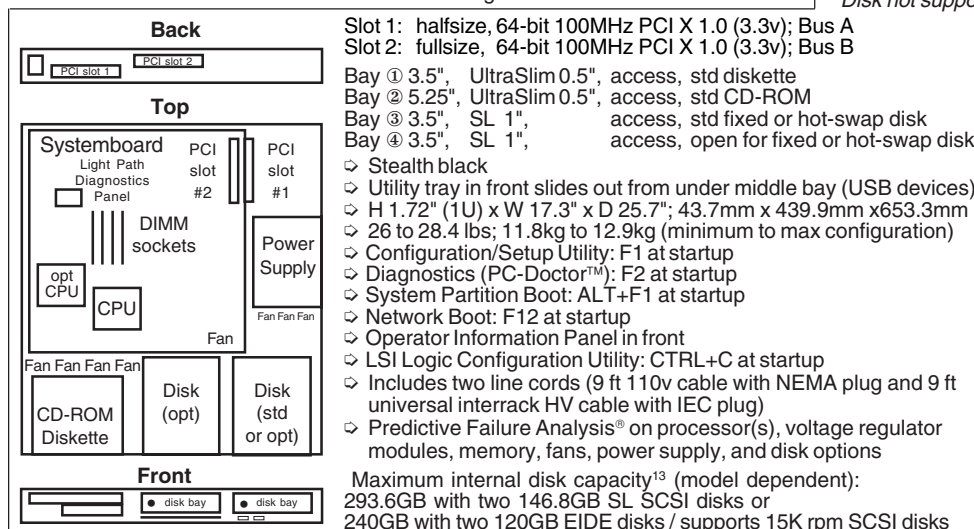|	
Systems mgmt	**IBM Integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, memory, optional disks, fans, power supply / support for optional Remote Supervisor Adapter with 20-pin conn on planar for continuous pwr (no ext pwr req)
Diagnostics	**Light Path Diagnostics**™ (LED lights indicate failed component) and on-board diagnostics (via PC-Doctor in BIOS)

Xeon DP 2.0GHz/512KB L2 Cache Proc Upg	59P5100
Xeon DP 2.4GHz/512KB L2 Cache Proc Upg	59P5102
512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5040
80GB ATA-100 EIDE HDD*	09N4226
36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD*	06P5776
Remote Supervisor Adapter	09N7585
ServeRAID™-4Mx Ultra160 SCSI Adapter	06P5736
IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
xSeries Cable Chain Technology Cable Kit (2 meter breakout cable and2 meter KVM chaining cable)	06P4792
NetBAY ACT Local Console Manager	1735L04

* Disk not supported in all x335 systems

Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode
Software	**ServerGuide**™ (CD-ROM installation and configuration utilities), IBM Director™, and others

Cooling fans	Eight fans (five for system, three on power supply) / variable speed / not redundant or hot-swap
Power supply	332 watt / universal / auto-sensing / auto-restart support
Prerequisites	Monitor, keyboard, mouse, rack, disk (some), operating sys, one Cable Chain Technology (C2T) Kit per chain of servers or NetBAY ACT CAT-5 chaining solutions

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Back

PCI slot 1   PCI slot 2

Top

Systemboard
Light Path Diagnostics Panel
PCI slot #2
PCI slot #1
DIMM sockets
Power Supply
opt CPU
CPU
Fan
Fan Fan Fan
Fan Fan Fan Fan
CD-ROM Diskette
Disk (opt)
Disk (std or opt)

Front

● disk bay   ● disk bay

Slot 1: halfsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus A
Slot 2: fullsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus B

Bay ① 3.5",   UltraSlim 0.5",   access, std diskette
Bay ② 5.25", UltraSlim 0.5",   access, std CD-ROM
Bay ③ 3.5",   SL 1",   access, std fixed or hot-swap disk
Bay ④ 3.5",   SL 1",   access, open for fixed or hot-swap disk

- ⇨ Stealth black
- ⇨ Utility tray in front slides out from under middle bay (USB devices)
- ⇨ H 1.72" (1U) x W 17.3" x D 25.7"; 43.7mm x 439.9mm x653.3mm
- ⇨ 26 to 28.4 lbs; 11.8kg to 12.9kg (minimum to max configuration)
- ⇨ Configuration/Setup Utility: F1 at startup
- ⇨ Diagnostics (PC-Doctor™): F2 at startup
- ⇨ System Partition Boot: ALT+F1 at startup
- ⇨ Network Boot: F12 at startup
- ⇨ Operator Information Panel in front
- ⇨ LSI Logic Configuration Utility: CTRL+C at startup
- ⇨ Includes two line cords (9 ft 110v cable with NEMA plug and 9 ft universal interrack HV cable with IEC plug)
- ⇨ Predictive Failure Analysis® on processor(s), voltage regulator modules, memory, fans, power supply, and disk options

Maximum internal disk capacity[13] (model dependent):
293.6GB with two 146.8GB SL SCSI disks or
240GB with two 120GB EIDE disks / supports 15K rpm SCSI disks

LIMITED WARRANTY[3]

- ➥ **3 year parts and labor**
- ➥ **International Warranty Service**[3]
- ➥ **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time**[7]
- ➥ **3 year on site warranty service upgrade options (in eligible locations):**[7]
  - **9 hour coverage, Mon-Fri excluding holidays, 4 hour average response** (ServicePac® part num 21P2072)
  - **24 hr x 7 day coverage, 4 hour average response** (ServicePac part number 21P2073)
  - **24 hr x 7 day coverage, 2 hour average response** (ServicePac part number 21P2074)
  - **Other ServicePac options at ibm.com/services/its/us/source/wamomxeu.pdf**
- ➥ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

See footnotes for important warranty information
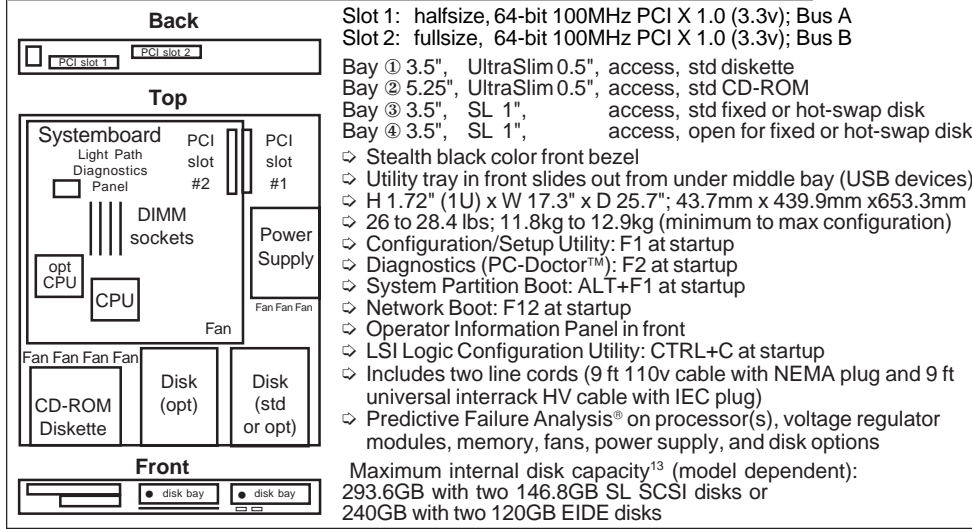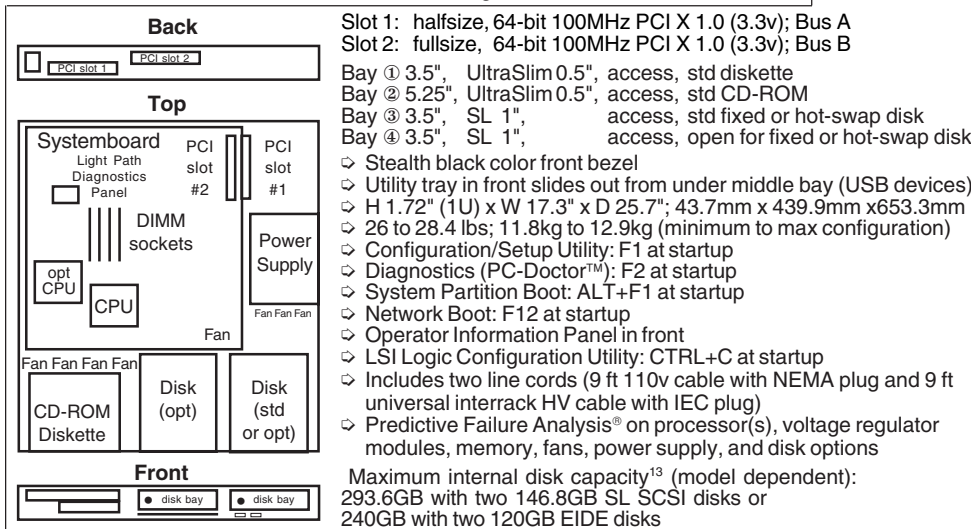
• = Hot-swap in some models
✂ US models announced August 20, 2002; withdrawn effective April 29, 2003

IBM® Type-model	Qty x Processor	L2 cache	FSB MHz	Memory	Memory type	Disk	Disk controller	Hot-swap or fixed disk bays	Slots x bays	Ethernet	Limited warranty[3]	Available date
8676-71X	1 x Xeon™ 2.6GHz	512KB	400⌂	512MB	Chipkill™	None (open)	Ultra320	2 hot-swap	2x4	2 x Gigabit	3 year	Aug 2002
8676-72X	1 x Xeon 2.6GHz	512KB	400⌂	512MB	Chipkill	40GB² EIDE	EIDE	2 fixed	2x4	2 x Gigabit	3 year	Aug 2002
✂ 8676-81X	1 x Xeon 2.8GHz	512KB	400⌂	512MB	Chipkill	None (open)	Ultra320	2 hot-swap	2x4	2 x Gigabit	3 year	Nov 2002
✂ 8676-82X	1 x Xeon 2.8GHz	512KB	400⌂	512MB	Chipkill	40GB² EIDE	EIDE	2 fixed	2x4	2 x Gigabit	3 year	Nov 2002

Positioning	*A highly manageable, ultra-dense 1U, 2-way server that delivers performance computing in space-constrained environments*
Processor(s)	**1 x Intel® Xeon® 2.6 or 2.8GHz**[1] with 400MHz frontside bus / Hyper-Threading technology
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 603-pin micro-PGA ZIF sockets, four memory DIMM slots, connector for one PCI-X slot, riser for one PCI-X slot, and integrated SCSI, ethernet, graphics
Memory	**512MB** std / 8GB max[13] / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
SCSI disk controller	*All (not used on EIDE models):* **LSI Logic® 53C1020 / Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X Bus B / supports **RAID-1 mirroring** (Embedded Mirroring) with two SCSI disks in front bays / one 16-bit internal channel / 16-bit 68-pin LVD cable from systemboard to backplane for two disks / no external connector
IDE controller / cable	*All:* Enhanced IDE ATA-100 controller in CSB5 South Bridge / two connectors on planar / one 1-drop IDE cable (CD-ROM) *EIDE models:* One 2-drop EIDE cable to two disk bays / one 1-drop EIDE cable to CD-ROM
Disk - capacity	*SCSI models:* none standard / supports up to 15000 rpm disks; *EIDE models:* 40GB / 7200 rpm / ATA-100 / 8.7ms seek
Disk - bays	*SCSI models:* two hot-swap / 80-pin SCA-2 connectors / filler panels in each disk bay / **all disk bays Ultra320-enabled**
Mechanical	**EIA 19" Rack (1U⁴)** / rack-mount only / supported in 26" deep racks such as the IBM NetBAY™ Rack products
Architecture / chipsets	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / one CIOB-X2 I/O Bridge (IMB2 bus to Host Bridge for PCI-X Bus A with slot 1 and dual ethernet and PCI-X Bus B with slot 2 and Ultra320 / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2 Bus C with graphics controller, EIDE, USB, SMBus, LPC bus to Super I/O) / National Semiconductor® PC87417 Super I/O chip
Bus slots	(See below) two available PCI-X 1.0 / no hot-swap Active™ PCI slots
Ethernet controllers	Two gigabit 10/100/1000 ethernet ports / Broadcom BCM5703 / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz Bus A / full duplex / Wake on LAN® / Alert Standard Format 1.0 / two rear RJ-45 ports
CD-ROM / diskette	24X-10X⁶ CD-ROM / IDE; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* one USB (Vers 1.1), C2T in, C2T out, serial (9-pin), two ethernet (RJ-45), one RS-485 (sys mgmt) / no parallel port
Front ports / graphics	*Front:* two USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus
Console interconnects	C2T Interconnect™ cable (10 inch, 245mm) is standard (Keyboard Video Mouse (KVM) chaining cable) / one Cable Chain Technology Cable Kit required at end of chain (a cable with separate keyboard, mouse, monitor connectors)
Systems mgmt	**IBM Integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, memory, optional disks, fans, power supply / support for optional Remote Supervisor Adapter with 20-pin conn on planar for continuous pwr (no ext pwr req)
Diagnostics	**Light Path Diagnostics**™ (LED lights indicate failing component) and on-board diagnostics (via PC-Doctor in BIOS)
Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode
Software	**ServerGuide**™ (CD-ROM installation and configuration utilities), IBM Director™, and others
Cooling fans	Eight fans (five for system, three on power supply) / variable speed / not redundant or hot-swap
Power supply	332 watt / universal / auto-sensing / auto-restart support
Prerequisites	Monitor, keyboard, mouse, rack, disk (some), operating sys, one Cable Chain Technology (C2T) Kit per chain of servers or NetBAY ACT CAT-5 chaining solutions

Xeon 2.6GHz/512KB L2 Cache Proc Upg	02R8957
Xeon 2.8GHz/512KB L2 Cache Proc Upg	02R8958
Xeon 2.8BGHz/512KB L2 Cache Proc Upg	73P6382
512MB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5040
80GB ATA-100 EIDE HDD*	09N4226
36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD*	06P5776
Remote Supervisor Adapter	09N7585
ServeRAID™-4Mx Ultra160 SCSI Adapter	06P5736
xSeries Cable Chain Technology Cable Kit (2M breakout cable and 2M KVM chaining cable)	06P4792
NetBAY ACT Local Console Manager	1735L04
Disk not supported in all x335 systems	

Back

Slot 1: halfsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus A
Slot 2: fullsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus B

Top

Bay ① 3.5", UltraSlim 0.5", access, std diskette
Bay ② 5.25", UltraSlim 0.5", access, std CD-ROM
Bay ③ 3.5", SL 1", access, std fixed or hot-swap disk
Bay ④ 3.5", SL 1", access, open for fixed or hot-swap disk

➾ Stealth black color front bezel
➾ Utility tray in front slides out from under middle bay (USB devices)
➾ H 1.72" (1U) x W 17.3" x D 25.7"; 43.7mm x 439.9mm x653.3mm
➾ 26 to 28.4 lbs; 11.8kg to 12.9kg (minimum to max configuration)
➾ Configuration/Setup Utility: F1 at startup
➾ Diagnostics (PC-Doctor™): F2 at startup
➾ System Partition Boot: ALT+F1 at startup
➾ Network Boot: F12 at startup
➾ Operator Information Panel in front
➾ LSI Logic Configuration Utility: CTRL+C at startup
➾ Includes two line cords (9 ft 110v cable with NEMA plug and 9 ft universal interrack HV cable with IEC plug)
➾ Predictive Failure Analysis® on processor(s), voltage regulator modules, memory, fans, power supply, and disk options

Front

Maximum internal disk capacity[13] (model dependent):
293.6GB with two 146.8GB SL SCSI disks or
240GB with two 120GB EIDE disks

See footnotes for important warranty information
• = Hot-swap in some models
✂ US models announced on November 19, 2002; withdrawn effective September 26, 2003
⌂ 533Mhz FSB models may use 400Mhz FSB processors **but** 400Mhz FSB models may not use 533Mhz FSB processors.

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IBM® Type-model	Qty x Processor	L2 cache	L3 cache	Memory	Memory type	Disk	Disk controller	Power Supply	Disk bays	Slots x bays	Ethernet	Limited warranty[3]	Available date
8676-11X	1 x Xeon 2.8B GHz	512KB	0MB	512MB	Chipkill	None (open)	Ultra320	332W	2 hot-swap	2x4	2 x Gigabit	3 year	May 2003
8676-12X	1 x Xeon 2.8B GHz	512KB	0MB	512MB	Chipkill	40GB[2] EIDE	EIDE	332W	2 fixed	2x4	2 x Gigabit	3 year	May 2003
8676-21X	1 x Xeon 3.06 GHz	512KB	0MB	512MB	Chipkill	None (open)	Ultra320	332W	2 hot-swap	2x4	2 x Gigabit	3 year	Apr 2003
8676-22X	1 x Xeon 3.06 GHz	512KB	0MB	512MB	Chipkill	40GB[2] EIDE	EIDE	332W	2 fixed	2x4	2 x Gigabit	3 year	May 2003
☞ 8676-G1X	1 x Xeon 3.2 GHz	512KB	1MB	1GB	Chipkill	None (open)	Ultra320	332W	2 hot-swap	2x4	2 x Gigabit	3 year	Nov 2003
☞ 8676-G2X	1 x Xeon 3.2 GHz	512KB	1MB	1GB	Chipkill	80GB[2] EIDE	EIDE	411W	2 fixed	2x4	2 x Gigabit	3 year	Nov 2003

Positioning	*A highly manageable, ultra-dense 1U, 2-way server that delivers performance computing in space-constrained environments*
Processor(s)	Up to **1 x Intel® Xeon 3.2GHz**[1] with 533MHz ✍ frontside bus / Hyper-Threading technology
Cache	**512KB L2 cache** on all models / **1MB L3 cache** on some models / on die of processor / at processor speed
SMP support	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 603-pin micro-PGA ZIF sockets, four memory DIMM slots, connector for one PCI-X slot, riser for one PCI-X slot, and integrated SCSI, ethernet, graphics
Memory	**512MB or 1GB** std / 8GB max[13] / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill™** (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
SCSI disk controller	*All (not used on EIDE models):* **LSI Logic® 53C1020** / **Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X Bus B / supports **RAID-1 mirroring** (Embedded Mirroring) with two SCSI disks in front bays / one 16-bit internal channel / 16-bit 68-pin LVD cable from systemboard to backplane for two disks / no external connector
IDE controller / cable	*All:* Enhanced IDE ATA-100 controller in CSB5 South Bridge / two connectors on planar / one 1-drop IDE cable (CD-ROM) *EIDE models:* One 2-drop EIDE cable to two disk bays / one 1-drop EIDE cable to CD-ROM
Disk - capacity	*SCSI models:* none standard / supports up to 15000 rpm disks; *EIDE models:* 40GB / 7200 rpm / ATA-100 / 8.7ms seek
Disk - bays	*SCSI models:* two hot-swap / 80-pin SCA-2 connectors / filler panels in each disk bay / **all disk bays Ultra320-enabled**
Mechanical	**EIA 19" Rack (1U[4])** / rack-mount only / supported in 26" deep racks such as the IBM NetBAY™ Rack products
Architecture / chipsets	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / one CIOB-X2 I/O Bridge (IMB2 bus to Host Bridge for PCI-X Bus A with slot 1 and dual ethernet and PCI-X Bus B with slot 2 and Ultra320 / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2 Bus C with graphics controller, EIDE, USB, SMBus, LPC bus to Super I/O) / National Semiconductor® PC87417 Super I/O chip
Bus slots	(See below) two available PCI-X 1.0 / no hot-swap Active™ PCI slots
Ethernet controllers	Two gigabit 10/100/1000 ethernet ports / Broadcom BCM5703 / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz Bus A / full duplex / Wake on LAN® / Alert Standard Format 1.0 / two rear RJ-45 ports
CD-ROM / diskette	24X-10X[6] CD-ROM / IDE; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* one USB (Vers 1.1), C2T in, C2T out, serial (9-pin), two ethernet (RJ-45), one RS-485 (sys mgmt) / no parallel port
Front ports / graphics	*Front:* two USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus
Console interconnects	C2T Interconnect™ cable (10 inch, 245mm) is standard (Keyboard Video Mouse (KVM) chaining cable) / one Cable Chain Technology Cable Kit required at end of chain (a cable with separate keyboard, mouse, monitor connectors)
Systems mgmt	**IBM Integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, memory, optional disks, fans, power supply / support for optional Remote Supervisor Adapter with 20-pin conn on planar for continuous pwr (no ext pwr req)
Diagnostics	**Light Path Diagnostics™** (LED lights indicate failing component) and on-board diagnostics (via PC-Doctor in BIOS)
Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode
Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director™, and others
Cooling fans	Eight fans (five for system, three on power supply) / variable speed / not redundant or hot-swap
Power supply	332 or 411 watt fixed / universal / auto-sensing / auto-restart
Prerequisites	Monitor, keyboard, mouse, rack, disk (some), operating sys, one Cable Chain Technology (C2T) Kit per chain of servers or NetBAY ACT CAT-5 chaining solutions

Xeon 2.8BGHz/512KB L2 Cache Proc Upg	73P6382
Xeon 3.06GHz/512KB L2 Cache Proc Upg	02R8959
Xeon 3.2GHz/512KB L2/1MB L3 Proc Upg	13N0661
512MB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5038
1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5040
80GB ATA-100 EIDE HDD*	09N4226
36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD*	06P5776
Remote Supervisor Adapter	09N7585
ServeRAID™-4Mx Ultra160 SCSI Adapter	06P5736
xSeries Cable Chain Technology Cable Kit	06P4792
NetBAY ACT Local Console Manager	1735L04
* Disk not supported in all x335 systems	

Back

PCI slot 1 **PCI slot 2**

Top

Systemboard — Light Path Diagnostics Panel / PCI slot #2 / PCI slot #1 / DIMM sockets / opt CPU / CPU / Power Supply / Fan / Fan Fan Fan / Fan Fan Fan Fan / CD-ROM Diskette / Disk (opt) / Disk (std or opt)

Front

● disk bay   ● disk bay

Slot 1: halfsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus A
Slot 2: fullsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus B

Bay ① 3.5", UltraSlim 0.5", access, std diskette
Bay ② 5.25", UltraSlim 0.5", access, std CD-ROM
Bay ③ 3.5", SL 1", access, std fixed or hot-swap disk
Bay ④ 3.5", SL 1", access, open for fixed or hot-swap disk

- Stealth black color front bezel
- Utility tray in front slides out from under middle bay (USB devices)
- H 1.72" (1U) x W 17.3" x D 25.7"; 43.7mm x 439.9mm x653.3mm
- 26 to 28.4 lbs; 11.8kg to 12.9kg (minimum to max configuration)
- Configuration/Setup Utility: F1 at startup
- Diagnostics (PC-Doctor™): F2 at startup
- System Partition Boot: ALT+F1 at startup
- Network Boot: F12 at startup
- Operator Information Panel in front
- LSI Logic Configuration Utility: CTRL+C at startup
- Includes two line cords (9 ft 110v cable with NEMA plug and 9 ft universal interrack HV cable with IEC plug)
- Predictive Failure Analysis® on processor(s), voltage regulator modules, memory, fans, power supply, and disk options

Maximum internal disk capacity[13] (model dependent):
293.6GB with two 146.8GB SL SCSI disks or
240GB with two 120GB EIDE disks

See footnotes for important warranty information

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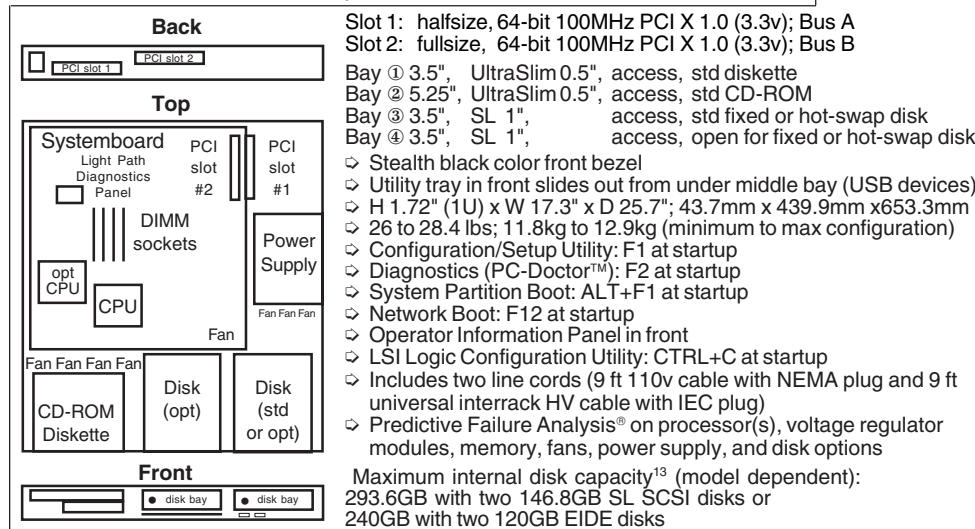
● = Hot-swap in some models
☞ US models announced April 15, 2003; previous models on February 18, 2003
✍ 533Mhz FSB models may use 400Mhz FSB processors **but** 400Mhz FSB models may not use 533Mhz FSB processors.

IBM @server™ xSeries™ 335 (DC power model)

IBM® Type-model	Qty x Processor	L2 cache	FSB MHz	Memory	Memory type	Disk	Disk controller	Hot-swap or fixed disk bays	Slots x bays	Ethernet	Limited warranty[3]	Available date
8676-1AX	1 x Xeon 2.8B GHz	512KB	533	512MB	Chipkill	None (open)	Ultra320	2 hot-swap	2x4	2 x Gigabit	3 year	Mar 2003

DC power models are designed for network infrastructures requiring network equipment to support DC power environments

Positioning	*A highly manageable, ultra-dense 1U, 2-way server that delivers performance computing in space-constrained environments*
Processor(s)	**1 x Intel® Xeon 2.8BGHz**[1] with 533MHz frontside bus / Hyper-Threading technology
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 603-pin micro-PGA ZIF sockets, four memory DIMM slots, connector for one PCI-X slot, riser for one PCI-X slot, and integrated SCSI, ethernet, graphics
Memory	**512MB** std / 8GB max[13] / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
SCSI disk controller	*All (not used on EIDE models):* **LSI Logic® 53C1020** / **Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X Bus B / supports **RAID-1 mirroring** (Embedded Mirroring) with two SCSI disks in front bays / one 16-bit internal channel / 16-bit 68-pin LVD cable from systemboard to backplane for two disks / no external connector
IDE controller / cable	*All:* Enhanced IDE ATA-100 controller in CSB5 South Bridge / two connectors on planar / one 1-drop IDE cable (CD-ROM) *EIDE models:* One 2-drop EIDE cable to two disk bays / one 1-drop EIDE cable to CD-ROM
Disk - capacity	*SCSI models:* none standard / supports up to 15000 rpm disks; *EIDE models:* 40GB / 7200 rpm / ATA-100 / 8.7ms seek
Disk - bays	*SCSI models:* two hot-swap / 80-pin SCA-2 connectors / filler panels in each disk bay / **all disk bays Ultra320-enabled**
Mechanical	**EIA 19" Rack (1U**[4]**)** / rack-mount only / supported in 26" deep racks such as the IBM NetBAY™ Rack products
Architecture / chipsets	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / one CIOB-X2 I/O Bridge (IMB2 bus to Host Bridge for PCI-X Bus A with slot 1 and dual ethernet and PCI-X Bus B with slot 2 and Ultra320 / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2 Bus C with graphics controller, EIDE, USB, SMBus, LPC bus to Super I/O) / National Semiconductor® PC87417 Super I/O chip
Bus slots	(See below) two available PCI-X 1.0 / no hot-swap Active™ PCI slots
Ethernet controllers	Two gigabit 10/100/1000 ethernet ports / Broadcom BCM5703 / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz Bus A / full duplex / Wake on LAN® / Alert Standard Format 1.0 / two rear RJ-45 ports
CD-ROM / diskette	24X-10X[6] CD-ROM / IDE; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* one USB (Vers 1.1), C2T in, C2T out, serial (9-pin), two ethernet (RJ-45), one RS-485 (sys mgmt) / no parallel port
Front ports / graphics	*Front:* two USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus
Console interconnects	C2T Interconnect™ cable (10 inch, 245mm) is standard (Keyboard Video Mouse (KVM) chaining cable) / one Cable Chain Technology Cable Kit required at end of chain (a cable with separate keyboard, mouse, monitor connectors)
Systems mgmt	**IBM Integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, memory, optional disks, fans, power supply / support for optional Remote Supervisor Adapter with 20-pin conn on planar for continuous pwr (no ext pwr req)
Diagnostics	**Light Path Diagnostics**™ (LED lights indicate failing component) and on-board diagnostics (via PC-Doctor in BIOS)

		OPTIONS	
Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode	Xeon 2.8BGHz/512KB L2 Cache Proc Upg	73P6382
		512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
Software	**ServerGuide**™ (CD-ROM installation and configuration utilities), IBM Director™, and others	1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
		2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5040
Cooling fans	Eight fans (five for system, three on power supply) / variable speed / not redundant or hot-swap	36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD	06P5776
		Remote Supervisor Adapter	09N7585
Power supply	**332 watt (-48 to -60 V dc [direct current])** / auto-sensing / supports dual input sources (two power sources) / not redundant / not hot-swap / auto-restart support	ServeRAID™-4Mx Ultra160 SCSI Adapter	06P5736
		Cable Chain Technology (C2T) Cable Kit (2 meter breakout cable and 2 meter KVM chaining cable)	06P4792
Prerequisites	Monitor, keyb., mouse, rack, disk, operating sys, one C2T Kit per chain of servers or NetBAY ACT CAT-5	NetBAY ACT Local Console Manager	1735L04

Back

□ [PCI slot 1] [PCI slot 2]

Top

Systemboard
Light Path Diagnostics Panel
DIMM sockets
opt CPU
CPU
PCI slot #2
PCI slot #1
Power Supply
Fan
Fan Fan Fan
Fan Fan Fan Fan
CD-ROM Diskette
Disk (opt)
Disk (std or opt)

Front

[□ disk bay] [□ disk bay]

Slot 1: halfsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus A
Slot 2: fullsize, 64-bit 100MHz PCI X 1.0 (3.3v); Bus B

Bay ① 3.5", UltraSlim 0.5", access, std diskette
Bay ② 5.25", UltraSlim 0.5", access, std CD-ROM
Bay ③ 3.5", SL 1", access, std fixed or hot-swap disk
Bay ④ 3.5", SL 1", access, open for fixed or hot-swap disk
- ⇨ Stealth black color front bezel
- ⇨ Utility tray in front slides out from under middle bay (USB devices)
- ⇨ H 1.72" (1U) x W 17.3" x D 25.7"; 43.7mm x 439.9mm x653.3mm
- ⇨ 26 to 28.4 lbs; 11.8kg to 12.9kg (minimum to max configuration)
- ⇨ Configuration/Setup Utility: F1 at startup
- ⇨ Diagnostics (PC-Doctor™): F2 at startup
- ⇨ System Partition Boot: ALT+F1 at startup
- ⇨ Network Boot: F12 at startup
- ⇨ Operator Information Panel in front
- ⇨ LSI Logic Configuration Utility: CTRL+C at startup
- ⇨ Includes two line cords (9 ft 110v cable with NEMA plug and 9 ft universal interrack HV cable with IEC plug)
- ⇨ Predictive Failure Analysis® on processor(s), voltage regulator modules, memory, fans, power supply, and disk options

Maximum internal disk capacity[13] (model dependent):
293.6GB with two 146.8GB SL SCSI disks or
240GB with two 120GB EIDE disks

LIMITED WARRANTY[3]
- ➥ **3 year parts and labor**
- ➥ **International Warranty Service**[3]
- ➥ **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time**[7]
- ➥ **On site service upgrade options (in eligible locations):**[7]
  - **3 year IOR 9x5, 4 hr avg response** (ServicePac® part num 21P2072)
  - **3 year IOR 24x7, 4 hr avg response** (ServicePac part num 21P2073)
  - **3 year IOR 24x7, 2 hr avg response** (ServicePac part num 21P2074)
  - **4 year IOR 24x7, 4 hr avg response** (ServicePac part num 69P9244)
  - **5 year IOR 9x5, NBD response** (ServicePac part num 69P9246)
  - **Other ServicePac options at ibm.com/services/its/us/ source/wamomxeu.pdf**
- ➥ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

See footnotes for important warranty information

(X335DC) © IBM Corp. February 2003

• = Hot-swap

☞ US models announced February18, 2003

IBM® Type-model	Qty x Processor	L2 cache	Memory	Ultra160 SCSI disk	SCSI controller	Mech- anical	Slots x bays	Fixed disk bays	Alarm Panel	Power supply	Compliant	Available date
8827-14X	2 x Pentium® III 1.26GHz	512KB	2GB	1 x 36.4GB² 10K	2 x Ultra160	2U⁴ rack	6x4	2 fixed	Yes	DC power	NEBS-3	Apr 2002

DC power models are designed for network infrastructures requiring network equipment to support DC power environments

Positioning	*Network Equipment Building System (NEBS) level 3-compliant for telecommunications carrier-grade environments*
Processor(s)	**2 x Intel® Pentium® III 1.26GHz-S with 133MHz frontside bus**
L2 cache	**512KB** std and max / ECC / at processor speed / processor and L2 cache in Flip Chip Pin Grid Array (FC-PGA2)
Implementation	Motherboard contains two Intel PGA370 sockets, six DIMM sockets, two PCI riser connectors, and integrated subsystems
SMP support	**2-way SMP** via second identical processor is standard
Memory	**2GB std / 6GB¹³ max** / 6 sockets / 4 available (ships with two 1GB DIMMs) / **Error Checking and Correcting** (ECC) memory controller / matched pairs required / two-way interleaving / **SDRAM / 133MHz** / six 168-pin gold-plated sockets / PC133-compliant / supports registered SDRAM ECC DIMMs only
SCSI disk controller	**Adaptec® AHA-7899W / dual channel Wide Ultra160 SCSI controller** (LVD 160MB/sec) / on planar / 64-bit PCI
SCSI channels	*SCSI Channel A:* external 16-bit .8mm VHDCI 68-pin external connector (no cables)
	SCSI Channel B: one internal 16-bit 68-pin LVD cable from controller to two-bay disk drive carrier
SCSI disk	**1 x 36GB** Ultra160 SCSI, 10K rpm, 4.9ms read seek, S.M.A.R.T.⁵
SCSI disk bays	Two fixed disk bays (not hot-swap) in disk drive carrier that slides out from front
IDE controller / cable	EIDE ATA-33 controller in South Bridge / one connector on planar / one 1-drop IDE cable (to CD-ROM)
Mechanical	**EIA 19" Rack (2U⁴) x 20-inch deep**
Rack support	Designed for installation in a two-post, 19" rack unit only (not supported in IBM NetBAY™ Racks) / ships with rack mount kit
PCI bus slots	(See below) three full height full length 64-bit 33MHz slots / three low-profile half length 64-bit 66MHz PCI slots / PCI 2.2 / peer PCI buses / no hot-swap Active™ PCI slots
Chipset	**ServerWorks® III HE-SL chipset** / CNB20HE-SL North Bridge for CIOB and PCI A 32-bit 33MHz (graphics, ethernet, South Bridge) / NB6555 Champion I/O Bridge (CIOB20) for PCI Bus B (slots, SCSI) and C (slots) / CSB5 South Bridge for EIDE, USB, LPC bus for Super I/O National Semiconductor PC8741 (diskette, serial, keyboard) and Baseboard Management Controller
Bays	(See diagram below): 4 bays / two disk bays (not hot-swap) / one CD-ROM bay / one diskette bay
10/100 ethernet	2 x Intel 82550 / on planar / full duplex / supports Wake on LAN®, PXE 2.0 Boot Agent, Adapter Fault Tolerance Failover
CD-ROM / diskette	24X-10X⁶ CD-ROM / multisession / IDE interface / bootable; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	Two USB ports (Version 1.1); RJ-45 serial; PS/2 keyboard; two RJ-45 ethernet; DB-15 graphics; 68-pin SCSI; DB-15 male connector for front panel alarm relay contacts / no parallel port / mouse connects to USB port (or keyboard port with standard Y-splitter cable)
Graphics controller	SVGA / PCI bus / ATI® Rage XL (on planar) / 8MB SDRAM std/max / 1600x1280 at 16M colors at 85Hz / 15-pin D-shell
Security	Power-on password / admin password / unattended boot / selectable boot / boot without keyboard / diskette write protect
Alarm panel	**External alarm panel** in front bezel provides 24x7 surveillance of critical, major and minor errors and power outages / four alarm panel LEDs: power alarm fault, critical alarm fault, major alarm fault, minor alarm fault
Status LEDs	**Operator Information Panel** (in front) / includes switches (NMI, power, reset) and status LEDs (NIC, disk, main power)
Systems mgmt	**Integrated service processor** (Baseboard Management Controller) / on planar / failures or thresholds in fans, memory, processors, temperature, voltage, and power supplies activate alarm panel LEDs /
Diagnostics	LED diagnostics and on-board diagnostics providing an LED map to a failing component
OS support	**Red Hat Linux® 7.1**
Software ship group	**Resource CD** (CD-ROM installation and configuration utilities, Intel Server Control server management software, Product Guide), PC-Doctor™ diagnostics diskette, and IBM Director (on separate CD)

Keyboard / mouse	None (since rack-based)	512MB SDRAM ECC DIMM 133MHz RDIMM	33L3324
Power supply	*Std:* two; *max:* two / accessible from rear /	1GB SDRAM ECC DIMM 133MHz RDIMM	33L3326
	350 watt (-48 to -60 V dc [direct current]) /	36.4GB 10K Ultra160 SCSI SL HDD	06P5751
	supports dual input sources (two power sources) /	IBM E54 (13.8" viewable) FST Monitor (black)	633147N
	redundant / hot-swap / auto-restart support	IBM Sleek Two-Button Mouse (black)	28L3673
		IBM 84-key Space Saver Keyboard (black)	28L3644
Fans	Four fans / multispeed / not hot-swap / not redundant /	Other options at **ibm.com**/pc/us/accessories	
	fan failure signals front panel alarm LED /		
	fan in each power supply / fan on each Pentium III processor		
Prerequisites	Appropriate dc power source and customer supplied wiring, monitor, keyboard, mouse, rack, operating system		

Slot 1: fullsize, 64-bit 33MHz PCI 2.2 (5v), Bus B
Slot 2: fullsize, 64-bit 33MHz PCI 2.2 (5v), Bus B
Slot 3: fullsize, 64-bit 33MHz PCI 2.2 (5v), Bus B
Slot 4: low-profile, 64-bit 66MHz PCI 2.2 (3.3v), Bus C
Slot 5: low-profile, 64-bit 66MHz PCI 2.2 (3.3v), Bus C
Slot 6: low-profile, 64-bit 66MHz PCI 2.2 (3.3v), Bus C

```
 ┌─────────────────────────────┐
 │   CD-ROM                     │
 │   diskette                   │   2U Rack
 │ ┌─────────┐   ┌─────────┐    │
 │ │ disk bay│   │ disk bay│    │
 │ └─────────┘   └─────────┘    │
 └─────────────────────────────┘
```

Bay ① 3.5", 0.5", access, std diskette
Bay ② 3.5", 0.5", access, std CD-ROM
Bay ③ 3.5", SL 1", no access, std disk
Bay ④ 3.5", SL 1", no access, optional disk

⇨ Raven black color (front bezel)
⇨ Configuration/Setup Utility invoked by pressing F2 at startup
⇨ SCSISelect near startup by pressing CTRL+A
⇨ PC-Doctor™ diagnostics on diskette
⇨ Several hardcopy publications
⇨ H 3.5" x W 17.5" x D 20.0"
⇨ H 89 mm x W 445 mm x D 508 mm
⇨ 34 to 37 pounds (15.4 to 16.8 kg)
⇨ IPMI 1.5 and WfM 2.0-compiant

All models: Max int disk capacity: 72.8GB² with two 36.4GB SL disks

LIMITED WARRANTY³
- **1 year parts and labor**
- **International Warranty Service³**
- **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time⁷**
- **1 year on site warranty service upgrade options (in eligible locations):⁷**
  - **9 hr coverage, Mon-Fri excluding holidays, 4 hr response time** (No ServicePac® part number)
  - **24 hr x 7 day coverage, 4 hour average response time** (No ServicePac part number)
  - **24 hr x 7 day coverage, 2 hour average response time** (No ServicePac part number)
- **24x7¹⁴ toll-free support for warranty issues during the warranty period³**

IBM @server™ xSeries™ 345

xREF by eServer Field Skills Enablement Team

IBM® Type-model	Qty x Processor	L2 cache	Memory	Memory type	Disk	SCSI controller	Mechanical	Slots x bays (hot-swap bays)	Power supply	Ethernet	Available date
✂ 8670-11X	1 x Xeon™ 2.0GHz	512KB	512MB	Chipkill™	None	2 x Ultra320	2U[4] rack	5x8 (6 hot-swap)	1 x hot-swap	2 x Gigabit	Jul 2002
✂ 8670-21X	1 x Xeon 2.2GHz	512KB	512MB	Chipkill	None	2 x Ultra320	2U rack	5x8 (6 hot-swap)	1 x hot-swap	2 x Gigabit	Jul 2002
8670-31X	1 x Xeon 2.4GHz	512KB	512MB	Chipkill	None	2 x Ultra320	2U rack	5x8 (6 hot-swap)	1 x hot-swap	2 x Gigabit	Jul 2002

Positioning	*A rack-dense 2-way server delivering high availability, scalability and expandability for application-serving Web environments*
Processor(s)	**1 x Intel® Xeon™ Processor 2.0, 2.2, or 2.4GHz**[1] with 400MHz frontside bus / Hyper-Threading technology
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	**2-way SMP** / up to two Xeon MP Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 603-pin micro-PGA ZIF sockets, four memory DIMM slots, two low-profile PCI-X slots, slot for standard PCI riser card (with two PCI-X slots and one PCI slot), and integrated SCSI, ethernet, graphics

Memory	**512MB** std / 8GB max[13] / two slots used / two slots available / two total power supplies required when using 2GB DIMMs **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)

SCSI disk controller	**LSI Logic® 53C1030** / **dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** (Embedded Mirroring) with up to one hot-spare disk / shared with optional IBM ServeRAID™-6i Controller for low-cost RAID 0, 1, 1E, 5, 00, 10, 1E0, 50 (installed only in Slot 2)
SCSI channels	Two 16-bit channels (one internal and one external) / *SCSI Channel A:* 16-bit 68-pin LVD cable from systemboard to backplane for six disks; *Channel B:* 16-bit 68-pin interface to support external SCSI devices via external SCSI 0.8mm VHDCI connector / supports optional ServeRAID adapters with external connector(s)
IDE controller / cable	Enhanced IDE ATA-100 controller in CSB5 South Bridge / one connector on planar / one 1-drop IDE cable (CD-ROM)
Disk - capacity	None standard / supports 7200-15000 rpm disks / one backplane
Disk - bays	Six hot-swap / 80-pin SCA-2 connectors / filler panels installed in each disk bay / all disk bays Ultra320-enabled

Mechanical	**EIA 19" Rack (2U**[4]**)** / rack-mount only / supported in IBM NetBAY™ Rack products / no rack to tower conversion
Chipset	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / two CIOB-X2 I/O Bridges (IMB2 bus to Host Bridge for PCI Bus A with low profile slots 1, 2, and Ultra320 and ethernet controllers; IMB2 bus to Host Bridge for PCI Bus B with slots 3 and 4 on riser card) / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2 bus C with slot 5 (on riser card) and graphics controller, EIDE, USB, SMBus, LPC bus to Super I/O) / NS PC87417 Super I/O
Bus slots	(See below) Four available PCI-X 1.0 / one available PCI 2.2 32-bit 33MHz slot / no hot-swap Active™ PCI slots

Ethernet controller	Two gigabit 10/100/1000 ethernet ports (dual port) / Intel 82546EB / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format 1.0 / two RJ-45 ports in rear
CD-ROM / diskette	24X-10X[6] CD-ROM / IDE; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* two USB (Vers 1.1), keyboard, mouse, serial (9-pin), graphics (DB-15), two ethernet (RJ-45), two RJ-45 (sys mgmt) / no parallel port
Front port / graphics	*Front:* one USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus

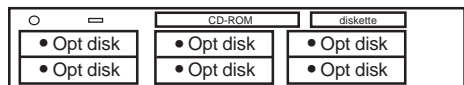|	
Security	Power-on password / administrator password / unattended boot / selectable boot sequence

Systems mgmt	**IBM Integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, optional disks, fans, power supp / supports optional Remote Supervisor Adapter with 20-pin connector on riser for continuous power (no ext power reqd)	Xeon DP 2.0GHz/512KB L2 Cache Proc Upg	33P2931
		Xeon DP 2.2GHz/512KB L2 Cache Proc Upg	33P2932
		Xeon DP 2.4GHz/512KB L2 Cache Proc Upg	37L3533
		512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
		1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
Diagnostics	**Light Path Diagnostics**™ panel providing LED map to failing part (under top cover) / Information LED Panel in front	2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM*	33L5039
		IBM ServeRAID-6i Controller (adapter for slot 2)	71P8595
Software	**ServerGuide**™ (CD-ROM installation and configuration utilities), IBM Director systems mgmt, others	IBM Remote Supervisor Adapter (PCI adapter)	09N7585
		36.4GB 15K-2 80 Ultra320 SCSI Hot-Swap SL HDD	06P5776
Keyboard / mouse	None standard (because rack-based)	73.4GB 10K-5 80 Ultra320 SCSI Hot-Swap SL HDD	32P0727
Power supply	*Std:* one 350 watt / hot-swap; *Max:* two 350 watt / hot-swap /	146.8GB 10K-5 80 Ultra320 SCSI Hot-Swap SL HDD	32P0728
	All: rear access / redundant with two power supplies / worldwide / voltage-sensing / auto-restart	350W Hot-Swap Power Supply (with three fans)	59P4057
		NetBAY 250mm KVM Conversion Option	32P1636
Fans	*Std:* five fans; *Max:* eight (three fans with optional second power supply) / redundant with eight fans installed;	NetBAY Local Console Manager	1735L04
		NetBAY Remote Console Manager	1735R16
	All: variable speed / hot-swap / PFA	Other options at **ibm.com**/pc/us/accessories	
Prerequisites	Monitor, keyboard, mouse, SCSI disk, rack	*additional 59P4057 required when installing 33L5040	

Slot 1: low-profile, 64-bit 100MHz 3.3v PCI-X, not hot, Bus A
Slot 2: low-profile, 64-bit 100MHz 3.3v PCI-X, not hot, Bus A*
Slot 3: full, 64-bit 133MHz 3.3v PCI-X, not hot-swap, Bus B
Slot 4: full, 64-bit 133MHz 3.3v PCI-X, not hot-swap, Bus B
Slot 5: half, 32-bit 33MHz 5v PCI 2.2, not hot-swap, Bus C**
* Extended slot for optional IBM ServeRAID-5i Controller
** Primarily for optional Remote Supervisor Adapter

○ ▭ CD-ROM diskette
• Opt disk | • Opt disk | • Opt disk
• Opt disk | • Opt disk | • Opt disk
2U Rack

Bay ① 3.5", 0.5", access, std diskette
Bay ② 5.25", 0.5" access, std CD-ROM
Bay ③ 3.5", SL 1", access, hot-swap, open for disk
Bay ④ 3.5", SL 1", access, hot-swap, open for disk
Bay ⑤ 3.5", SL 1", access, hot-swap, open for disk
Bay ⑥ 3.5", SL 1", access, hot-swap, open for disk
Bay ⑦ 3.5", SL 1", access, hot-swap, open for disk
Bay ⑧ 3.5", SL 1", access, hot-swap, open for disk

Bays 3 through 8 support six SL disks
via SCA-2 connectors

⇨ Quick release adapter slots (no screws)
⇨ Configuration/Setup Utility: F1 at startup
⇨ Diagnostics (PC-Doctor™): F2 at startup
⇨ System Partition Boot: ALT+F1 at startup
⇨ Network Boot: F12 at startup
⇨ LSI Logic Configuration Utility: CTRL+C at startup
⇨ Front indicators LEDs: Power-on LED, SCSI bus activity LED, system identification LED, information LED, and system-error LED
⇨ Predictive failure analysis on disk options, memory, processors, VRMs, power supplies, and fans in conjunction with IBM Director can alert the system administrator of an imminent component failure
⇨ Rack: H 3.36" x W 17.5" x D 27.5" H 85.4mm x W 443.6mm x D 698mm
⇨ 44 to 62 lbs / 21.09 to 28.12 kg
⇨ Stealth black color

All models: Max int disk capacity: 880.0GB[2] with six 146.8GB SL disks

LIMITED WARRANTY[3]
⇨ **3 year parts and labor**
⇨ **International Warranty Service**[3]
⇨ **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time**[7]
⇨ **3 year on site warranty service upgrade options (in eligible locations):**[7]
 • **9 hr coverage, Mon-Fri excluding holidays, 4 hr response time** (ServicePac® 21P2077)
 • **24 hr x 7 day coverage, 4 hour average response time** (ServicePac 21P2078)
 • **24 hr x 7 day coverage, 2 hour average response time** (ServicePac 21P2093)
 • **Other ServicePac options at ibm.com/services/its/us/source/wamomxeu.pdf**
⇨ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

See footnotes for important warranty information   • = Hot-swap   (X345) © IBM Corp. July 2002
US models announced July 16, 2002
✂ = 21X model withdrawn from marketing effective January 2003; 11X model withdrawn effective April 29, 2003

IBM® Type-model	Qty x Processor	L2 Cache	L3 Cache	Memory	Disk	SCSI controller	Form Factor	Slots x bays (hot-swap bays)	Power supply	Ethernet	Available date
8670-51X	1 x Xeon™ 2.67GHz	512KB	0MB	512MB	None	2 x Ultra320	2U⁴	5x8 (6 hot-swap)	1 x 350W hot-swap	2 x Gigabit	Feb 2003
8670-61X	1 x Xeon 2.8BGHz	512KB	0MB	512MB	None	2 x Ultra320	2U	5x8 (6 hot-swap)	1 x 350W hot-swap	2 x Gigabit	Feb 2003
8670-71X	1 x Xeon 3.06GHz	512KB	0MB	512MB	None	2 x Ultra320	2U	5x8 (6 hot-swap)	1 x 512W hot-swap	2 x Gigabit	May2003
8670-91X	1 x Xeon 3.06GHz	512KB	1MB	512MB	None	2 x Ultra320	2U	5x8 (6 hot-swap)	1 x 512W hot-swap	2 x Gigabit	Aug 2003
☞ 8670-G1X	1 x Xeon 3.2GHz	512KB	1MB	1GB	None	2 x Ultra320	2U	5x8 (6 hot-swap)	1 x 512W hot-swap	2 x Gigabit	Nov2003

Positioning	*A rack-dense 2-way server delivering high availability, scalability and expandability for application-serving Web environments*
Processor(s)	Up to **1 x Intel® Xeon™ Processor 3.2Ghz** with 533MHz frontside bus / Hyper-Threading technology
L2/L3 cache	**512KB** L2 Cache / Up to **1MB** L3 Cache / Both on die of processor / Both at processor speed
SMP support	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Systemboard contains two Intel 603-pin micro-PGA ZIF sockets, four memory DIMM slots, two low-profile PCI-X slots, slot for standard PCI riser card (with two PCI-X slots and one PCI slot), and integrated SCSI, ethernet, graphics
Memory	**512MB or 1GB** std / 8GB max / two slots used / two slots available / two total power supplies required when using 2GB DIMMs **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 133MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
SCSI disk controller	**LSI Logic® 53C1030** / **dual channel Ultra320 SCSI controller** (LVD 320MB/sec) / on planar / 64-bit 100MHz PCI-X / supports **RAID-1 mirroring** (Embedded Mirroring) with up to one hot-spare disk / shared with optional IBM ServeRAID™-6i Controller for low-cost RAID 0, 1, 1E, 5, 00, 10, 1E0, 50 (installed only in Slot 2)
SCSI channels	Two 16-bit channels (one internal and one external) / *SCSI Channel A:* 16-bit 68-pin LVD cable from systemboard to backplane for six disks; *Channel B:* 16-bit 68-pin interface to support external SCSI devices via external SCSI 0.8mm VHDCI connector / supports optional ServeRAID adapters with external connector(s)
IDE controller / cable	Enhanced IDE ATA-100 controller in CSB5 South Bridge / one connector on planar / one 1-drop IDE cable (CD-ROM)
Disk - capacity	None standard / supports 7200-15000 rpm disks / one backplane
Disk - bays	Six hot-swap / 80-pin SCA-2 connectors / filler panels installed in each disk bay / all disk bays Ultra320-enabled
Mechanical	**EIA 19" Rack (2U⁴)** / rack-mount only / supported in IBM NetBAY™ Rack products / no rack to tower conversion
Chipset	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / two CIOB-X2 I/O Bridges (IMB2 bus to Host Bridge for PCI Bus A with low profile slots 1, 2, and Ultra320 and ethernet controllers; IMB2 bus to Host Bridge for PCI Bus B with slots 3 and 4 on riser card) / CSB5 South Bridge (Thin IMB to Host Bridge for PCI 2.2 bus C with slot 5 (on riser card) and graphics controller, EIDE, USB, SMBus, LPC bus to Super I/O) / NS PC87417 Super I/O
Bus slots	(See below) Four available PCI-X 1.0 / one available PCI 2.2 32-bit 33MHz slot / no hot-swap Active™ PCI slots
Ethernet controller	Two gigabit 10/100/1000 ethernet ports (dual port) / Intel 82546EB / two full gigabit ethernet MAC and PHY layer functions / on planar / PCI-X 64-bit 100MHz / full duplex / Wake on LAN® / Alert Standard Format 1.0 / two RJ-45 ports in rear
CD-ROM / diskette	24X-10X⁶ CD-ROM / IDE; *Diskette:* 3.5" 1.44MB diskette drive / dust cover
Rear ports	*Rear:* two USB (Vers 1.1), keyboard, mouse, serial (9-pin), graphics (DB-15), two ethernet (RJ-45), two RJ-45 (sys mgmt) / no parallel port
Front port / graphics	*Front:* one USB (Vers 1.1); *Graphics:* SVGA / ATI® Rage XL / on planar / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus
Security	Power-on password / administrator password / unattended boot / selectable boot sequence

Systems mgmt	**IBM Integrated system management processor** (ISMP) / H8S2148 / on planar / provides system and environmental monitoring such as temp, optional disks, fans, power supp / supports optional Remote Supervisor Adapter with 20-pin connector on riser for continuous power (no ext power reqd)	Xeon 2.67GHz/512KB L2 Cache Proc Upg	71P8966
		Xeon 2.8BGHz/512KB L2 Cache Proc Upg	71P8967
		Xeon 3.06Ghz/512KB L2 Cache Proc Upg	02R1988
		Xeon 3.06Ghz/512KB L2/1MB L3 Cache Proc Upg	88P9677
		Xeon 3.2Ghz/512KB L2/1MB L3 Cache Proc Upg	23K4523
Diagnostics	**Light Path Diagnostics**™ panel providing LED map to failing part (under top cover) / Information LED Panel in front	1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
		2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM*	33L5040
Software	**ServerGuide**™ (CD-ROM installation and configuration utilities) / IBM Director systems mgmt, others	IBM ServeRAID-6i Controller (adapter for slot 2)	71P8595
		IBM Remote Supervisor Adapter (PCI adapter)	09N7585
Keyboard / mouse	None standard (because rack-based)	73.4GB 10K-5 80 Ultra320 SCSI Hot-Swap SL HDD	32P0727
Power supply	*Std/Max:* one/two 350 or 514 watt hot-swap	146.8GB 10K-5 80 Ultra320 SCSI Hot-Swap SL HDD	32P0728
	All: rear access / redundant with two power supplies / worldwide / voltage-sensing / auto-restart	350W Hot-Swap Power Supply (with three fans)*	59P4057
		514W Hot-Swap Power Supply (3.06Ghz+ Only)*	74P4965
Fans	*Std:* five fans; *Max:* eight (three fans with optional second power supply) / redundant with eight fans installed;	NetBAY Local Console Manager	1735L04
		NetBAY Remote Console Manager	1735R16
	All: variable speed / hot-swap / PFA	Other options at **ibm.com**/pc/us/accessories	
Prerequisites	Monitor, keyboard, mouse, SCSI disk, rack	*additional power supply required when installing 33L5040	

Slot 1: low-profile, 64-bit 100MHz 3.3v PCI-X, not hot, Bus A
Slot 2: low-profile, 64-bit 100MHz 3.3v PCI-X, not hot, Bus A*
Slot 3: full, 64-bit 133MHz 3.3v PCI-X, not hot-swap, Bus B
Slot 4: full, 64-bit 133MHz 3.3v PCI-X, not hot-swap, Bus B
Slot 5: half, 32-bit 33MHz 5v PCI 2.2, not hot-swap, Bus C**
* Extended slot for optional IBM ServeRAID-5i Controller
** Primarily for optional Remote Supervisor Adapter

○ ▭	CD-ROM	diskette
• Opt disk	• Opt disk	• Opt disk
• Opt disk	• Opt disk	• Opt disk

2U Rack

Bay ① 3.5", 0.5", access, std diskette
Bay ② 5.25", 0.5", access, std CD-ROM
Bay ③ 3.5", SL 1", access, hot-swap, open for disk
Bay ④ 3.5", SL 1", access, hot-swap, open for disk
Bay ⑤ 3.5", SL 1", access, hot-swap, open for disk
Bay ⑥ 3.5", SL 1", access, hot-swap, open for disk
Bay ⑦ 3.5", SL 1", access, hot-swap, open for disk
Bay ⑧ 3.5", SL 1", access, hot-swap, open for disk
Bays 3 through 8 support six SL disks
via SCA-2 connectors

⇨ Quick release adapter slots (no screws)
⇨ Configuration/Setup Utility: F1 at startup
⇨ Diagnostics (PC-Doctor™): F2 at startup
⇨ System Partition Boot: ALT+F1 at startup
⇨ Network Boot: F12 at startup
⇨ LSI Logic Configuration Utility: CTRL+C at startup
⇨ Front indicators LEDs: Power-on LED, SCSI bus activity LED, system identification LED, information LED, and system-error LED
⇨ Predictive failure analysis on disk options, memory, processors, VRMs, power supplies, and fans in conjunction with IBM Director can alert the system administrator of an imminent component failure
⇨ Rack: H 3.36" x W 17.5" x D 27.5"
⇨ 44 to 62 pounds
⇨ Stealth black color

All models: Max int disk capacity: 880.0GB² with six 146.8GB SL disks

See footnotes for important warranty information   • = Hot-swap   (X345B) © IBM Corp. October 2003
☞ US models announced October 14, 2003; others January 21, 2003, May 13, 2003 or July 29, 2003

IBM® Type-model	Qty x Processor	L3 cache	Memory	Disks	SCSI controller	Mechan-ical	Slots x bays	RXE Exp Ports	Hot-swap pwr supplies	Mgmt adapter	Available date
8686-1RQ	1 x Xeon™ MP 2.0GHz	1MB	1GB Chipkill™	None	Ultra160	3U⁴ rack	6x5	One	One (not redun)	PCI	Jun 2003
8686-1SQ	2 x Xeon™ MP 2.0GHz	1MB	1GB Chipkill	None	Ultra160	3U rack	6x5	One	Two redundant	PCI	Nov 2003
8686-1TQ	2 x Xeon™ MP 2.0GHz	1MB	3GB Chipkill	2 x 36.4GB 10K	Ultra160	3U rack	6x5	One	Two redundant	PCI	Nov 2003
8686-2RQ	2 x Xeon MP 2.5GHz	1MB	2GB Chipkill	None	Ultra160	3U rack	6x5	One	Two redundant	PCI	Jun 2003
8686-3RQ	2 x Xeon MP 2.8GHz	2MB	2GB Chipkill	None	Ultra160	3U rack	6x5	One	Two redundant	PCI	Jun 2003

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Processors	**1** or **2 x Intel® Xeon™ Processor MP 2.0, 2.5, or 2.8GHz**¹ with 400MHz frontside bus / Hyper-Threading technology
L2 cache	**512KB** / on die of processor / at processor speed
L3 cache	**1MB** or **2MB** / on die of processor / at processor speed
Processor upgrade	**4-way SMP** / up to four Xeon Processors MP (same speed/cache size)
Implementation	Systemboard contains four Intel 603-pin micro-PGA ZIF sockets, one memory board slot, six Active™ PCI-X slots, and integrated SCSI, ethernet, graphics
Memory	Up to **3GB** std / 16GB max¹²,¹³ / two (1GB model), four (2GB models) or six (3GB models) 512MB DIMMs installed / 1.7-inch tall / one memory board standard with 8 DIMM gold-connector slots / DIMMs must be installed in matched pairs / 128-bit simultaneous transfer from two DIMMs / PC1600 200MHz registered 184-pin DDR-SDRAM RDIMMs / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill™** (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
SCSI disk controller	Adaptec® AIC-7892 / Wide Ultra160 SCSI (LVD 160MB/sec) / single channel / 64-bit 33MHz PCI / integrated on planar
SCSI connectors	Controller hard-wired to SCSI backplane (no cable) / no external SCSI connector
SCSI cabling	One standard 16-bit LVD cable included for attaching an optional ServeRAID adapter to the three-bay backplane; SCSI RAID adapter 68-pin connector on systemboard for this cable to get signals to three-bay backplane
IDE controller / cabling	Enhanced IDE ATA-33 controller in OSB4 South Bridge
Disk - capacity	None standard / supports up to 15,000 rpm disks
Disk - bays	Three hot-swap bays / converged tray / 80-pin SCA-2 connectors
Mechanical	**EIA 19" rack models (3U⁴)** x 28" deep / supported in NetBAY™ Racks (such as NetBAY42 SR, NetBAY42 ER)
Chipset	**IBM XA-32™ chipset** / IBM Memory I/O Controller (improved performance from earlier models) with two remote I/O ports (one to IBM PCI-X Host Bridge; one to RXE Expansion Port) / IBM PCI-X Host Bridge provides three peer PCI buses (two PCI-X 1.0, one PCI 2.2) / PCI 2.2 Bus 0 supports SCSI, graphics, ethernet, adapter slot with Remote Supervisor Adapter, and ServerWorks® OSB4 South Bridge (IDE, USB, ISA bus for Super I/O NS PC97317VUL [diskette, keyboard, mouse])
Slots (Active™ PCI-X)	Six hot-swap PCI-X 1.0 slots¹⁰ available with power and attention indicator lights (optical sensors control power to slot) / **hot replace, hot upgrade, hot expansion** / separated by insulative plastic dividers
RXE Expansion Port	**One port to support up to 12 additional PCI-X slots via an optional IBM RXE-100 Remote Expansion Enclosure**
CD-ROM / diskette	24X-10X⁶ CD-ROM / 3.5" 1.44MB diskette drive
Ethernet	Intel 82559 10/100 ethernet controller / on systemboard / full duplex / 32-bit PCI / Wake on LAN® / Alert on LAN™ 2
Graphics controller	SVGA / S3® Savage4 LT / on systemboard / 8MB SDRAM std/max / up to 1280x1024 at 64K colors at 85Hz
Ports	*Rear:* RXE-100 Expansion Port (to connect optional RXE-100), RXE Management Port (to manage optional RXE-100), two USB (Ver 1.1), keyboard, mouse, analog DB-15 graphics, ethernet / no serial or parallel ports / *Front:* one USB (Ver 1.1)
Security	Power-on and administrator passwords / unattended boot / selectable boot
Systems management	**Remote Supervisor Adapter** / PCI adapter / includes 10/100 ethernet, RJ-11, and serial connectors / provides remote console and mgmt / power on/off system / monitors power status, op system, temperature, disks, fans, power supplies
Diagnostics	**Light Path Diagnostics™** / primary indicator on information panel with LEDs associated with failing components / IBM Real Time Diagnostics (operated through IBM Director) available even while server running
Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director, and others
Keyboard / mouse	None standard (because rack-based)
Power supplies	*Std:* one or two 370 watt hot-swap; *Max:* three hot-swap / redundant with two power supplies (some configurations) / worldwide / voltage-sensing / auto-restart / fans in each power supply / PFA
Cooling fans	Six hot-swap, redundant, multi-speed fans / one additional fan in each power supply / PFA / fan failure signals Diagnostic LED and mgmt processor

Option	Part number
RXE-100 Remote Expansion Enclosure	86841RX
512MB PC1600 ECC DDR SDRAM RDIMM	33L3283
1GB PC1600 ECC DDR SDRAM RDIMM	33L3285
2GB PC1600 ECC DDR SDRAM RDIMM¹²	33L3287
Xeon MP 2.0GHz/1MB L3 Cache Proc Upg	73P8805
Xeon MP 2.5GHz/1MB L3 Cache Proc Upg	73P8806
Xeon MP 2.8GHz/2MB L3 Cache Proc Upg	73P8807
370 watt Hot-Swap Redundant Power Supply	31P6108
IBM ServeRAID™-4Mx Ultra160 SCSI Adapter	06P5736
IBM 73.4GB 10K Ultra160 SCSI Hot-Swap SL	06P5756
IBM NetBAY42 Standard Rack (SR)	9306420
IBM Integrated xSeries Adapter for iSeries	1519100
IBM T541 15" Flat Panel Color Monitor (black)	9512AB1

Other options at **ibm.com**/pc/us/accessories

Six available 3.3 volt Active PCI-X slots:
- Bus 2 (B) with two slots supports (slots 1, 2):
  - one fullsize, 64-bit, 133MHz PCI-X, hot-swap
  - or two fullsize, 64-bit, 100MHz PCI-X, hot-swap
  - or two fullsize, 64-bit, 66MHz PCI-X, hot-swap
  - or two fullsize, 64-bit, 66MHz PCI, hot-swap
  - or two fullsize, 64-bit, 33MHz PCI, hot-swap
- Bus 1 (A) with four slots supports (slots 3, 4, 5, 6):
  - four fullsize, 64-bit, 66MHz PCI-X, hot-swap
  - or two fullsize, 64-bit, 66MHz PCI, hot-swap
  - or four fullsize, 64-bit, 33MHz PCI, hot-swap
- Bus 0 with one slot supports:
  - only for standard Remote Supervisor Adapter
  - halfsize, 64-bit, 33MHz PCI, not hot-swap
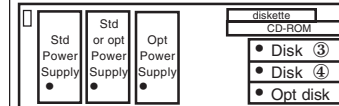
3U Rack

Bay ① 3.5", 0.5", access, diskette
Bay ② 3.5", 0.5", access, CD-ROM
Bay ③ 3.5", SL 1", access, hot-swap
Bay ④ 3.5", SL 1", access, hot-swap
Bay ⑤ 3.5", SL 1", access, hot-swap

➪ Dimensions: H5.25" x W17.4" x D27.6"
  Dimensions: H133.4mm x W442.0mm x D701mm
➪ Weight: 58.4 to 70lbs; 24.9 to 31.8kg
➪ Stealth black color
➪ Tool-free serviceability
➪ Access adapters, processors, memory, and systemboard from top
➪ Access power supplies and disks from front
➪ Setup Program by pressing F1 at startup
➪ Diagnostics (PC-Doctor) by pressing F2 at startup
➪ SCSISelect by pressing Ctrl+A at startup
➪ Top cover Light Path Diagnostics (level 2 diagnostic panel) for outside view of potential problem without removing cover
➪ Information LED panel, diagnostic LED panel, and component LEDs give visual indications of system well-being
➪ Predictive Failure Analysis® alerts on disks, power supplies, memory, processors, VRMs, and fans with IBM Director

All models: Maximum internal disk capacity: 220.2GB with three 73.4GB² hot-swap SCSI disks

See footnotes for important warranty information
US models announced June 30, 2003 or November 11, 2003
• = Hot-swap

IBM® Type-model	Qty x Processor	L3 cache	Memory	SCSI disks	SCSI controller	Mechanical	Slots x bays	Hot-swap bays	Hot-swap power supplies	Chipset	Operating system	Available date
8834-21X	2 x Itanium 1.4Ghz	1.5MB	2GB	1 x 73.4GB	2 x Ultra320	2U[4] rack	3x2	2 hot-swap	2+1 redundant	E8870	None	Sep 2003
8834-32X	2 x Itanium 1.5Ghz	6.0MB	4GB	2 x 73.4GB	2 x Ultra320	2U[4] rack	3x2	2 hot-swap	2+1 redundant	E8870	None	Aug 2003

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Positioning	*High-performance 2-way Intel Itanium 2 platform for floating point intensive 64-bit applications such as Linux clusters*
Processor	**Up to 2 x Intel® Itanium 2™ 1.5Ghz** with 400MHz frontside bus (double pumped 200MHz) / others avail. by special bid
L3 cache	**Up to 6.0MB L3 cache** / inside Itanium 2 cartridge / at processor speed
Processor upgrade	Not Available
Implementation	Two Processor Board with two Socket K 418-pin LIF sockets / both sockets used by Itanium PAC418 (418-pin array cartridge) processor and caches / each Itanium powered by one Power Pod on Processor Board / system contains one Processor Board (2 sockets, SAC, SDC), two Memory Boards, one I/O Baseboard (slots, graphics, ethernet, SCSI, PXB, 3 x WXB), one Sideplane (connects I/O Baseboard to Processor Brd), one Legacy I/O Board (IFB, USB, FWH, Super I/O)
Memory - std / max	**Up to 4GB std / 16GB max**[13] / 133Mhz 2.5V PC2100 ECC DDR SDRAM **/** Error Checking and Correction (ECC) /
Memory - features	Two Memory Boards standard each with four 184-pin DIMM sockets / ships standard with four or eight 512MB DIMMs for four-way interleaving / must install four identical DIMMs at a time / adding DIMMs on second Memory Board enables Card to Card (C2C) interleaving
SCSI disk controller	**LSI® 53C1030** LVD Ultra320 / **integrated RAID-1** controller
SCSI channels	Two Ultra320 SCSI channels (LVDS 320MB/sec) / 64-bit 100MHz and 133Mhz PCI / controller on I/O Baseboard
SCSI implementation	First channel to internal 2-port SCSI backplane for internal hot-swap disks (16-bit LVD cable to SCSI backplane) / second channel to one external .8mm VHDCI 68-pin connector (16-bit LVD cable from I/O Baseboard to ext connector)
IDE controller	Enhanced IDE busmaster / ATA-100 / one connector on Legacy I/O Board
IDE cabling	One 1-drop IDE cable to DVD/CD-RW
Disks - capacity	**1 or 2 x 73.4GB**[2] Ultra320 SCSI / 10000 rpm / tray integrated on disk
Disk - bays	Hot-swap / 80-pin SCA-2 connectors
Mechanical	**EIA 19" rack models (2U[4])**
Rack / conversion	Supported in IBM NetBAY™ Enterprise Racks or other NetBAY racks with extension options
Chipsets	**Intel E8870 chipset** / well-aligned system bus, memory and I/O / 6.5 GB/sec bandwidth / Intel Server Platform **SR870BH2** includes E8870 Scalable Node Controller (SNC), E8870DH DDR Memory Hub (DMH), E8870IO Server Input Output Hub (SIOH), E8870SP Scalability Port Switch (SPS), 82870P2 64-Bit PCI/PCI-X Controller (P64H2), 82801DB I/O Controller Hub (ICH4), 82802AC FirmWare Hub (FMH)
Legacy I/O Board	Legacy I/O Board in proprietary connector / contains controllers for hardware monitoring (BMC, ICMB), USB (Vers 1.1), single channel IDE, FirmWare Hub (FWH), I/O Firmware Bridge (IFB), SMCS™ LPC47B272 Super I/O (one RJ-45 serial, no parallel, no keyboard, no mouse) / USB used for keyboard and mouse
Slots (PCI-X)	Three PCI-X slots[11] available with power and attention indicator lights (magnetic sensors control power to slot) / separated by insulative plastic dividers / PCI Hot-Plug Specification 1.0
Ethernet	Integrated Intel 82546EB 10/100/1000 dual port controller / full duplex / two RJ-45 connectors on rear
Optical / Ports	8X[6] DVD/CD-RW Combo Drive / one RJ-45 serial / no parallel / four USB 1.1 (two front, two rear) / no keyboard /
Ports	no mouse / two analog DB-15 SVGA (one front, one rear)
Graphics controller	SVGA / ATI® RAGE XL / integrated on I/O Baseboard / 8MB SDRAM std/max
Security	BIOS administrator and BIOS user passwords / mountable in an optional secure rack enclosure / selectable drive-startup
Systems management	Three microcontrollers: (1) Baseboard Mgmt Controller (BMC), (2) Intelligent Chassis Management Bus Controller (ICMB), (3) Hot-Swap Controller (HSC) / provides remote console and mgmt / power on/off system / monitors power status,oper system, temp, disks, fans, power supplies / software utility (Intel Server Control) for mgmt required and supported
Diagnostics	Intel Server Management 6.1 including integrated in-band and out-of-band remote management, event alerting and logging
Software and CDs	Diagnostic Diskette, Utliity CD, Publication CD, Installation Guide / no ServerGuide™ / no IBM Director™
Keyboard / mouse	None standard / use optional USB
Power supplies	*Std/Max:* two/three 350 watt **hot-swap N+1 redundant** / universal (voltage sensing) / two individual 220v power cords to two connectors / PFA
Fans	**Six redundant fans** / variable speed / PFA / additional fans inside power supplies
Operating system	No operating system included / Supported OS include Itanium 2 64-bit OS from SuSE, Red Hat, and Microsoft

OPTIONS

512MB PC2100 DDR ECC SDRAM RDIMM	33L5038
1GB PC2100 DDR ECC SDRAM RDIMM	33L5039
2GB PC2100 DDR ECC SDRAM RDIMM	33L5040
IBM 73.4GB 10K Ultra320 SCSI HS SL HDD	32P0727
IBM 146.8GB 10K Ultra320 SCSI HS SL HDD	32P0728
IBM USB Space Saver Keyboard	22P5150

NOTE: 3rd power supply available by special bid only
NOTE: All other Itanium 2 processors available via special bid

LIMITED WARRANTY[3]

- **3 year parts and labor**
- **International Warranty Service**[3]
- **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time**
- **3 year on site warranty service upgrade options (in eligible locations):**[7]
  - **9 hr coverage, Mon-Fri excluding holidays, 4 hour average response time**
  - **24 hr x 7 day coverage, 4 hour average response time**
- **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]
- **ServicePac® Warranty and Maintenance options at ibm.com/ services/its/us/servicepac.html**

- Dimensions: H3.50" x W18.90" x D30.51"
  H88.90mm x W480.00mm x D775.00mm
- Weight: 69.21 lbs (31.39 kg)
- Access adapters from top (no tools required)
- Access power supplies from front (cust replaceable)
- Processor and memory upgrades (IBM service only)
- BIOS Setup Utility by pressing F2 at startup
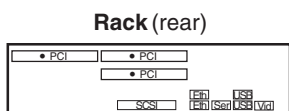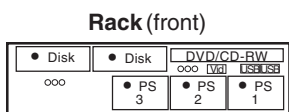
Slot 1: Bottom Slot / Not hot-swap
full length, 64-bit 133MHz PCI-X, accessible, Bus A
Slot 2: Middle Slot, Back side / Not hot-swap
half length, 64-bit 100MHz PCI-X, accessible, Bus B
Slot 3: Top Slot / Not hot-swap
full length, 64-bit 100MHz PCI-X, accessible, Bus B
NOTE: Slots cannot total more than 45 watts

Rack (front)

• Disk	• Disk	DVD/CD-RW ⊙⊙⊙ [Vid] [USB][USB]
⊙⊙⊙	• PS 3	• PS 2	• PS 1

Rack (rear)

- Two 1.0" SL 3.5" disk bays (both hot-swap)
- Stealth black color
- Wired for Mgmt 2.0
- DMI 2.0 and ACPI 2.0-compliant

- Predictive Failure Analysis® alerts on disks, power supplies, memory, processors, Power Pods, and fans (enabled by Intel Server Control (ISC) software)
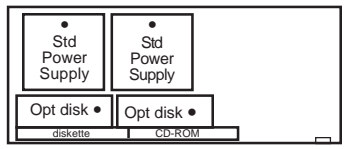- SMBIOS-2.3 compliant

All models: Maximum internal disk capacity: 293.6GB with two 146.8GB[2] SL hot-swap SCSI disks

See footnotes for important warranty information
US models announced on July 1, 2003 or September 9, 2003

• = Hot-swap

IBM® Type-model	Qty x Processor	L3 cache	L4 cache	Memory	Disk	SCSI controller	Mech-anical	Slots x bays	SMP/RXE Exp Ports	Hot-swap pwr supplies	Mgmt adapter	Available date
8870-3RY	2 x Xeon™ 3.0GHz	None	64MB	2GB Chipkill™	None	2xUltra320	4U⁴ rack	6x4	3/1	Two redundant	PCI	Jul 2003
8870-4RY	4 x Xeon 3.0GHz	None	128MB	2GB Chipkill	None	2xUltra320	4U rack	6x4	3/1	Two redundant	PCI	Jul 2003

Positioning	*SMP power for high-end databases, server consolidation and mission-critical business applications*
Processors	**2 or 4 x Intel® Xeon™ Processor 3.0GHz**[1] with 400MHz frontside bus / supports Hyper-Threading technology
L2 cache	**512KB** each processor / on die of processor / at processor speed
L4 cache	*3RY:* **64MB**; *4RY:* **128MB**; *All:* **XceL4™ Server Accelerator Cache** / 64MB in each SMP Expansion Module / ECC / 64-bit 400MHz bus from Cache and Scalability Controller
Processor upgrade	*3RY:* **4-way SMP** with two SMP Expansion Modules; *All:* all models can be upgraded to Xeon MP processors to support up to 8-way SMP with two SMP Expansion Modules or up to 16-way SMP with two xSeries 445 systems
SMP Expansion Module	*3RY:* **one std**; *4RY:* **two std**; *All:* two max / each contains four Intel 603-pin micro-PGA ZIF sockets for Xeon, 64MB L4 cache, sixteen DIMM sockets, three SMP Expansion Ports (second module connected via one or two SMP Expansion Ports) / each SMP Expansion Module activates one RXE Expansion Port (only one RXE Expansion Port supported)
Additional boards	One I/O Board (PCI-X Host Bridge, SCSI, ethernet, graphics, South Bridge, Super I/O, slot for Mgmt Adapter), one PCI Board (PCI-X Host Bridge, six PCI-X slots), one Midplane Board (connects SMP Exp Modules, I/O Board, PCI Board)

Memory	**2GB** std / **32GB** max[13] (up to **64GB** per chassis using optional SMP Expansion Module) / four 512MB DIMMs installed / 16 DIMM gold-connector slots / must install two indentical DIMMs at same time / 2-way interleaving / PC2100 DDR SDRAM / **Error Checking and Correcting (ECC)** and **Chipkill™** via **Memory ProteXion™** (1, 2, 3, or 4-bit errors on same chip; up to two chips at once; redundant bit steering) / **Active Memory™** supporting **hot-swap** and **hot-add** (OS specific) and **Memory Mirroring™** (non-OS specific)

SCSI disk controller	LSI Loigic / Wide Ultra320 SCSI (LVD 32MB/sec) / dual channel / 64-bit 66MHz PCI / **integrated RAID-1** on I/O Board
SCSI implementation	First channel to internal 2-port SCSI backplane for internal hot-swap disks (16-bit LVD cable to SCSI backplane) / second channel to one external .8mm VHDCI 68-pin connector (16-bit LVD cable from I/O Board to ext connector) / one standard (longer) 16-bit LVD cable included for attaching an optional ServeRAID adapter to the two-bay backplane
IDE controller	Enhanced IDE ATA-100 controller in South Bridge / one one-drop IDE cable to backplane for diskette and CD-ROM
Disk - capacity/bays	No disks standard / supports up to 15K rpm SCSI disks / two hot-swap bays / converged tray / 80-pin SCA-2 connectors

Mechanical	**EIA 19" rack models (4U⁴)** x 28" deep / supported in NetBAY™ Racks (such as NetBAY42 SR, NetBAY42 ER)

Chipset	**IBM XA-32™ 2nd Generation chipset** / IBM Cache and Scalability Controller with L4 cache controller and three SMP Expansion Ports / IBM Memory I/O Controller with two remote I/O ports (each to a IBM PCI-X Host Bridge) / each IBM PCI-X Host Bridge provides three peer PCI buses / PCI 2.2 Bus E supports graphics, adapter slot with Remote Supervisor Adapter, VIA® 82C686B South Bridge (IDE ATA-100, USB, Super I/O PC97317VUL [keyboard, mouse]) / PCI 2.2 Bus F supports SCSI, ethernet / PCI-X Bus A, B, C, D support PCI-X slots / designed to the PCI-X 1.0 specification
Slots (Active™ PCI-X)	Six hot-swap PCI-X 1.0 slots[10] available with power and attention indicator lights (optical sensors control power to slot) / **hot replace, hot upgrade, hot expansion** / separated by insulative plastic dividers
RXE Expansion Port	One RXE-100 Remote Expansion Enclosure can be shared between two x445 4-way, 8-way, or 16-way xSeries 445 servers or attached alone. Both PCI-X 6-packs must be installed to support **RIO sharing** as each server will access six additional PCI-X slots.

CD-ROM / diskette	24X-8X⁶ **DVD-ROM** / 3.5" 1.44MB diskette drive / both removable from Ultrabay 2000 bays / supports CD-RW, DVD
Ethernet	**Dual** Broadcomª 5704 10/100/1000 ethernet controller / on I/O Board / full duplex / 64-bit 66MHz PCI bus / Wake on LAN®
Graphics controller	SVGA / S3® Savage4 Pro / on I/O Board / 8MB SDRAM 125MHz std/max / up to 1280x1024 at 64K colors at 85Hz
Ports	*Rear:* RXE-100 Expansion Port (to connect optional RXE-100), RXE Management Port, two USB (Vers 1.1), keyboard, mouse, analog DB-15 graphics, ethernet / no serial or parallel ports / *Front:* one USB (Vers 1.1)

Security	Power-on and administrator passwords / unattended boot / selectable boot

Systems mgmt	**Remote Supervisor Adapter** / PCI adapter / includes 10/100 ethernet, RJ-11, and serial connectors / provides remote console and mgmt / power on/off system / monitors power status, op system, temperature, disks, fans, power supplies
Diagnostics	**Light Path Diagnostics™** / primary indicator on information panel with LEDs associated with failing components / IBM Real Time Diagnostics (operated through IBM Director), available even while server running
Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director, and others

xSeries SMP Expansion Module with two 3.0Ghz Xeon Processors	02R1871
512MB DDR PC2100 ECC SDRAM RDIMM	33L5038
1GB DDR PC2100 ECC SDRAM RDIMM	33L5039
2GB DDR PC2100 ECC SDRAM RDIMM	33L5040
IBM 73.4GB 10K Ultra160 SCSI Hot-Swap	06P5756
IBM ServeRAID™-4H Ultra160 SCSI Adapter	37L6889
NetBAY11 Standard Rack Cabinet	9306110
8X/4X/24X Max CD-RW Ultrabay 2000	22P9101
IBM T540 15" Flat Panel Color Monitor (black)	9511AG4
Other options at **ibm.com**/pc/us/accessories	

Keyboard / mouse	None standard (because rack-based)
Power supplies	*Std:* two; *max:* two / hot-swap / 1050 watts at 220v or 550 watts at 110v / redundant at 220v with two power supplies / front access / worldwide / voltage-sensing / auto-restart / fans in each power supply / PFA
Cooling fans	Four hot-swap, redundant, multi-speed fans / one additional fan in each power supply / PFA / fan failure signals Diagnostic LED and mgmt processor

Six available 3.3 volt Active PCI-X slots:

Slot 1: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 2: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 3: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 4: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 5: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus C
Slot 6: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus D
Slot: used by Remote Supervisor Adp, 32-bit 33MHz

```
 _____
|  ___       ___        |
| |Std|     |Std|       |
| |Power|   |Power|      |    4U Rack
| |Supply|  |Supply|     |
| |___|     |___|       |
| Opt disk ● | Opt disk ● |
| diskette    CD-ROM    |
|_____|
```

4U Rack

Bay ① 3.5", 0.5", access, diskette (Ultrabay 2000)
Bay ② 3.5", 0.5", access, CD-ROM (Ultrabay 2000)
Bay ③ 3.5", SL 1", access, hot-swap
Bay ④ 3.5", SL 1", access, hot-swap

- ➯ Dimensions: H7.0" x W19.0" x D27.5" Dimensions: H178mm x W483mm x D699mm
- ➯ Max weight: 110 lbs; 50kg
- ➯ Stealth black color
- ➯ Tool-free serviceability
- ➯ Access processors, memory, adapters, and SMP Expansion Module from top
- ➯ Access power supplies and disks from front
- ➯ Setup Program by pressing F1 at startup
- ➯ Diagnostics (PC-Doctor) by pressing F2 at startup
- ➯ SCSISelect by pressing Ctrl+A at startup
- ➯ Information LED panel and front-accessible pull-out Light Path panel (1st and 2nd level diagnostics without removing cover)
- ➯ Predictive Failure Analysis® alerts on processors, XceL4 Server Accelerator Cache, memory, fans, power supplies, and optional disks with IBM Director

All models: Maximum internal disk capacity: 293.6GB with two 146.8GB² hot-swap SCSI disks
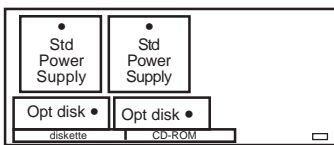
LIMITED WARRANTY[3]

- ➯ **3 year parts and labor**
- ➯ **International Warranty Service**[3]
- ➯ **On site, 9 hr x 5 day coverage, next day response time**[7]
- ➯ **1 year on site warranty service upgrade option (in eligible locations):**[7]
  - **24 hr x 7 day coverage, 2 hour response time** (No ServicePac available)
- ➯ **Post warranty maintenance services available**
- ➯ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]
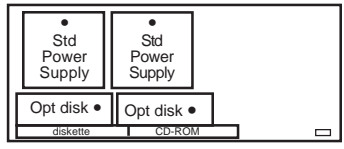
See footnotes for important warranty information
US models announced July 1, 2003
● = Hot-swap

IBM® Type-model	Qty x Processor	L3 cache	L4 cache	Memory	Disk	SCSI controller	Mech-anical	Slots x bays	SMP/RXE Exp Ports	Hot-swap pwr supplies	Mgmt adapter	Available date
8870-1RX	2 x Xeon™ MP 2.0GHz	1MB	64MB	2GB Chipkill™	None	2xUltra320	4U⁴ rack	6x4	3/1	Two redundant	PCI	Jul 2003
8870-2RX	2 x Xeon MP 2.5GHz	1MB	64MB	2GB Chipkill	None	2xUltra320	4U rack	6x4	3/1	Two redundant	PCI	Jul 2003
8870-4RX	4 x Xeon MP 2.8GHz	2MB	64MB	2GB Chipkill	None	2xUltra320	4U rack	6x4	3/1	Two redundant	PCI	Jul 2003

Positioning	*Up to 8-way (16-way two chassis) power for high-end databases, server consolidation and mission-critical business applications*
Processors	**2 or 4 x Intel® Xeon™ Processor MP 2.0, 2.5, or 2.8GHz**[1] with 400MHz frontside bus / supports Hyper-Threading
L3 cache	**1MB or 2MB** each processor / on die of processor / at processor speed
L4 cache	**64MB XceL4™ Server Accelerator Cache** (up to **128MB** with optional SMP Expansion Module) / 64MB in each SMP Expansion Module / ECC / 64-bit 400MHz bus from Cache and Scalability Controller
Processor upgrade	**4-way SMP** (up to **8-way SMP** with optional SMP Expansion Module)
SMP Expansion Module	**One SMP Expanion Module std** / two max / each contains four Intel 603-pin micro-PGA ZIF sockets for Xeon MP, 64MB L4 cache, sixteen DIMM sockets, three SMP Expansion Ports (second module connected via one or two SMP Expansion Ports) / each SMP Expansion Module activates one RXE Expansion Port (one RXE Expansion Port supported)
Additional boards	One I/O Board (PCI-X Host Bridge, SCSI, ethernet, graphics, South Bridge, Super I/O, slot for Mgmt Adapter), one PCI Board (PCI-X Host Bridge, six PCI-X slots), one Midplane Board (connects SMP Exp Modules, I/O Board, PCI Board)
Memory	**2GB std / 32GB max**[13] (up to **64GB** per chassis using optional SMP Expansion Module) / four 512MB DIMMs installed / 16 DIMM gold-connector slots / must install two indentical DIMMs at same time / 2-way interleaving / PC2100 DDR SDRAM / **Error Checking and Correcting (ECC)** and **Chipkill**™ via **Memory ProteXion**™ (1, 2, 3, or 4-bit errors on same chip; up to two chips at once; redundant bit steering) / **Active Memory**™ supporting **hot-swap** and **hot-add** (OS specific) and **Memory Mirroring**™ (non-OS specific)
SCSI disk controller SCSI implementation	LSI Loigic / Wide Ultra320 SCSI (LVD 32MB/sec) / dual channel / 64-bit 66MHz PCI / **integrated RAID-1** on I/O Board First channel to internal 2-port SCSI backplane for internal hot-swap disks (16-bit LVD cable to SCSI backplane) / second channel to one external .8mm VHDCI 68-pin connector (16-bit LVD cable from I/O Board to ext connector) / one standard (longer) 16-bit LVD cable included for attaching an optional ServeRAID adapter to the two-bay backplane
IDE controller	Enhanced IDE ATA-100 controller in South Bridge / one one-drop IDE cable to backplane for diskette and CD-ROM
Disk - capacity/bays	No disks standard / supports up to 15K rpm SCSI disks / two hot-swap bays / converged tray / 80-pin SCA-2 connectors
Mechanical	**EIA 19" rack models (4U⁴)** x 28" deep / supported in NetBAY™ Racks (such as NetBAY42 SR, NetBAY42 ER)
Chipset	**IBM XA-32™ 2nd Generation chipset** / IBM Cache and Scalability Controller with L4 cache controller and three SMP Expansion Ports / IBM Memory I/O Controller with two remote I/O ports (each to a IBM PCI-X Host Bridge) / each IBM PCI-X Host Bridge provides three peer PCI buses / PCI 2.2 Bus E supports graphics, adapter slot with Remote Supervisor Adapter, VIA® 82C686B South Bridge (IDE ATA-100, USB, Super I/O PC97317VUL [keyboard, mouse]) / PCI 2.2 Bus F supports SCSI, ethernet / PCI-X Bus A, B, C, D support PCI-X slots / designed to the PCI-X 1.0 specification
Slots (Active™ PCI-X)	Six hot-swap PCI-X 1.0 slots[10] available with power and attention indicator lights (optical sensors control power to slot) / **hot replace, hot upgrade, hot expansion** / separated by insulative plastic dividers
RXE Expansion Port	One RXE-100 Remote Expansion Enclosure can be shared between two x445 4-way, 8-way, or 16-way xSeries 445 servers or attached alone. Both PCI-X 6-packs must be installed to support **RIO sharing** as each server will access six additional PCI-X slots.
CD-ROM / diskette	24X-8X⁶ **DVD-ROM** / 3.5" 1.44MB diskette drive / both removable from Ultrabay 2000 bays / supports CD-RW, DVD
Ethernet	**Dual** Broadcomª 5704 10/100/1000 ethernet controller / on I/O Board / full duplex / 64-bit 66MHz PCI bus / Wake on LAN®
Graphics controller	SVGA / S3® Savage4 Pro / on I/O Board / 8MB SDRAM 125MHz std/max / up to 1280x1024 at 64K colors at 85Hz
Ports	*Rear:* RXE-100 Expansion Port (to connect optional RXE-100), RXE Management Port, two USB (Vers 1.1), keyboard, mouse, analog DB-15 graphics, ethernet / no serial or parallel ports / *Front:* one USB (Vers 1.1)
Security	Power-on and administrator passwords / unattended boot / selectable boot
Systems mgmt	**Remote Supervisor Adapter** / PCI adapter / includes 10/100 ethernet, RJ-11, and serial connectors / provides remote console and mgmt / power on/off system / monitors power status, op system, temperature, disks, fans, power supplies
Diagnostics	**Light Path Diagnostics**™ / primary indicator on information panel with LEDs associated with failing components / IBM Real Time Diagnostics (operated through IBM Director) available even while server running

Software	**ServerGuide**™ (CD-ROM installation and configuration utilities), IBM Director, and others

xSeries SMP Expansion Module	02R1870
1GB DDR PC2100 ECC SDRAM RDIMM	33L5039
2GB DDR PC2100 ECC SDRAM RDIMM	33L5040
Xeon MP 2.0GHz/1MB L3 Cache Proc Upg	02R2062
Xeon MP 2.5GHz/1MB L3 Cache Proc Upg	02R2063
Xeon MP 2.8GHz/2MB L3 Cache Proc Upg	02R2064
IBM 73.4GB 10K Ultra160 SCSI Hot-Swap	06P5756
IBM ServeRAID™-4H Ultra160 SCSI Adapter	37L6889
NetBAY11 Standard Rack Cabinet	9306110
8X/4X/24X Max CD-RW Ultrabay 2000	22P9101
IBM T540 15" Flat Panel Color Monitor (black)	9511AG4

Other options at **ibm.com**/pc/us/accessories

Keyboard / mouse	None standard (because rack-based)
Power supplies	*Std:* two; *max:* two / hot-swap / 1050 watts at 220v or 550 watts at 110v / redundant at 220v with two power supplies / front access / worldwide / voltage-sensing / auto-restart / fans in each power supply / PFA
Cooling fans	Four hot-swap, redundant, multi-speed fans / one additional fan in each power supply / PFA / fan failure signals Diagnostic LED and mgmt processor

Six available 3.3 volt Active PCI-X slots:

Slot 1: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 2: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 3: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 4: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 5: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus C
Slot 6: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus D
Slot: used by Remote Supervisor Adp, 32-bit 33MHz

```
 ┌──────────┬──────────┐
 │   •      │    •     │
 │  Std     │   Std    │
 │ Power    │  Power   │
 │ Supply   │  Supply  │
 ├──────────┼──────────┤
 │ Opt disk • │ Opt disk • │
 └──────────┴──────────┘
   diskette    CD-ROM
```
4U Rack

Bay ① 3.5", 0.5", access, diskette (Ultrabay 2000)
Bay ② 3.5", 0.5", access, CD-ROM (Ultrabay 2000)
Bay ③ 3.5", SL 1", access, hot-swap
Bay ④ 3.5", SL 1", access, hot-swap

➪ Dimensions: H7.0" x W19.0" x D27.5"
   Dimensions: H178mm x W483mm x D699mm
➪ Max weight: 110 lbs; 50kg
➪ Stealth black color
➪ Tool-free serviceability
➪ Access processors, memory, adapters, and SMP Expansion Module from top
➪ Access power supplies and disks from front
➪ Setup Program by pressing F1 at startup
➪ Diagnostics (PC-Doctor) by pressing F2 at startup
➪ SCSISelect by pressing Ctrl+A at startup
➪ Information LED panel and front-accessible pull-out Light Path panel (1st and 2nd level diagnostics without removing cover)
➪ Predictive Failure Analysis® alerts on processors, XceL4 Server Accelerator Cache, memory, fans, power supplies, and optional disks with IBM Director

All models: Maximum internal disk capacity: 293.6GB with two 146.8GB² hot-swap SCSI disks

LIMITED WARRANTY[3]

➪ **3 year parts and labor**
➪ **International Warranty Service**[3]
➪ **On site, 9 hr x 5 day coverage, next day response time**[7]
➪ **3 year on site warranty service upgrade option (in eligible locations):**[7]
  • **24 hr x 7 day coverage, 2 hour response time** (No ServicePac available)
➪ **Post warranty maintenance services available**
➪ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

See footnotes for important warranty information
US models announced July 1, 2003
• = Hot-swap

(X445A) © IBM Corp. July 2003

IBM® Type-model	Qty x Processor	L3 cache	L4 cache	Memory	Disk	SCSI controller	Mech-anical	Slots x bays	SMP/RXE Exp Ports	Hot-swap pwr supplies	Mgmt adapter	Available date
8870-1AX	2 x Xeon™ MP 2.0GHz	1MB	64MB	0GB Chipkill™	None	2xUltra320	4U⁴ rack	6x4	3/1	Two redundant	PCI	Jul 2003
8870-2AX	2 x Xeon MP 2.5GHz	1MB	64MB	0GB Chipkill	None	2xUltra320	4U rack	6x4	3/1	Two redundant	PCI	Jul 2003
8870-4AX	2 x Xeon MP 2.8GHz	2MB	64MB	0GB Chipkill	None	2xUltra320	4U rack	6x4	3/1	Two redundant	PCI	Jul 2003

Positioning	*Up to 8-way (16-way two chassis) power for high-end databases, server consolidation and mission-critical business applications*
Processors	**2 or 4 x Intel® Xeon™ Processor MP 2.0, 2.5, or 2.8GHz**[1] with 400MHz frontside bus / supports Hyper-Threading
L3 cache	**1MB or 2MB** each processor / on die of processor / at processor speed
L4 cache	**64MB XceL4™ Server Accelerator Cache** (up to **128MB** with optional SMP Expansion Module) / 64MB in each SMP Expansion Module / ECC / 64-bit 400MHz bus from Cache and Scalability Controller
Processor upgrade	SMP Expansion Module standard / ready for adding additional processors (up to 8 total) and memory
SMP Expansion Module	**One SMP Expanion Module std** / two max / each contains four Intel 603-pin micro-PGA ZIF sockets for Xeon MP, 64MB L4 cache, sixteen DIMM sockets, three SMP Expansion Ports (second module connected via one or two SMP Expansion Ports) / each SMP Expansion Module activates one RXE Expansion Port (one RXE Expansion Port supported)
Additional boards	One I/O Board (PCI-X Host Bridge, SCSI, ethernet, graphics, South Bridge, Super I/O, slot for Mgmt Adapter), one PCI Board (PCI-X Host Bridge, six PCI-X slots), one Midplane Board (connects SMP Exp Modules, I/O Board, PCI Board)

Memory	**0GB** std / **64GB** max[13] (uses standard SMP Expansion Module) / no DIMMs installed / 32 DIMM gold-connector slots / must install two indentical DIMMs at same time / 2-way interleaving / PC2100 DDR SDRAM / **Error Checking and Correcting (ECC)** and **Chipkill™** via **Memory ProteXion™** (1, 2, 3, or 4-bit errors on same chip; up to two chips at once; redundant bit steering) / **Active Memory™** supporting **hot-swap** and **hot-add** (OS specific) and **Memory Mirroring™** (non-OS specific)

SCSI disk controller	LSI Loigic / Wide Ultra320 SCSI (LVD 32MB/sec) / dual channel / 64-bit 66MHz PCI / **integrated RAID-1** on I/O Board
SCSI implementation	First channel to internal 2-port SCSI backplane for internal hot-swap disks (16-bit LVD cable to SCSI backplane) / second channel to one external .8mm VHDCI 68-pin connector (16-bit LVD cable from I/O Board to ext connector) / one standard (longer) 16-bit LVD cable included for attaching an optional ServeRAID adapter to the two-bay backplane
IDE controller	Enhanced IDE ATA-100 controller in South Bridge / one one-drop IDE cable to backplane for diskette and CD-ROM
Disk - capacity/bays	No disks standard / supports up to 15K rpm SCSI disks / two hot-swap bays / converged tray / 80-pin SCA-2 connectors

Mechanical	**EIA 19" rack models (4U⁴)** x 28" deep / supported in NetBAY™ Racks (such as NetBAY42 SR, NetBAY42 ER)

Chipset	**IBM XA-32™ 2nd Generation chipset** / IBM Cache and Scalability Controller with L4 cache controller and three SMP Expansion Ports / IBM Memory I/O Controller with two remote I/O ports (each to a IBM PCI-X Host Bridge) / each IBM PCI-X Host Bridge provides three peer PCI buses / PCI 2.2 Bus E supports graphics, adapter slot with Remote Supervisor Adapter, VIA® 82C686B South Bridge (IDE ATA-100, USB, Super I/O PC97317VUL [keyboard, mouse]) / PCI 2.2 Bus F supports SCSI, ethernet / PCI-X Bus A, B, C, D support PCI-X slots / designed to the PCI-X 1.0 specification
Slots (Active™ PCI-X)	Six hot-swap PCI-X 1.0 slots[10] available with power and attention indicator lights (optical sensors control power to slot) / **hot replace, hot upgrade, hot expansion** / separated by insulative plastic dividers
RXE Expansion Port	One RXE-100 Remote Expansion Enclosure can be shared between two x445 4-way, 8-way, or 16-way xSeries 445 servers or attached alone. Both PCI-X 6-packs must be installed to support **RIO sharing** as each server will access six additional PCI-X slots.

CD-ROM / diskette	24X-8X⁶ **DVD-ROM** / 3.5" 1.44MB diskette drive / both removable from Ultrabay 2000 bays / supports CD-RW, DVD
Ethernet	**Dual** Broadcomª 5704 10/100/1000 ethernet controller / on I/O Board / full duplex / 64-bit 66MHz PCI bus / Wake on LAN®
Graphics controller	SVGA / S3® Savage4 Pro / on I/O Board / 8MB SDRAM 125MHz std/max / up to 1280x1024 at 64K colors at 85Hz
Ports	*Rear:* RXE-100 Expansion Port (to connect optional RXE-100), RXE Management Port, two USB (Vers 1.1), keyboard, mouse, analog DB-15 graphics, ethernet / no serial or parallel ports / *Front:* one USB (Vers 1.1)

Security	Power-on and administrator passwords / unattended boot / selectable boot

Systems mgmt	**Remote Supervisor Adapter** / PCI adapter / includes 10/100 ethernet, RJ-11, and serial connectors / provides remote console and mgmt / power on/off system / monitors power status, op system, temperature, disks, fans, power supplies
Diagnostics	**Light Path Diagnostics™** / primary indicator on information panel with LEDs associated with failing components / IBM Real Time Diagnostics (operated through IBM Director) available even while server running

Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director, and others	IBM Preload Kit for 1-8 Processors Microsoft Windows Server Datacenter 2003 — 48164BU
		IBM Software Subscription Update for Microsoft Windows Server Datacenter 2003 — 4816CBX
		1GB DDR PC2100 ECC SDRAM RDIMM — 33L5039
		2GB DDR PC2100 ECC SDRAM RDIMM — 33L5040
		Xeon MP 2.0GHz/1MB L3 Cache Proc Upg — 02R2062
Keyboard / mouse	None standard (because rack-based)	Xeon MP 2.5GHz/1MB L3 Cache Proc Upg — 02R2063
Power supplies	*Std:* two; *max:* two / hot-swap / 1050 watts at 220v or 550 watts at 110v / redundant at 220v with two power supplies / front access / worldwide / voltage-sensing / auto-restart / fans in each power supply / PFA	Xeon MP 2.8GHz/2MB L3 Cache Proc Upg — 02R2064
		IBM 73.4GB 10K Ultra160 SCSI Hot-Swap — 06P5756
Cooling fans	Four hot-swap, redundant, multi-speed fans / one additional fan in each power supply / PFA / fan failure signals Diagnostic LED and mgmt processor	IBM ServeRAID™-4H Ultra160 SCSI Adapter — 37L6889
		Other options at **ibm.com**/pc/us/accessories

Six available 3.3 volt Active PCI-X slots:

Slot 1: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 2: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 3: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 4: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 5: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus C
Slot 6: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus D
Slot: used by Remote Supervisor Adp, 32-bit 33MHz

```
┌─────────┬─────────┐
│   •     │    •    │
│  Std    │   Std   │
│ Power   │  Power  │          4U Rack
│ Supply  │  Supply │
├─────────┼─────────┤
│Opt disk•│Opt disk•│
├─────────┴─────────┤
│ diskette  CD-ROM  │     ▭
└───────────────────┘
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Bay ① 3.5", 0.5", access, diskette (Ultrabay 2000)
Bay ② 3.5", 0.5", access, CD-ROM (Ultrabay 2000)
Bay ③ 3.5", SL 1", access, hot-swap
Bay ④ 3.5", SL 1", access, hot-swap

⇨ Dimensions: H7.0" x W19.0" x D27.5"
  Dimensions: H178mm x W483mm x D699mm
⇨ Max weight: 110 lbs; 50kg
⇨ Stealth black color
⇨ Tool-free serviceability
⇨ Access processors, memory, adapters, and SMP Expansion Module from top
⇨ Access power supplies and disks from front
⇨ Setup Program by pressing F1 at startup
⇨ Diagnostics (PC-Doctor) by pressing F2 at startup
⇨ SCSISelect by pressing Ctrl+A at startup
⇨ Information LED panel and front-accessible pull-out Light Path panel (1st and 2nd level diagnostics without removing cover)
⇨ Predictive Failure Analysis® alerts on processors, XceL4 Server Accelerator Cache, memory, fans, power supplies, and optional disks with IBM Director

All models: Maximum internal disk capacity: 293.6GB with two 146.8GB² hot-swap SCSI disks
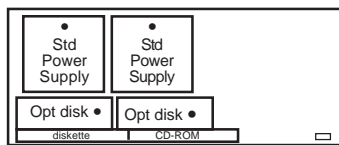
LIMITED WARRANTY[3]

⇨ **3 year parts and labor**
⇨ **International Warranty Service**[3]
⇨ **On site, 9 hr x 5 day coverage, next day response time**[7]
⇨ **1 year on site warranty service upgrade option (in eligible locations):**[7]
  • **24 hr x 7 day coverage, 2 hour response time** (No ServicePac available)
⇨ **Post warranty maintenance services available**
⇨ **24x7**[14] **toll-free support for warranty issues during the warranty period**[3]

See footnotes for important warranty information
US models announced July 1, 2003   • = Hot-swap

= Memory, HDDs and Preload Kit for Microsoft Windows 2000 or 2003 Datacenter Edition must be ordered as part of the IBM Datacenter Solution for these models.

IBM @server™ xSeries™ 450 (July 2003)

IBM® Type-model	Qty x Processor	L3 cache	L4 cache	Memory	Disk	SCSI controller	Mechanical	Slots x bays	SMP/RXE Exp Ports	Hot-swap pwr supplies	Mgmt adapter	Available date
8688-4RX	1 x Itanium 2™ 1.3Ghz	3.0MB	64MB	1GB Chipkill™	None	1xUltra320	4U⁴ rack	6x2	0/1	Two redundant	PCI	Jul 2003
8688-5RX	2 x Itanium 2™ 1.4GHz	4.0MB	64MB	2GB Chipkill™	None	1xUltra320	4U⁴ rack	6x2	0/1	Two redundant	PCI	Jul 2003
8688-6RX	2 x Itanium 2™ 1.5GHz	6.0MB	64MB	2GB Chipkill™	None	1xUltra320	4U⁴ rack	6x2	0/1	Two redundant	PCI	Jul 2003

Positioning	*Up to 4-way power for high-end databases, server consolidation and mission-critical business applications*
Processors	**1** or **2 x Intel® Itanium 2™ Processor 900Mhz or 1.0GHz** with 400MHz frontside bus
L2 cache	**256KB** each processor / on die of processor / at processor speed
L3 cache	**3MB, 4MB** or **6MB** each processor / on die of processor / at processor speed
L4 cache	**64MB XceL4™ Server Accelerator Cache**
	ECC / 64-bit 400MHz bus from Cache and Scalability Controller
Processor upgrade	**4-way SMP**
SMP Exp. Module	Not Applicable
Additional boards	One I/O Board (PCI-X Host Bridge, SCSI, ethernet, graphics, South Bridge, Super I/O, slot for Mgmt Adapter), one PCI Board (PCI-X Host Bridge, six PCI-X slots), one Midplane Board (connects SMP Exp Modules, I/O Board, PCI Board)

Memory	**1GB** or **2GB** std / **40GB** max when installing 2GB DIMMs into 20 slots / 28 DIMM gold-connector slots
	PC2100 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / DIMMs must be installed in matched pairs [a bank] / 2-way interleaving / **Active Memory™** with **Error Checking and Correcting (ECC), Chipkill™, Memory ProteXion™** (1, 2, 3, or 4-bit errors on same chip; up to two chips at once; redundant bit steering) / via memory mirroring (memory mirroring supported with any OS)

SCSI disk controller	LSI® 53C1030 / Ultra320 SCSI (LVD 320MB/sec) / dual channel RAID / 64-bit 66MHz PCI / integrated on I/O Board
SCSI implementation	One channel backplane for internal hot-swap disks (16-bit LVD cable to SCSI backplane) / ServeRAID adapter and SCSI cable required if attaching external storage enclosures
IDE controller	Enhanced IDE ATA-100 controller in South Bridge / one one-drop IDE cable to backplane for diskette and CD-ROM
Disk - capacity/bays	No disks standard / supports up to 15K rpm SCSI disks / two hot-swap bays / converged tray / 80-pin SCA-2 connectors

Mechanical	**EIA 19" rack models (4U⁴)** x 28" deep / supported in NetBAY™ Racks (such as NetBAY42 SR, NetBAY42 ER)

Chipset	**IBM XA-64™ chipset** / IBM Cache and Scalability Controller with L4 cache controller / IBM Memory I/O Controller with two remote I/O ports (each to a IBM PCI-X Host Bridge) / each IBM PCI-X Host Bridge provides three peer PCI buses / PCI 2.2 Bus E supports graphics, adapter slot with Remote Supervisor Adapter, VIA® 82C686B South Bridge (IDE ATA-100, USB, Super I/O PC97317VUL [keyboard, mouse]) / PCI 2.2 Bus F supports SCSI, ethernet / PCI-X Bus A, B, C, D support PCI-X slots / designed to the PCI-X 1.0 specification
Slots (Active™ PCI-X)	Six hot-swap PCI-X 1.0 slots¹⁰ available with power and attention indicator lights (optical sensors control power to slot) / **hot replace, hot upgrade, hot expansion** / separated by insulative plastic dividers
RXE Expansion Port	**One port to support up to 12 additional PCI-X slots via an optional IBM RXE-100 Remote Expansion Enclosure**

CD-ROM / diskette	24X/10X/24X/8X⁶ CD-RW/DVD-ROM Combo IV drive standard / two removable Ultrabay™ 2000 bays
Ethernet	Dual Broadcom® 5704 10/100/1000 ethernet controller / on I/O Board / full duplex / 64-bit 66MHz PCI bus / Wake on LAN®
Graphics controller	SVGA / S3® Savage4 Pro / on I/O Board / 8MB SDRAM 125MHz std/max / up to 1280x1024 at 64K colors at 85Hz
Ports	*Rear:* RXE-100 Expansion Port (to connect optional RXE-100), RXE Management Port, two USB (Vers 1.1), analog DB-15 graphics, ethernet / no serial or parallel ports / *no keyboard or mouse* / *Front:* one USB (Vers 1.1)

Security	Power-on and administrator passwords / unattended boot / selectable boot

Systems mgmt	**Remote Supervisor Adapter** / PCI adapter / includes 10/100 ethernet, RJ-11, and serial connectors / provides remote console and mgmt / power on/off system / monitors power status, op system, temperature, disks, fans, power supplies
Diagnostics	**Light Path Diagnostics™** / primary indicator on information panel with LEDs associated with failing components / IBM Real Time Diagnostics (operated through IBM Director) available even while server running
Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director, and others

Itanium 2 1.3GHz/3MB L3 Cache Proc Upg	73P7076
Itanium 2 1.4GHz/4MB L3 Cache Proc Upg	73P7077
Itanium 2 1.5GHz/6MB L3 Cache Proc Upg	73P7078
EXA 512MB PC2100 CL2.5 ECC DDR SDRAM	73P2027
EXA 1GB PC2100 CL2.5 ECC DDR SDRAM	73P2028
EXA 2GB PC2100 CL2.5 ECC DDR SDRAM	73P2030
IBM 73.4GB 15K Ultra320 SCSI Hot-Swap	32P0735
IBM 146.8GB 10K Ultra320 SCSI Hot-Swap	32P0728
IBM ServeRAID™-4Mx Ultra160 SCSI Adapter	06P5736
NetXtreme Dual Port Gigabit Ethernet Adapter	31P6401
Removable 3.5" Diskette Drive Ultrabay 2000	08K9603
IBM T540 15" Flat Panel Color Monitor (black)	9511AG4

Keyboard / mouse	None standard (because rack-based) / USB only
Power supplies	*Std:* two; *max:* two / hot-swap / 1050 watts at 220v or 550 watts at 110v / redundant at 220v with two power supplies / front access / worldwide / voltage-sensing / auto-restart / fans in each power supply / PFA
Cooling fans	Four hot-swap, redundant, multi-speed fans / one additional fan in each power supply / PFA

Other options at **ibm.com**/pc/us/accessories

Six available 3.3 volt Active PCI-X slots:

Slot 1: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 2: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 3: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 4: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 5: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus C
Slot 6: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus D
Slot: used by Remote Supervisor Adp, 32-bit 33MHz

Std Power Supply	Std Power Supply
Opt disk •	Opt disk •
diskette	CD-ROM

4U Rack

Bay① 3.5", 0.5", access, open (Ultrabay 2000)
Bay② 3.5", 0.5", access, Combo (Ultrabay 2000)
Bay③ 3.5", SL 1", access, hot-swap
Bay④ 3.5", SL 1", access, hot-swap

⇨ Dimensions: H7.0" x W19.0" x D27.5"
   Dimensions: H178mm x W483mm x D699mm
⇨ Max weight: 110 lbs; 50kg
⇨ Stealth black color
⇨ Tool-free serviceability
⇨ Access processors, memory, adapters, and SMP Expansion Module from top
⇨ Access power supplies and disks from front
⇨ Setup Program by pressing F1 at startup
⇨ Diagnostics (PC-Doctor) by pressing F2 at startup
⇨ SCSISelect by pressing Ctrl+A at startup
⇨ Information LED panel and front-accessible pull-out Light Path panel (1st and 2nd level diagnostics without removing cover)
⇨ Predictive Failure Analysis® alerts on processors, XceL4 Server Accelerator Cache, memory, fans, power supplies, and optional disks with IBM Director

All models: Maximum internal disk capacity: 293.6GB with two 146.8GB² hot-swap SCSI disks

LIMITED WARRANTY³

⇨ **1 year parts and labor**
⇨ **International Warranty Service³**
⇨ **On site, 24 hr x 7 day coverage, same day response time⁷**
⇨ **1 year on site warranty service upgrade option (in eligible locations):⁷**
   • **24 hr x 7 day coverage, 2 hour response time** (ServicePac part numbers avail. May 2003)
⇨ **Post warranty maintenance services available**
⇨ **24x7¹⁴ toll-free support for warranty issues during the warranty period³**

See footnotes for important warranty information
US models announced July 1, 2003
• = Hot-swap

(X450B) © IBM Corp. July 2003

IBM® Type-model	Qty x Processor	L3 cache	L4 cache	Memory	Disk	SCSI controller	Mech- anical	Slots x bays	SMP/RXE Exp Ports	Hot-swap pwr supplies	Mgmt adapter	Available date
8855-1AX	2 x Itanium 2™ 1.3Ghz	3.0MB	64MB	0GB Chipkill™	None	2 x Ultra320	4U⁴ rack	6x2	0/1	Two redundant	PCI	Dec 2003
8855-1RX	2 x Itanium 2™ 1.3Ghz	3.0MB	64MB	1GB Chipkill	None	2 x Ultra320	4U rack	6x2	0/1	Two redundant	PCI	Dec 2003
8855-2AX	2 x Itanium 2™ 1.4GHz	4.0MB	64MB	0GB Chipkill	None	2 x Ultra320	4U rack	6x2	0/1	Two redundant	PCI	Dec 2003
8855-2RX	2 x Itanium 2™ 1.4GHz	4.0MB	64MB	2GB Chipkill	None	2 x Ultra320	4U rack	6x2	0/1	Two redundant	PCI	Dec 2003
8855-3AX	2 x Itanium 2™ 1.5GHz	6.0MB	64MB	0GB Chipkill	None	2 x Ultra320	4U rack	6x2	0/1	Two redundant	PCI	Dec 2003
8855-3RX	2 x Itanium 2™ 1.5GHz	6.0MB	64MB	2GB Chipkill	None	2 x Ultra320	4U rack	6x2	0/1	Two redundant	PCI	Dec 2003

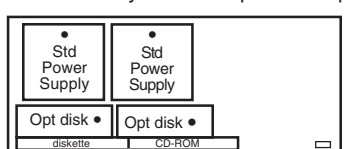|	
Positioning	*Up to 16-way power for high-end databases, server consolidation and mission-critical business applications*
Processors	**2 x Intel® Itanium 2™ Processor 1.3GHz, 1.4GHz or 1.5GHz** with 400MHz frontside bus
L2 cache	**256KB** each processor / on die of processor / at processor speed
L3 cache	**3MB, 4MB** or **6MB** each processor / on die of processor / at processor speed
L4 cache	**64MB XceL4™ Server Accelerator Cache**
	ECC / 64-bit 400MHz bus from Cache and Scalability Controller
Processor upgrade	**4-way SMP** per chassis
SMP Exp. Module	**Up to 16-way** using four x455 chassis / requires appropriate 8-way or 16-way kits
Additional boards	One I/O Board (PCI-X Host Bridge, SCSI, ethernet, graphics, South Bridge, Super I/O, slot for Mgmt Adapter), one PCI Board (PCI-X Host Bridge, six PCI-X slots), one Midplane Board (connects SMP Exp Modules, I/O Board, PCI Board)
Memory	**1GB** or **2GB** std (using 512MB DIMMs)/ **56GB** max when installing 2GB DIMMs into 28 slots / 28 DIMM gold-connector slots **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / DIMMs must be installed in matched pairs [a bank] / 2-way interleaving / **Active Memory™** with **Error Checking and Correcting (ECC), Chipkill™, Memory ProteXion™** (1, 2, 3, or 4-bit errors on same chip; up to two chips at once; redundant bit steering) / via memory mirroring (memory mirroring supported with any OS) / **Hot-add and Hot-swappable** using Microsoft Windows Server 2003
SCSI disk controller	LSI® 53C1030 / Ultra320 SCSI (LVD 320MB/sec) / dual channel RAID / 64-bit 66MHz PCI / integrated on I/O Board
SCSI implementation	Two channel backplane for internal hot-swap disks (16-bit LVD cable to SCSI backplane) / ServeRAID adapter and SCSI cable required if attaching external storage enclosures
IDE controller	Enhanced IDE ATA-100 controller in South Bridge / one one-drop IDE cable to backplane for diskette and CD-ROM
Disk - capacity/bays	No disks standard / supports up to 15K rpm SCSI disks / two hot-swap bays / converged tray / 80-pin SCA-2 connectors
Mechanical	**EIA 19" rack models (4U⁴)** x 28" deep / supported in NetBAY™ Racks (such as NetBAY42 SR, NetBAY42 ER)
Chipset	**IBM XA-64™ chipset** / IBM Cache and Scalability Controller with L4 cache controller / IBM Memory I/O Controller with two remote I/O ports (each to a IBM PCI-X Host Bridge) / each IBM PCI-X Host Bridge provides three peer PCI buses / PCI 2.2 Bus E supports graphics, adapter slot with Remote Supervisor Adapter, VIA® 82C686B South Bridge (IDE ATA-100, USB, Super I/O PC97317VUL [keyboard, mouse]) / PCI 2.2 Bus F supports SCSI, ethernet / PCI-X Bus A, B, C, D support PCI-X slots / designed to the PCI-X 1.0 specification
Slots (Active™ PCI-X)	Six hot-swap PCI-X 1.0 slots¹⁰ available with power and attention indicator lights (optical sensors control power to slot) / **hot replace, hot upgrade, hot expansion** / separated by insulative plastic dividers
RXE Expansion Port	One RXE-100 Remote Expansion Enclosure can be shared between two x455 4-way, 8-way, or 16-way xSeries 445 servers or attached alone. Both PCI-X 6-packs must be installed to support **RIO sharing** as each server will access six additional PCI-X slots.
CD-ROM / diskette	24X/10X/24X/8X⁶ CD-RW/DVD-ROM Combo IV drive standard / two removable Ultrabay™ 2000 bays
Ethernet	Dual Broadcom® 5704 10/100/1000 ethernet controller / on I/O Board / full duplex / 64-bit 66MHz PCI bus / Wake on LAN®
Graphics controller	SVGA / S3® Savage4 Pro / on I/O Board / 8MB SDRAM 125MHz std/max / up to 1280x1024 at 64K colors at 85Hz
Ports	*Rear:* RXE-100 Expansion Port (to connect optional RXE-100), RXE Management Port, two USB (Vers 1.1), analog DB-15 graphics, ethernet / no serial or parallel ports / *no keyboard or mouse / Front:* one USB (Vers 1.1)
Security	Power-on and administrator passwords / unattended boot / selectable boot
Systems mgmt	**Remote Supervisor Adapter** / PCI adapter / includes 10/100 ethernet, RJ-11, and serial connectors / provides remote console and mgmt / power on/off system / monitors power status, op system, temperature, disks, fans, power supplies
Diagnostics	**Light Path Diagnostics™** / primary indicator on information panel with LEDs associated with failing components / IBM Real Time Diagnostics (operated through IBM Director) available even while server running
Software	**ServerGuide™** (CD-ROM installation and configuration utilities), IBM Director, and others
Keyboard / mouse	None standard (because rack-based) / USB only
Power supplies	*Std:* two; *max:* two / hot-swap / 1050 watts at 220v or 550 watts at 110v / redundant at 220v with two power supplies / front access / worldwide / voltage-sensing / auto-restart / fans in each power supply / PFA
Cooling fans	Four hot-swap, redundant, multi-speed fans / one additional fan in each power supply / PFA

Itanium 2 1.3GHz/3MB L3 Cache Proc Upg	73P7076
Itanium 2 1.4GHz/4MB L3 Cache Proc Upg	73P7077
Itanium 2 1.5GHz/6MB L3 Cache Proc Upg	73P7078
512MB PC2100 CL2.5 ECC DDR SDRAM	33L5038
1GB PC2100 CL2.5 ECC DDR SDRAM	33L5039
2GB PC2100 CL2.5 ECC DDR SDRAM	33L5040
IBM 73.4GB 15K Ultra320 SCSI Hot-Swap	32P0735
IBM 146.8GB 10K Ultra320 SCSI Hot-Swap	32P0728
IBM ServeRAID™ 6M Ultra320 256MB Cache	02R0988
IBM RXE-100 Remote Storage Enclosure	86841RX
4-way to 8-way Expansion Option	73P9911
8-way to 16-way Supplemental Option	73P9715

Six available 3.3 volt Active PCI-X slots:

Slot 1: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 2: fullsize, 64-bit 66MHz PCI-X, hot-swap Bus A
Slot 3: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 4: fullsize, 64-bit 100MHz PCI-X, hot-swap, Bus B
Slot 5: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus C
Slot 6: fullsize, 64-bit 133MHz PCI-X, hot-swap, Bus D
Slot: used by Remote Supervisor Adp, 32-bit 33MHz

4U Rack

```
+-------------------------------------------------+
|  +---------+   +---------+                       |
|  |  Std    |   |  Std    |                       |
|  |  Power  |   |  Power  |                       |
|  |  Supply |   |  Supply |                       |
|  +---------+   +---------+                       |
|  Opt disk •   Opt disk •                         |
|     diskette        CD-ROM                       |
+-------------------------------------------------+
```

Bay① 3.5", 0.5", access, open (Ultrabay 2000)
Bay② 3.5", 0.5", access, Combo (Ultrabay 2000)
Bay③ 3.5", SL 1", access, hot-swap
Bay④ 3.5", SL 1", access, hot-swap

➪ Dimensions: H7.0" x W19.0" x D27.5"
  Dimensions: H178mm x W483mm x D699mm
➪ Max weight: 120 lbs; 54.30kg
➪ Stealth black color
➪ Tool-free serviceability
➪ Access processors, memory, adapters, and SMP Expansion Module from top
➪ Access power supplies and disks from front
➪ Setup Program by pressing F1 at startup
➪ Diagnostics (PC-Doctor) by pressing F2 at startup
➪ SCSISelect by pressing Ctrl+A at startup
➪ Information LED panel and front-accessible pull-out Light Path panel (1st and 2nd level diagnostics without removing cover)
➪ Predictive Failure Analysis® alerts on processors, XceL4 Server Accelerator Cache, memory, fans, power supplies, and optional disks with IBM Director

All models: Maximum internal disk capacity: 293.6GB with two 146.8GB² hot-swap SCSI disks

See footnotes for important warranty information
US models announced November 11, 2003
• = Hot-swap

(X455A) © IBM Corp. November 2003

IBM® Type-model	Supported blades	Blade bays std / max	Switch module bays std / max	Switch module bays (type)	Management module bays std / max	Power module bays std / max	Power Module Wattage	Blower module bays std / max	Mech-anical	Available date
8677-1XX	8678 / 8832 HS20	0 / 14	0 / 4	Ethernet, Fibre Channel	1 / 1	2 / 4	1200W	2 / 2	7U⁴ rack	Nov 2002
8677-2XX	8678 / 8832 HS20	0 / 14	0 / 4	Ethernet, Fibre Channel	1 / 2	2 / 4	1800W	2 / 2	7U⁴ rack	Oct 2003

Positioning	*Flexible, innovative design provides investment protection and reduces deployment costs*
Description	Provides common resources shared by blade servers such as power, system management, cabling, ethernet management and expansion, external Fibre Channel storage switching and connectivity, and I/O (diskette drive, CD-ROM drive, and ports for USB, keyboard, video, mouse)
Blade bays	Supports 8678 and 8832 HS20 blades (and HS20 SCSI Storage Expansion Units) / 14 hot-pluggable bays / front access
Switch modules	*Std:* none; *max:* four / hot-swap / rear access
Ethernet Switch Module	Supports two *4-port GB Ethernet Switch Modules* in bays 1 and 2 / one Ethernet Switch Module required for ethernet support on HS20 blade server (two modules to support both ethernet controllers on HS20 and for failover redundancy) / bays 1 and 2 wired to the HS20 dual integrated ethernet controllers / four external ports / connects to std mgmt module
Fibre Channel Switch Module	Supports two *2-port Fibre Channel Switch Modules* in bays 3 and 4 / one Fibre Channel Switch Module required for one of two ports on optional Fibre Channel Expansion Card (two modules to support both ports and for failover redundancy) / bays 3 and 4 wired to the HS20 I/O expansion option connector / two external 2GBps small form factor pluggable ports
Management modules	*Std:* one; *max:* one or two / hot-swap / rear access / comprehensive system management functions / PowerPC® 401 controller / communicates with integrated system management processor on each HS20 server blade / multiplexor for console connectivity / ports: DB-15 analog video port, PS/2 keyboard port, PS/2 mouse port, 10/100 ethernet remote management connection port / all ports shared by up to 14 blade servers
Power modules	*Std:* two in bays 1 and 2 (with two 9ft IEC 320-C13 to IEC 320-C14 cables for intrarack power distribution); *max:* four / hot-swap / rear access / 1200 watts at 220v / both redundant to each other (N+N redundancy) / two std modules supply power to all modules and blade bays 1 through 6 / power for bays 7 through 14 requires two additional power modules in bays 3 and 4 (redundant to each other) / worldwide / voltage-sensing / auto-restart / no fans in each power module
Blower modules	*Std:* two; *max:* two / hot-swap / redundant / variable speed / rear access / 325 cubic ft per min (CFM) / front to back airflow
Mechanical	**EIA 19" rack models (7U⁴)** x 28" deep / supported in NetBAY™ Racks (such as NetBAY42 ER, NetBAY42 SR)
CD / diskette / USB	24X-10X⁶ CD-ROM / 3.5" 1.44MB diskette drive / one USB port (Version 1.1) / all USB interface / not removable / front access / shared by up to 14 blade servers / requests for CD-ROM, diskette drive, and USB port by pressing CD select button on server blade front panel
Keyboard / mouse	None standard / provides KVM console support / requests for keyboard, mouse, and video by pressing the display button on server blade front panel / supports NetBAY ACT CAT5 chaining solutions
Ports	*Rear:* keyboard (PS/2), mouse (PS/2), analog DB-15 graphics (on standard mgmt module) / no serial or parallel ports / *Front:* one USB (Version 1.1)
Security	Login password for remote connection / secure socket layer (SSL) security for remote management access / recommended in rack environment providing security through lockable doors or other security measures
Ethernet	One of the dual integrated gigabit ethernet controllers on each HS20 blade servers connects to an optional *4-port GB Ethernet Switch Module* (the second HS20 ethernet controller requires a second optional *4-port GB Ethernet Switch Module*)
Systems mgmt	Provides remote console and mgmt / power on/off blades/modules / monitors power status, operating system, temperature, disks, blowers, power modules / system diagnostic programs provided through IBM Director software
System LED panel	System LED panel provides power-on, location, over-temperature, information, and system-error conditions

NetBAY 1U Flat Panel Monitor Console Kit (with kybd/monitor)	32P1031	IBM 1200W Power Supply Module (includes two modules)	48P7052
NetBAY 2U Flat Panel Monitor Console Kit (with kybd/monitor)	32P1702	IBM 1800W Power Supply Module (includes two modules)	13N0570
NetBAY ACT Local Console Manager (CAT5 KVM cabling)	1735L04	IBM KVM/Redundant Management Module	48P7055
NetBAY ACT Remote Console Manager (CAT5 KVM cabling)	1735R16	IBM BladeCenter 4-port GB Ethernet Switch Module	48P7054
NetBAY ACT 250mm KVM Conversion Option	32P1636	IBM BladeCenter 2-port Fibre Channel Switch Module	48P7062
NetBAY ACT 1.5m KVM Conversion Option	32P1652	IBM BladeCenter Acoustic Attenuation Module (for rear)	49P2694
IBM Sleek 2-Button Stealth Black Mouse	28L3673	IBM FAStT700 Fibre Channel Storage Server	17421RU
NetBAY42 Enterprise Rack Cabinet	930842S	IBM FAStT200 Storage Server	35421RU
NetBAY42 Standard Rack Cabinet	9306420	IBM T541 15" Flat Panel Color Monitor (black)	9512AB1
NetBAY25 Standard Rack Cabinet	9306250	• Other options at **ibm.com**/pc/us/accessories	
APC Smart-UPS 5000RMB	37L6861	• Solutions available from IBM BladeCenter Alliance program partners	

Front

LED panel   Bay 1   Bay 2

○○○○□ ▯ | USB CD-ROM | USB Diskette |

| B 1 | B 2 | B 3 | B 4 | B 5 | B 6 | B 7 | B 8 | B 9 | B 10 | B 11 | B 12 | B 13 | B 14 |

Blade bays

Rear

| SM 3 • | SM 1 • | PM 3 • | Blower module 1 • (std) | PM 1 • | MM 1 • |
| SM 4 • | SM 2 • | PM 4 • | Blower module 2 • (std) | PM 2 • | MM 2 • |

Switch modules   Power modules   Power modules (both std)   Management module (std)

Module bays

➾ Dimensions: H12.0" x W17.5" x D28"
  Dimensions: H304.2mm x W444mm x D711.2mm
➾ Weight: 99 to 240 lb; 44.91 to 108.86kg
➾ Stealth black color bezel
➾ Tool-free customer serviceability
➾ Access HS20 server blades and SCSI Expansion Units from front
➾ Access modules from rear
➾ Midplane in center of system to interface for all major system components
➾ Predictive Failure Analysis® alerts on blowers, blade server memory, processor(s), and optional disk(s) with IBM Director

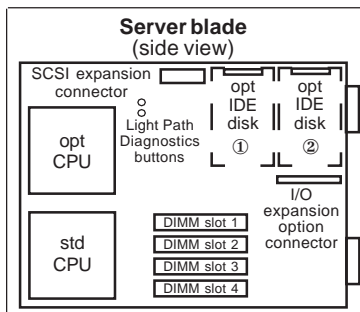| Switch module bay	Switch module function
1	Ethernet link 1 for all blade servers
2	Ethernet link 2 for all blade servers
3	Network connection 1 for all blade server I/O expansion options (Fibre Channel)
4	Network connection 2 for all blade server I/O expansion options (Fibre Channel)

LIMITED WARRANTY³

➾ **3 year parts and labor**
➾ **International Warranty Service³**
➾ **On site, 8 am - 5 pm, Mon - Fri coverage excluding holidays, next business day response time⁷**
➾ **On site service upgrade options (in eligible locations):⁷**
  - **3 year IOR 24x7, 2 hr avg response** (ServicePac® part num 21P2074)
  - **3 year IOR 24x7, 4 hr avg response** (ServicePac part num 21P2073)
  - **3 year IOR 9x5, 4 hr avg response** (ServicePac part num 21P2072)
  - **5 year IOR 9x5, 4 hr avg response** (ServicePac part num 69P9247)
  - **5 year IOR 24x7, 2 hr avg response** (ServicePac part num 69P9249)
  - **Other ServicePac options at ibm.com/services/its/us/ source/wamomxeu.pdf**
➾ **24x7¹⁴ toll-free support for warranty issues during the warranty period³**

See footnotes for important warranty information

(BC1) © IBM Corp. October 2003

• = Hot-swap

US models announced September 24, 2002 or October 14, 2003

IBM® Type-model	Qty x Processor[1]	Memory	Frontside Bus Mhz	Disk	Disk controller	Disk bays	SCSI support with optional stor exp unit	Slots x bays	Mech- anical	Required chassis	Available date
✄ 8678-21X	1 x Xeon™ 2.0GHz	512MB	400Mhz	None (open)	EIDE	2 fixed	2 hot-swap Ultra320	0x2	6U[4] blade	BladeCenter	Nov 2002
✄ 8678-41X	1 x Xeon 2.4GHz	512MB	400Mhz	None (open)	EIDE	2 fixed	2 hot-swap Ultra320	0x2	6U blade	BladeCenter	Nov 2002
☞ 8678-51X	1 x Xeon 2.67GHz	512MB	400Mhz	None (open)	EIDE	2 fixed	2 hot-swap Ultra320	0x2	6U blade	BladeCenter	Mar 2003
☞ 8678-61X	1 x Xeon 2.8GHz	512MB	400Mhz	None (open)	EIDE	2 fixed	2 hot-swap Ultra320	0x2	6U blade	BladeCenter	Mar 2003

Positioning	*Ultra-dense, highly manageable modular computing platform with superior performance*
Processor(s)	**1 x Intel® Xeon 2.0 to 2.8GHz** with 400 MHz frontside bus / Hyper-Threading technology / NetBurst™ microarchitecture
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Server blade contains two Intel 604-pin micro-PGA ZIF sockets, four memory DIMM slots, two IDE connectors, one SCSI expansion connector, one I/O expansion option connector, and integrated graphics and dual ethernet
Memory	**512MB** std / 8GB max[13] / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
IDE controller	Enhanced IDE ATA-100 controller in CSB5 South Bridge / two connectors on planar / each supports one 2.5" IDE disk / no cable as IDE disk attaches to riser card and tray (included with option kit) / each IDE connector on separate bus
IDE disk bays	Supports max of two IDE disks / space for only one IDE disk if an I/O expansion option installed [Fibre Channel]
SCSI disk controller	None / **supports optional SCSI Storage Expansion Unit** (a blade occupying adjacent blade slot / connects to HS20 via one connector / LSI Logic® 53C1020 Ultra320 SCSI controller [LVD 320MB/sec] / 64-bit 100MHz PCI-X Bus B from CIOB-X2 I/O Bridge (IMB2 bus to Host Bridge) / supports **RAID-1 mirroring** [Embedded Mirroring] with two hot-swap 3.5" one-inch high SL SCSI disks in front bays / one 16-bit internal channel / no cables or external connector)
SCSI disk bays	Supports max of two hot-swap 3.5" SL Ultra320 SCSI disks in optional SCSI Storage Expansion Unit / 80-pin SCA-2 connectors / **all SCSI bays Ultra320-enabled**
External storage	Support for IBM TotalStorage™ solutions (including FAStT and NAS family of products)
Mechanical	Supported in IBM BladeCenter (type 8677) / BladeCenter supported in 28" deep racks such as the IBM NetBAY™ Rack products
Architecture / chipsets	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / one CIOB-X2 I/O Bridge (IMB2 bus to Host Bridge) for two PCI-X Buses with Bus A for ethernet and Bus B for ethernet and the I/O expansion option connector / CSB5 South Bridge (Thin IMB to Host Bridge) for EIDE, USB, LPC bus to Super I/O, and PCI 2.2 Bus C with graphics controller / National Semiconductor® PC87417 Super I/O chip
Bus slots	No PCI or PCI-X slots (expansion via modules or network-interface option connector)
Ethernet controllers	Two gigabit 10/100/1000 ethernet controllers / Broadcom® BCM5703 / on blade / two PCI-X 64-bit 100MHz buses / full duplex / Wake on LAN® / Alert Standard Format 1.0 / teaming and failover support / one of the dual controllers connects to an optional *4-port GB Ethernet Switch Module* (the second controller requires a second optional Ethernet Switch Module)
Network-interface	**One connector for I/O expansion option** (Fibre Channel Expansion Card) / requires same interface modules in bays 3 and 4 of BladeCenter / all blades in a single BladeCenter must contain the same expansion card (or no expansion card) / ethernet and serial I/O expansion cards planned for future release[20]
CD / diskette / USB	None / requests for CD-ROM, diskette drive, and USB port in BladeCenter by pressing CD select button on front control panel
Kybd / video / mouse	None / requests for keyboard, mouse, and video in BladeCenter by pressing the display button on front control panel
Graphics	SVGA / ATI® Rage XL / on blade / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus

Systems mgmt	**IBM integrated system management processor** (ISMP) / H8S2148 / on blade / provides system and environmental monitoring, event recording, alert capability / RS-485 interface for communication with BladeCenter management module	Xeon 2.0GHz/512KB L2 Cache Proc Upg	48P7060
		Xeon 2.4GHz/512KB L2 Cache Proc Upg	48P7096
		Xeon 2.67Ghz/512KB L2 Cache Proc Upg	73P5982
		Xeon 2.8Ghz/512KB L2 Cache Proc Upg	73P5983
Diagnostics	**Light Path Diagnostics**™ (LED lights indicate failing component) and on-board diagnostics (via PC-Doctor in BIOS)	512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM	33L5038
		1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5039
		2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM	33L5040
Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode	IBM HS20 SCSI Storge Expansion Unit (blade)	48P7058
Software ship group	Documentation CD, IBM Director 4.1 CD, Device Driver CD	IBM HS20 Fibre Channel Expansion Card (with two ports; each port requires a FC Switch Module)	48P7061
Cooling fans	Uses cooling from BladeCenter (type 8677) / thermal sensors on each processor and BladeCenter modules and front panel	IBM HS20 40GB[2] 5400 rpm ATA-100 HDD	48P7063
		36.4GB 15K Ultra160 SCSI Hot-Swap SL HDD*	06P5768
Power supply	Uses power module(s) in BladeCenter (type 8677)	36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD*	06P5776
Prerequisites	Monitor, keyboard, mouse for setup; ethernet switch module, disk, BladeCenter (type 8677), operating system	73.4GB 10K Ultra160 SCSI Hot-Swap SL HDD*	06P5756
		Disk requires SCSI Storage Expansion Unit	

Server blade
(side view)

SCSI expansion connector
Light Path Diagnostics buttons
opt CPU
opt IDE disk ①
opt IDE disk ②
std CPU
DIMM slot 1
DIMM slot 2
DIMM slot 3
DIMM slot 4
I/O expansion option connector

A control panel on top front of blade has following LEDs:
• Power good
• Blade location
• Over temperature
• Information
• General fault
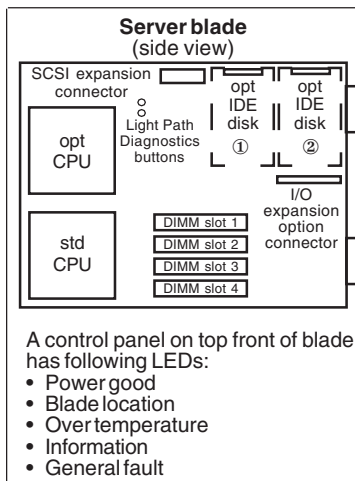
Bay ① 3.5", 9.5mm, no front access, optional ThinkPad® IDE disk
Bay ② 3.5", 9.5mm, no front access, optional ThinkPad IDE disk

➪ Stealth black front bezel
➪ H 9.7" x W 1.14" x D 17.6"; H 24.5cm x W 2.9cm x D 44.6cm
➪ 12 lbs; 5.4kg (max configuration)
➪ Configuration/Setup Utility: F1 at startup
➪ Diagnostics (PC-Doctor™): F2 at startup
➪ System Partition Boot: ALT+F1 at startup
➪ Network Boot: F12 at startup
➪ PXE Boot Agent Utility: Ctrl+S at startup
➪ Blade control panel on each HS20 blade server provides media select button, keyboard/mouse/video select button, and indicators for blade error, information, location, disk activity, and power
➪ Predictive Failure Analysis® alerts on memory, processor(s), and optional disk(s) with IBM Director

Maximum internal disk capacity for each HS20 blade server[13]:
80GB with two 40GB EIDE disks or
293.6GB* with two 146.8GB SL SCSI disks

See footnotes for important warranty information
☞ US models announced March 11, 2003; others September 24, 2002
✄ US models withdrawn effective June 27, 2003 (21X) or September 26, 2003 (41X)

IBM® Type-model	Qty x Processor[1]	Memory	Frontside Bus Mhz	Disk	Disk controller	Disk bays	SCSI support with optional stor exp unit	Slots x bays	Mech-anical	Required chassis	Available date
8832-21X	1 x Xeon™ 2.8BGhz	512MB	533Mhz	None (open)	EIDE	2 fixed	2 hot-swap Ultra320	0x2	6U[4] blade	BladeCenter	July 2003
8832-31X	1 x Xeon 3.06GHz	512MB	533Mhz	None (open)	EIDE	2 fixed	2 hot-swap Ultra320	0x2	6U[4] blade	BladeCenter	Oct 2003
8832-G1X	1 x Xeon 3.2GHz	1GB	533Mhz	None (open)	EIDE	2 fixed	2 hot-swap Ultra320	0x2	6U[4] blade	BladeCenter	Nov 2003

Positioning	*Ultra-dense, highly manageable modular computing platform with superior performance*
Processor(s)	Up to **1 x Intel® Xeon 3.2GHz** with 533MHz frontside bus / Hyper-Threading technology / NetBurst™ microarchitecture
L2 cache	**512KB** / on die of processor / at processor speed (no L3 cache)
SMP support	**2-way SMP** / up to two Xeon Processors (same speed/cache size)
Implementation	Server blade contains two Intel 604-pin micro-PGA ZIF sockets, four memory DIMM slots, two IDE connectors, one SCSI expansion connector, one I/O expansion option connector, and integrated graphics and dual ethernet
Memory	**512MB or 1GB** std / 8GB max[13] / two slots used / two slots available / **PC2100** 266MHz registered 184-pin ECC DDR-SDRAM DIMMs / four DIMM gold-connector slots on systemboard / DIMMs must be installed in matched pairs [a bank] / 2-way memory interleave / dual channel / memory bus runs at 2 x 100MHz / **Error Checking and Correcting (ECC)** via **16-bit Checksum Chipkill**™ (corrects 1, 2, 3, or 4-bit errors on same chip and detects 2- through 8-bit errors contained in two chips)
IDE controller/bays	Enhanced IDE ATA-100 controller in CSB6-U South Bridge / two connectors/buses on planar / each supports one 2.5" IDE disk / no cable as IDE disk attaches to riser card and tray (included with option kit) / Supports max of two IDE disks / space for only one IDE disk if an I/O expansion option installed [Fibre Channel] / **RAID-1 mirroring** standard
SCSI disk controller	None / **supports optional SCSI Storage Expansion Unit** (a blade occupying adjacent blade slot / connects to HS20 via one connector / LSI Logic® 53C1020 Ultra320 SCSI controller [LVD 320MB/sec] / 64-bit 133MHz PCI-X Bus B from CIOB-ES I/O Bridge (IMB2 bus to Host Bridge) / supports **RAID-1 mirroring** [Embedded Mirroring] with two hot-swap 3.5" one-inch high SL SCSI disks in front bays / one 16-bit internal channel / no cables or external connector)
SCSI disk bays	Supports max of two hot-swap 3.5" SL Ultra320 SCSI disks in optional SCSI Storage Expansion Unit / 80-pin SCA-2 connectors / **all SCSI bays Ultra320-enabled**
External storage	Support for IBM TotalStorage™ solutions (including FAStT and NAS family of products)
Mechanical	Supported in IBM BladeCenter (type 8677) / BladeCenter supported in 28" deep racks such as the IBM NetBAY™ Rack products
Architecture / chipsets	**ServerWorks® Grand Champion™ 4.0 LE** / CMIC LE Host Bridge (memory controller and I/O Bridge) / one CIOBE-S I/O Bridge (IMB2 bus to Host Bridge) for two PCI-X Buses with Bus A for ethernet and Bus B for ethernet and the I/O expansion option connector / CSB6-U South Bridge (Thin IMB to Host Bridge) for EIDE, USB, LPC bus to Super I/O, and PCI 2.2 Bus C with graphics controller / National Semiconductor® PC87417 Super I/O chip
Bus slots	No PCI or PCI-X slots (expansion via modules or network-interface option connector)
Ethernet controllers	Two gigabit 10/100/1000 ethernet controllers / Broadcom® BCM5704S / on blade / two PCI-X 64-bit 133MHz buses / full duplex / Wake on LAN® / Alert Standard Format 1.0 / teaming and failover support / one of the dual controllers connects to an optional *4-port GB Ethernet Switch Module* (the second controller requires a second optional Ethernet Switch Module)
Network-interface	**One connector for I/O expansion option** (Fibre Channel Expansion Card) / requires same interface modules in bays 3 and 4 of BladeCenter / all blades in a single BladeCenter must contain the same expansion card (or no expansion card) / ethernet and serial I/O expansion cards planned for future release[20]
CD / diskette / USB	None / requests for CD-ROM, diskette drive, and USB port in BladeCenter by pressing CD select button on front control panel
Kybd / video / mouse	None / requests for keyboard, mouse, and video in BladeCenter by pressing the display button on front control panel
Graphics	SVGA / ATI® Rage XL / on blade / 8MB SDRAM std/max / 32-bit 33MHz PCI 2.2 bus

Systems mgmt	**IBM integrated system management processor** (ISMP) / H8S2148 / on blade / provides system and environmental monitoring, event recording, alert capability / RS-485 interface for communication with BladeCenter management module	Xeon 2.8BGhz/512KB L2 Cache Proc Upg 73P9073
		Xeon 3.06Ghz/512KB L2 Cache Proc Upg 73P9074
		Xeon 3.2Ghz/512KB L2 Cache Proc Upg 13N0650
		512MB PC2100 CL2.5 ECC DDR-SDRAM DIMM 33L5038
Diagnostics	**Light Path Diagnostics**™ (LED lights indicate failing component) and on-board diagnostics (via PC-Doctor in BIOS)	1GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM 33L5039
		2GB PC2100 CL2.5 ECC DDR-SDRAM RDIMM 33L5040
		IBM HS20 SCSI Storge Expansion Unit (blade) 48P7058
Security	Power-on password / administrator password / unattended boot / selectable boot / unattended start mode	IBM HS20 Fibre Channel Expansion Card (with two ports; each port requires a FC Switch Module) 48P7061
Software ship group	Documentation CD, IBM Director 4.1 CD, Device Driver CD	IBM HS20 40GB[2] 5400 rpm ATA-100 HDD 48P7063
Cooling fans	Uses cooling from BladeCenter (type 8677) / thermal sensors on each processor and BladeCenter modules and front panel	36.4GB 15K Ultra160 SCSI Hot-Swap SL HDD* 06P5768
		36.4GB 15K Ultra320 SCSI Hot-Swap SL HDD* 06P5776
Power supply	Uses power module(s) in BladeCenter (type 8677)	73.4GB 10K Ultra160 SCSI Hot-Swap SL HDD* 06P5756
Prerequisites	Monitor, keyboard, mouse for setup; ethernet switch module, disk, BladeCenter (type 8677), operating system	146.8GB 10K Ultra320 SCSI Hot-Swap SL HDD* 32P0728
		* Disk requires SCSI Storage Expansion Unit

Server blade
(side view)

- SCSI expansion connector
- Light Path Diagnostics buttons
- opt CPU
- opt IDE disk ①
- opt IDE disk ②
- I/O expansion option connector
- std CPU
- DIMM slot 1
- DIMM slot 2
- DIMM slot 3
- DIMM slot 4

A control panel on top front of blade has following LEDs:
- Power good
- Blade location
- Over temperature
- Information
- General fault

Bay ① 3.5", 9.5mm, no front access, optional ThinkPad® IDE disk
Bay ② 3.5", 9.5mm, no front access, optional ThinkPad IDE disk

- Stealth black front bezel
- H 9.7" x W 1.14" x D 17.6"; H 24.5cm x W 2.9cm x D 44.6cm
- 12 lbs; 5.4kg (max configuration)
- Configuration/Setup Utility: F1 at startup
- Diagnostics (PC-Doctor™): F2 at startup
- System Partition Boot: ALT+F1 at startup
- Network Boot: F12 at startup
- PXE Boot Agent Utility: Ctrl+S at startup
- Blade control panel on each HS20 blade server provides media select button, keyboard/mouse/video select button, and indicators for blade error, information, location, disk activity, and power
- Predictive Failure Analysis® alerts on memory, processor(s), and optional disk(s) with IBM Director

Maximum internal disk capacity for each HS20 blade server[13]:
80GB with two 40GB EIDE disks or
293.6GB* with two 146.8GB SL SCSI disks

See footnotes for important warranty information
US models announced July 1, 2003

Warranty information: For a copy of applicable product warranties, write to: Warranty Information, P.O. Box 12195, RTP, NC, 27709, Attn: Dept JDJA/B203. IBM makes no representation or warranty regarding third party products or services.

[1] MHz/GHz only measures microprocessor internal clock speed; many factors affect application perfomance.

[2] MB/GB/TB = 1 million/billion/trillion bytes when referring to storage capacity. Accessible capacity is less; up to 3GB is used in service partition.

[3] For terms and conditions or a copy of IBM's Statement of Limited Warranty, call 1 800 772-2227 in the U.S. Copies available upon request. Telephone support may be subject to additional charges. For onsite labor, IBM will attempt to diagnose and resolve the problem remotely before sending a technician. International Warranty Service is available in any country in which this product is sold and serviced. Service delivery methods and parts availability vary by country, may be different from that in the country of purchase, and are subject to change without notice. Fees and restrictions may apply in some countries.

[4] A single "U", or rack unit, is 1.75" or 44.45mm.

[5] S.M.A.R.T. stands for Self-Monitoring, Analysis and Reporting Technology.

[6] CD and DVD drives speeds are variable and are often less than the maximum.

[7] These services are available for machines normally used for business, professional, or trade purposes, rather than personal, family or household purposes. Not all machine types and models are covered. Service period begins with the equipment date of purchase. Service must be purchased during the original limited product warranty period. Service levels are response time objectives and are not guarantees. A service technician is scheduled to arrive at your location within two or four business hours or the next business day (depending on service) after remote problem determination is completed. For the 9x5x4-hour service, calls dispatched after 1:00 p.m. local time, you can expect the service technician to arrive by the morning of the next business day. For non-critical service requests, a service technician will arrive by the end of the following business day. If the machine problem turns out to be a Customer Replaceable Unit (CRU), IBM will express ship the part to you for quick replacement. Onsite 24x7x2-hour service is not available in all locations. External peripherals, such as racks, tape drives, and channel controllers, require their own, separate service coverage, they are not covered under the attached Machine. Service activation is required immediately following purchase. For ThinkPad notebooks requiring LCD or other component replacement, IBM may choose to perform service at the depot repair center. For failing non-IBM components, customer must provide replacement part unless IBM has a Technical Support Agreement with the manufacturer. Service does not cover accessories, supply items and certain parts such as batteries, frames and covers. Not available in all states; call your IBM representative for details.

[8] Subject to conditions.

[9] Some software may differ from retail version (if any) and may not include user manuals or all program functionality. Software license agreements may apply.

[10] Updated drivers and hot-swap services for certain operating systems may be required to support PCI hot-swap functions.

[11] Fire GL1, Fire GL2 and Fire GL4 are trademarks of ATI Technologies, Inc., and are used under license.

[12] Installation of 2GB RDIMMs requires BIOS and diagnostic firmware version 1.08 or later. When more than 8GB of memory is installed, the integrated SCSI controller must be disabled.

[13] Maximum memory and internal hard disk capacities may require the replacement of standard component with largest supported component available.

[14] Response times may vary. May exclude some holidays. Telephone support may be subject to additional charges.

[15] IBM makes no respresentations or warranties regarding non-IBM products and services that are ServerProven, including but not limited to the implied warranties of merchantability and fitness for particular purpose. These products are offered and warranted by third parties, not IBM.

[16] Asset ID allows your computer to be scanned by various radio frequency emitting devices which must be purchased separately from independent companies.

[17] Some software may differ from its retail version (if available), and may not include user manual or all program functionality. Software license agreements may apply.

[18] Diskettes and hard copy documentation available at extra charge.

[19] For combination drives, maximum possible speeds only are given in the following order: CD read, CD write, CD re-write, DVD read.

[20] Statement of direction and subject to availability.