June 24th 2002

Configuration and Options Guide

IBM @server xSeries

IBM IntelliStation®

ULTRA320 SCSI

Systems and Options

External Expansion

Rack Cabinets & Options

Fibre Channel Solutions

Internal/External Cabling

System Management H/W

@server PROVEN

xSeries

xSeries 235

xSeries 232

xSeries 220

xSeries 200

xSeries 255

xSeries 380

xSeries 300

xSeries 330

xSeries 342

xSeries 343

Rack Enclosures

xSeries 440

RXE-100
I/O Enclosure

xSeries 360

EXP300
Storage Enclosure

FAStT EXP500
Storage Enclosure

FAStT200 (HA)
Storage Server

R Pro

M Pro
Uniprocessor
Models

M Pro
Dual Processor
Models

Z Pro

IntelliStation

Changes in this Edition

CHANGE MADE	SECTION(S) IMPACTED
Added New xSeries 235 and 255 families and options	**New x235 and x255 sections**
Added New x360 models	**Added to x360 section**
Removed IDE Adapter	**Removed adapter from IDE models product sections**
Removed xSeries 250 and 350 families (withdrawn with effect from 31/05/02)	**x250 and x350 sections removed**
Removed xSeries Hosting Appliance Server	**Appliance Server section removed**
Removed NetBAY3/3E and options (withdrawn with effect from 31/05/02)	**NetBAY 3/3E Stackable Enclosures section removed**
Removed withdrawn Serial I/O options	**Removed Appendix F: Serial I/O. Updated Serial I/O Adapter entry in the I/O charts in all relevant product sections**
Removed Useful URLs, Server Product Positioning, Configurator Description information	**Appendix H:, Server Product Positioning, Configurator Description secitons removed**

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Keep Us Informed - Feedback

The IBM Configuration and Options Guide Feedback Form:

Please give us the benefit of your experience

1. Please rate the value of the IBM Configuration and Options Guide overall.

   Very useful ❒
   Useful ❒
   Not useful ❒

2. Please rate the usefulness of these sections in the IBM Configuration and Options Guide:

	Very Useful	Useful	Not Useful
Changes in this Edition	❒	❒	❒
Business Models Summary	❒	❒	❒
Product Family Pages	❒	❒	❒
Sample Configurations	❒	❒	❒
Fibre Channnel Solutions O/view	❒	❒	❒
Rack and Options Section	❒	❒	❒
Rack Power Section	❒	❒	❒
Tape Drives & Libraries Sections	❒	❒	❒
UPS Runtimes Section	❒	❒	❒
External SCSI Cabling Chart	❒	❒	❒
Internal Storage Cabling Overview	❒	❒	❒
System Management Section	❒	❒	❒
Selection Guidance	❒	❒	❒

3. How would you rate the quality of information contained in the IBM Configuration and Options Guide?

   ❒ Too much
   ❒ About right
   ❒ Not enough

4. Does the format allow you to assemble a preliminary xSeries or IntelliStation configuration?

   ❒ Quickly
   ❒ Able to get it done
   ❒ With some difficulty

5. Are you aware of the other xSeries configurators that are available on PartnerInfo and the Web? at URL: http://www.ibm.com/pc/europe/configurators

   ❒ Yes
   ❒ No - but I will take a look

6. Are you a...? (Check one)

   ❒ PC Dealer ❒ IBM Sales Support ❒ IBM Customer
   ❒ PC Distributor ❒ IBM Field Sales Rep. ❒ IBM Large Account Customer
   ❒ PC VAR ❒ Other (specify)

7. Other Comments

Please either fax this form to +44 (0) 1256 343964

or send an e-mail to psg_configure@uk.ibm.com

Thank You - we appreciate your help

IntelliStation® Video Adapter Guide

Video Adapter[1]	Imaging	Dual-head Graphics	Memory	Signal Width	Resolution Supported (each head)	Quantity / Type Monitors Supported	System Support[2]
Matrox Millennium G450 DVI-I	high-performance 2D	Y	32MB	64-bit	2048 x 1536 (analog), 1280 x 1024 (digital)	2 analog or 1 analog and 1 digital	M Pro Dual Proc. M Pro Uniproc.
Matrox Millennium G450	high-performance 2D	Y	16MB	64-bit	2048 x 1536	2 analog	M Pro Dual Proc. Z Pro Itanium
NVIDIA Quadro4 900XGL	advanced 3D/ extreme 3D	Y	128MB	128-bit	2048 x 1536 (analog), 1600 x 1200 (digital)	2 digital or analog	M Pro Dual Proc. M Pro Uniproc.
NVIDIA Quadro4 200NVS	high-performance 2D	Y	64MB	128-bit	2048 x 1536 (analog), 1280 x 1024 (digital)	2 digital or analog	M Pro Dual Proc. M Pro Uniproc.
ATI Fire GL 8800	advanced 3D	Y	128MB	128-bit	2048 x 1536 (analog), 1600 x 1200 (digital)	2 analog or 1 analog and 1 digital	M Pro Dual Proc. M Pro Uniproc.
ATI Fire GL4[3]	extreme 3D	Y	128MB	256-bit	2048 x 1536 (analog), 1600 x 1200 (digital)	2 digital or analog	M Pro Dual Proc.
3Dlabs Wildcat III 6110[3]	extreme 3D	Y	16/64/ 128MB	128/128/ 64-bit	1920 x 1080 (analog), 1280 x 1024 (digital)	2 digital or analog	M Pro Dual Proc. M Pro Uniproc.

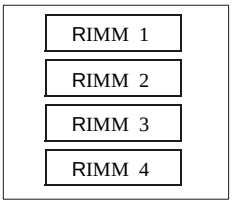
1. Available only as standard equipment in an IntelliStation workstation model.
2. See IntelliStation system At-A-Glance sections to identify models that include these standard video adapters.
3. Requires more space than the planar provides between slots, preventing the installation of an optional PCI adapter in the first PCI slot.

IntelliStation M Pro (uniprocessor)

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache	Memory (Std/Max)	Video Adapter	Form Factor	Onboard Ethernet (Mbps)	Disk Controller (U160=SCSI)	Removable Media Bays (Tot/Av)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[7]	Bays (Total/Avail)	Slots (Tot/Av)[8]
IntelliStation M Pro At-A-Glance (uniprocessor models)														
PT710xx[1,9]	-	2.0[2]	1/1	512KB	256MB/2GB	Matrox Mille. G450 DVI-I	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT7A0xx[1,10]	-	2.0[2]	1/1	512KB	256MB/2GB	Matrox Mille. G450 DVI-I	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT712xx[1,9]	-	2.0[2]	1/1	512KB	256MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT7A2xx[1,10]	-	2.0[2]	1/1	512KB	256MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT713xx[1,9]	-	2.0[2]	1/1	512KB	512MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT7A3xx[1,10]	-	2.0[2]	1/1	512KB	512MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT715xx[1,9]	-	2.0[2]	1/1	512KB	512MB/2GB	ATI Fire GL8800™	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT7A5xx[1,10]	-	2.0[2]	1/1	512KB	512MB/2GB	ATI Fire GL8800	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT716xx[1,9]	-	2.0[2]	1/1	512KB	512MB/2GB	3Dlabs Wildcat III 6110™	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/3[8]
PT7A6xx[1,10]	-	2.0[2]	1/1	512KB	512MB/2GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/3[8]
PT720xx[1,9]	-	2.2[2]	1/1	512KB	256MB/2GB	Matrox Mille. G450 DVI-I	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT7B0xx[1,10]	-	2.2[2]	1/1	512KB	256MB/2GB	Matrox Mille. G450 DVI-I	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT722xx[1,9]	-	2.2[2]	1/1	512KB	256MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT7B2xx[1,10]	-	2.2[2]	1/1	512KB	256MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT723xx[1,9]	-	2.2[2]	1/1	512KB	512MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT7B3xx[1,10]	-	2.2[2]	1/1	512KB	512MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT725xx[1,9]	-	2.2[2]	1/1	512KB	512MB/2GB	ATI Fire GL8800	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT7B5xx[1,10]	-	2.2[2]	1/1	512KB	512MB/2GB	ATI Fire GL8800	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT726xx[1,9]	-	2.2[2]	1/1	512KB	512MB/2GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/3[8]
PT7B6xx[1,10]	-	2.2[2]	1/1	512KB	512MB/2GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/3[8]
PT730xx[1,11]	-	2.4[3]	1/1	512KB	256MB/2GB	Matrox Mille. G450 DVI-I	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT7C0xx[1,10]	-	2.4[3]	1/1	512KB	256MB/2GB	Matrox Mille. G450 DVI-I	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT732xx[1,11]	-	2.4[3]	1/1	512KB	256MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT7C2xx[1,10]	-	2.4[3]	1/1	512KB	256MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[4]	3/1	40GB/240GB[5]	48X-20X	7/4	5/5
PT733xx[1,11]	-	2.4[3]	1/1	512KB	512MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT7C3xx[1,10]	-	2.4[3]	1/1	512KB	512MB/2GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT735xx[1,11]	-	2.4[3]	1/1	512KB	512MB/2GB	ATI Fire GL8800	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT7C5xx[1,10]	-	2.4[3]	1/1	512KB	512MB/2GB	ATI Fire GL8800	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT736xx[1,11]	-	2.4[3]	1/1	512KB	512MB/2GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/3[8]
PT7C6xx[1,10]	-	2.4[3]	1/1	512KB	512MB/2GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/3[8]
PT737xx[1,11]	-	2.4[3]	1/1	512KB	512MB/2GB	NVIDIA Quadro4 900XGL	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4
PT7C7xx[1,10]	-	2.4[3]	1/1	512KB	512MB/2GB	NVIDIA Quadro4 900XGL	Tower	10/100	U160[4]	3/1	18.2GB/293.6GB[6]	48X-20X	7/4	5/4

1. IntelliStation M Pro (uniprocessor) ships with a keyboard and mouse. See Power, Monitors and Accessories for a list of compatible monitors. Tower models are rack-mountable using an optional tower-to-rack conversion kit, or they can be turned on the side and installed as desktop units capable of supporting the weight of a monitor.
2. Intel Pentium 4 processor with advanced transfer ECC L2 cache, 4x100MHz (quad-pumped) Front Side Bus (FSB) and MMX technology.
3. Intel Pentium 4 processor with advanced transfer ECC L2 cache, 533MHz Front Side Bus (FSB) and MMX technology. Models shipped with this processor require 288Mb memory options that support 533MHz FSB operation. These are memory option P/Ns 31P8431, 31P8433, 31P8435 (see Memory Configurator section).
4. All models include an integrated ATA-100 IDE controller that supports up to four IDE devices (four HDDs or three IDE HDDs and one CD-ROM) in IDE models. SCSI models include a single-channel Ultra160 SCSI PCI Adapter with one internal and one external port (each with high-density 68-pin connectors) installed in slot five. A five-drop, terminated 16-bit LVD internal SCSI cable is included with SCSI models, which support up to five SCSI HDDs.
5. IDE models include two two-drop ATA-100 IDE cables. The CD-ROM must be disconnected to support four IDE HDDs. Maximum storage is based on four 60GB IDE HDDs, which also requires replacing the standard 40GB HDD.
6. Maximum capacity requires replacement of the standard 18.2GB 10,000rpm HDD with a 73.4GB HDD and installing three additional non hot-swap 73.4GB HDDs (total of four).
7. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
8. Certain video adapters require additional space, preventing slot one from being used to install an optional PCI adapter. This applies to models with the 3Dlabs Wildcat III 6110 adapter.
9. These models include a Windows 2000 preloaded software package.
10. These models include a PC DOS 2000 licence.
11. These models include a Windows XP Professional preloaded software package.

IntelliStation M Pro Memory Configurator (uniprocessor models)



Part Number	Memory Description[1]
33L3350	128MB PC800 4D ECC RDRAM RIMM (288Mb)
33L3352	256MB PC800 8D ECC RDRAM RIMM (288Mb)
33L3254	512MB 800MHz ECC 16D RDRAM RIMM (288Mb)
31P8431	128MB PC800 4D ECC RDRAM RIMM (288Mb)[2]
31P8433	256MB PC800 8D ECC RDRAM RIMM (288Mb)[2]
31P8435	512MB PC800 16D ECC RDRAM RIMM (288Mb)[2]

1. Memory RIMMs must be installed in pairs using the same option part number according to the following order: RIMM connectors one and two (set one), then connectors three and four (set two).
2. RIMMs P/N 31P8431, 31P8433 and 31P8435, support front-side (FSB) operation of 533MHz, which is required by 2.4GHz processor models. When installed in other models, the FSB operates at the lower frequency (400MHz).

Total System Memory[1]		Quantity of RIMMs Added		
256MB (2 x 128) Models	512MB (2 x 256) Models	128MB P/N 33L3350 or P/N 31P8431[3]	256MB P/N 33L3352 or P/N 31P8433[3]	512MB P/N 33L3254 or P/N 31P8435[3]
512MB	768MB	2	-	-
768MB	1024MB	-	2	-
1280MB	1536MB	-	-	2
2GB[2]	2GB[2]	-	-	4[2]

This table does not represent all possible memory configurations. Memory modules may vary in priceper MB. Selection of smaller RIMMs may provide a more cost-effective alternative to using larger RIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.

2. Requires replacing the standard RIMMs.

3. Models shipped with a 2.4GHz processor require memory options that support 533MHz FSB. These are memory option P/Ns 31P8431, 31P8433 and 31P8435.

IntelliStation M Pro Internal Hard Disk Drive (HDD) Storage Configurator (uniprocessor models)

SCSI Models					
Total Int Storage[1]	10,000RPM HDDs			15,000RPM HDDs	
	18.2GB P/N 06P5750	36.4GB P/N 06P5751	73.4GB P/N 06P5752	18.2GB P/N 06P5765	36.4GB P/N 06P5766
18.2GB	18.2GB Standard on SCSI models (10,000rpm)			18.2GB Standard on SCSI models (10,000rpm)	
36.4GB	1	-	-	1	-
54.6GB	2	-	-	2	-
72.8GB	3	-	-	3	-
91GB	2 and	1	-	2 and	1
109.2GB	1 and	2	-	1 and	2
127.4GB	-	3	-	-	3
145.6GB[2]	-	4[2]	-	-	4
182.6GB[2]	-	3 and	1[2]	-	-
219.6GB[2]	-	2 and	2[2]	-	-
256.6GB[2]	-	1 and	3[2]	-	-
293.6GB[2]	-	-	4[2]	-	-

This table does not represent all possible HDD configurations.

1. Select a total storage row then add the quantity of HDDs from all columns in an RPM range to the standard HDD.
2. Addition of four disks requires replacement of the standard HDD.

EIDE Models[2]		
Total Internal Storage[1]	**7200RPM EIDE HDDs**	
	40GB P/N 22P7157	**60GB P/N 09N4207**
40GB	Standard on EIDE models	-
80GB	1	-
100GB	-	1
120GB	2	-
140GB	1 and	1
160GB	-	2
180GB[3]	-	3[3]
240GB[4]	-	4[4]

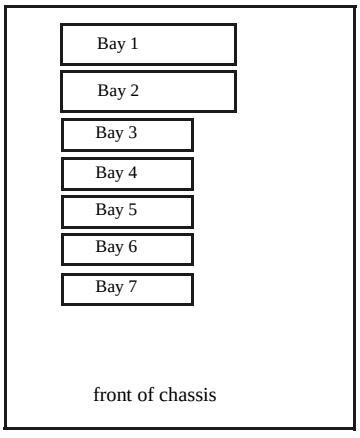
This table does not represent all possible HDD configurations.Total Internal Storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then add the quantity of HDDs from all columns to the standard HDD.
2. EIDE models support a maximum of four IDE devices including CD-ROM drives, HDDs and IDE tape drives.
3. Requires replacing the standard HDD.
4. Requires replacing the standard HDD and disconnecting the CD-ROM.

Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	HH	Yes	CD-ROM[1]
2	133mm (5.25in)	HH	Yes	open[1]
3	89mm (3.5in)	SL	Yes	FDD
4	89mm (3.5in)	SL	Yes	open[2]
5, 6	89mm (3.5in)	SL	No	open[2]
7	89mm (3.5in)	SL	No	Std HDD[2]

1. Bay 1 supports removable media devices only. Hard disk drives are not supported.

2. Maximum of four SCSI HDDs supported in SCSI models and a maximum of four IDE HDDs supported (with CD-ROM disconnected) in IDE models.



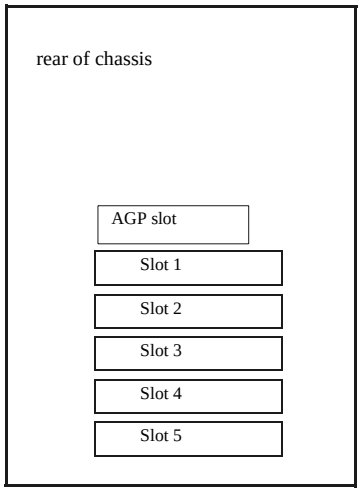
Part Number	Description	RPM	Height	Bays Supported[3]	Max Qty
IDE HDD[1, 2]					
22P7157	40GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	3 ... 7	4[3]
09N4207	60GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	3 ... 7	4[3]
Ultra160 HDDs[2, 4]					
06P5750	18.2GB 10Krpm Ultra160 SCSI SL HDD	10000	SL	3 ... 7	4[4]
06P5751	36.4GB 10Krpm Ultra160 SCSI SL HDD	10000	SL	3 ... 7	4[4]
06P5752	73.4GB 10Krpm Ultra160 SCSI SL HDD	10000	SL	3 ... 7	4[4]
06P5765	18.2GB 15Krpm Ultra160 SCSI SL HDD	15000	SL	3 ... 7	4[4]
06P5766	36.4GB 15Krpm Ultra160 SCSI SL HDD	15000	SL	3 ... 7	4[4]

Removable Media Devices		Bays Supported
10K3782	48X-20X IDE CD-ROM[5]	1, 2
10K3790	8X-4X-32X-8X Max CD-RW/DVD-ROM Combination Drive[5, 6]	1, 2
22P6950	16X Max RAM-Read DVD-ROM Drive[5, 6]	1, 2
22P6959	DVD-RAM/DVD-R Drive[5, 6]	1, 2
22P6965	24X/10X/40X Max Black CD-RW Drive[5]	1, 2
00N8078	250MB IDE Internal Zip Drive	4

1. IDE models support a maximum of four IDE devices including CD-ROM drives, IDE hard disk drives and IDE tape drives.
2. Standard HDD installed in bay seven for both SCSI and IDE models.
3. Maximum quantity of IDE HDDs requires disconnecting the CD-ROM.
4. SCSI models support a maximum of four SCSI HDDs.
5. Either replace the standard CD-ROM or install in the available media bay. An IDE cable with three connectors is included with the optional optical drive. The included audio cable must be connected in order to support audio for music CDs but not for DVD-ROM.
6. DVD video playback is not supported for models that include a 3Dlabs Wildcat III 6110 video adapter.

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[2, 3]
	Storage Controllers[4]			
19K4646	PCI Wide Ultra160 SCSI Adapter[5]	Half	32-bit	1 ... 5
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[6]	Half	64-bit	1 ... 5
	Networking[7]			
	Ethernet[8]			
09N3601	10/100 EtherLink PCI Management Adapter by 3Com	Half	32-bit	1 ... 5
22P6501	Pro/1000 T Desktop Adapter by Intel	Half	32-bit	1 ... 5
	Token Ring			
34L5001	16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 5
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 5
	Communications[9]			

1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot.
2. IntelliStation M Pro (uniprocessor) has five full-length PCI expansion slots.
3. A dedicated PCI slot supports a standard AGP graphics adapter located above the five PCI expansion slots. When the standard graphics adapter is a 3Dlabs Wildcat III 6110, slot one is not available to install another adapter.
4. IntelliStation M Pro (uniprocessor) includes an integrated dual channel ATA-100 IDE controller. SCSI models include a single-channel Ultra160 SCSI PCI Adapter with one internal and one external port (each with high-density 68-pin connectors) installed in slot five.
5. PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilised.
6. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI.
7. Wake on LAN® is supported through PCI networking adapters that provide this function.
8. The integrated full duplex 10/100 Intel-based Ethernet controller supports Wake on LAN.
9. M Pro (uniprocessor) includes four USB ports (two each on front and rear of chassis), two 9-pin serial ports, one 25-pin parallel port, AC 97 audio line in/out jacks, and a microphone in jack.



All PCI expansion slots are full-length, 32-bit, 33MHz, 5V or universal on a single PCI bus.

IntelliStation M Pro Power, Monitors, Accessories (uniprocessor models)

Part Number	Description
	Power[1, 4]
94G7448	Rack Power Cable Type C12 (3.7m)[4]
	Monitors[2]
T274Axx[5]	G78 Color Monitor 17in (406.4mm, 16in viewable image), stealth black
T57HGxx[5]	T750 Hybrid Flat Panel Color Monitor 17in (433mm, 17in viewable image), stealth black
T52U3xx[5]	P275 Color Monitor 21in (503mm, 19.8in viewable image), stealth black
T39U3xx[5]	P77 Color Monitor 17in (406mm, 16in viewable image), stealth black
T1U3Nxx[5]	P97 Color Monitor 19in (457.3mm, 18in viewable image), stealth black
T56HGxx[5]	T560 Hybrid Flat Panel Monitor 15in (381mm, 15in viewable image), stealth black
T4HB0xx[5]	T860 Hybrid Flat Panel Monitor 18.1in (460mm, 18.1in viewable image), stealth black,
T59HGxx[5]	T210 Flat Panel Color Monitor 20.8in (528mm, 20.8in viewable image), stealth black
	Conversion Kits[4]
09N4300	4Ux20D Tower-to-Rack Kit[4]
	Keyboard and Mouse[3]
22P5xxx[6]	Rapid Access III USB Keyboard with Hub, stealth black
33L3252	SpaceBall 3D Input Device

1. IntelliStation M Pro (uniprocessor) includes a 340W voltage-sensing power supply and a single standard country power cord
2. Refer to the the IntelliStation Video Adapter Guide section and M Pro At-a-Glance table to identify which models support digital and/or analog monitors. Digital-to-analog adapters to support analog monitors through digital video adapter connectors are shipped with the appropriate system.
3. IntelliStation M Pro (uniprocessor) ships standard with an IBM 104-key keyboard and three-button mouse.
4. If conversion to Rack format is being carried out, Rack Power Cable P/N 94G7448 (type C12) must be ordered if connection to a high voltage UPS or PDU is required.
5. Where 'xx' represents a specific country code as follows: DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.
6. Where 'xxx' represents a specific country code as follows: 189=Belgian/English, 190=Danish, 191=Dutch, 192=French, 193=German, 194=Greek, 195=Icelandic, 196=Italian, 197=Norwegian, 198=Spanish, 199=Swedish/Finnish, 200=Swiss, 201=UK English, 202=US International, 205=Arabic

IntelliStation M Pro Tape Options (uniprocessor models)

Part Number	Tape Drives Description	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Encl
48P7042	20/40GB TR7 Internal IDE Tape Drive[1]	1	-	89mm (3.5in) SL or 133mm (5.25in) HH	-	-

1. Connecting an IDE tape drive to the standard IDE controller will limit the number of hard disk drives supported in IDE models. See Internal HDD Storage Configurator section.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

IntelliStation M Pro (dual processor)

Part Number	Withdrawal Date: ddmmyy[11]	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max)	Video Adapter	Form Factor	Onboard Ethernet (Mbps)	Disk Controller (U160=SCSI)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[6]	Bays (Tot/Av)	Slots (Tot/Av)[10]
IntelliStation M Pro At-A-Glance (dual processor models)														
KDT20xx[1,7]	28/06/02	1.7[2]	1/2	256	256MB/4GB	Matrox Millennium G450	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDTB0xx[1,8]	28/06/02	1.7[2]	1/2	256	256MB/4GB	Matrox Millennium G450	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDT21xx[1,7]	28/06/02	1.7[2]	1/2	256	256MB/4GB	Matrox Millennium G450	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDTB1xx[1,8]	28/06/02	1.7[2]	1/2	256	256MB/4GB	Matrox Millennium G450	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDT22xx[1,7]	28/06/02	1.7[2]	1/2	256	512MB/4GB	NVIDIA Quadro2 Pro	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDTB2xx[1,8]	28/06/02	1.7[2]	1/2	256	512MB/4GB	NVIDIA Quadro2 Pro	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDT25xx[1,7]	28/06/02	1.7[2]	1/2	256	512MB/4GB	ATI Fire GL4™	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/4[10]
KDTB5xx[1,8]	28/06/02	1.7[2]	1/2	256	512MB/4GB	ATI Fire GL4	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/4[10]
KDT40xx[1,7]	-	2.0[2]	1/2	512	512MB/4GB	Matrox Mill. G450 DVI-I	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDTD0xx[1,8]	-	2.0[2]	1/2	512	512MB/4GB	Matrox Mill. G450 DVI-I	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDT42xx[1,7]	-	2.0[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDTD2xx[1,8]	-	2.0[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDT43xx[1,7]	-	2.0[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDTD3xx[1,8]	-	2.0[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDT45xx[1,7]	-	2.0[2]	1/2	512	512MB/4GB	ATI Fire GL8800	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDTD5xx[1,8]	-	2.0[2]	1/2	512	512MB/4GB	ATI Fire GL8800	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDT46xx[1,7]	-	2.0[2]	1/2	512	512MB/4GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/4[10]
KDTD6xx[1,8]	-	2.0[2]	1/2	512	512MB/4GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/4[10]
KDT50xx[1,7]	-	2.2[2]	1/2	512	512MB/4GB	Matrox Mill. G450 DVI-I	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDTE0xx[1,8]	-	2.2[2]	1/2	512	512MB/4GB	Matrox Mill. G450 DVI-I	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDT52xx[1,7]	-	2.2[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDTE2xx[1,8]	-	2.2[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	IDE[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDT53xx[1,7]	-	2.2[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDTE3xx[1,8]	-	2.2[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDT55xx[1,7]	-	2.2[2]	1/2	512	512MB/4GB	ATI Fire GL8800	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDTE5xx[1,8]	-	2.2[2]	1/2	512	512MB/4GB	ATI Fire GL8800	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDT56xx[1,7]	-	2.2[2]	1/2	512	512MB/4GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/4[10]
KDTE6xx[1,8]	-	2.2[2]	1/2	512	512MB/4GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/4[10]
KDT60xx[1,9]	-	2.4[2]	1/2	512	512MB/4GB	Matrox Mill. G450 DVI-I	Tower	10/100	U160[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDTG0xx[1,8]	-	2.4[2]	1/2	512	512MB/4GB	Matrox Mill. G450 DVI-I	Tower	10/100	U160[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDT62xx[1,9]	-	2.4[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDTG2xx[1,8]	-	2.4[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[3]	3/1	40GB/240GB[4]	48X-20X	9/6	5/5
KDT63xx[1,9]	-	2.4[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDTG3xx[1,8]	-	2.4[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 200NVS	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDT65xx[1,9]	-	2.4[2]	1/2	512	512MB/4GB	ATI Fire GL8800	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDTG5xx[1,8]	-	2.4[2]	1/2	512	512MB/4GB	ATI Fire GL8800	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDT66xx[1,9]	-	2.4[2]	1/2	512	512MB/4GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/4[10]
KDTG6xx[1,8]	-	2.4[2]	1/2	512	512MB/4GB	3Dlabs Wildcat III 6110	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/4[10]
KDT67xx[1,9]	-	2.4[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 900XGL	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5
KDTG7xx[1,8]	-	2.4[2]	1/2	512	512MB/4GB	NVIDIA Quadro4 900XGL	Tower	10/100	U160[3]	3/1	18.2GB/440.4GB[5]	48X-20X	9/6	5/5

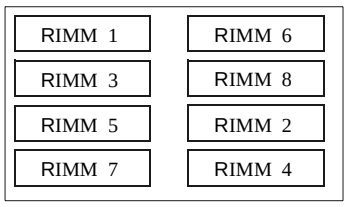
1. IntelliStation M Pro ships with a keyboard and mouse. Tower models are rack-mountable using an optional tower-to-rack conversion kit, or they can be turned on their side and installed as desktop units capable of supporting the weight of a monitor. See Power, Monitors, Accessories section for more information and for a list of compatible monitors.
2. Intel Xeon[a] processor with advanced transfer ECC L2 cache and 4x100MHz (quad-pumped) Front Side Bus (FSB).
3. All models include both an integrated ATA-100 IDE controller and an integrated Ultra160 SCSI controller. The IDE controller supports up to four IDE devices (four HDDs or three IDE HDDs and one CD-ROM or IDE tape drive) in IDE models, which ship with two two-drop IDE cables. The single-channel integrated Ultra160 SCSI controller has one internal and one external port. Both ports are 68-pin, 16-bit Ultra 160 (LVD) connectors. The external port supports external Ultra160 SCSI storage devices. Alternatively, a six-drop LVD SCSI cable in included that can support up to six internal SCSI HDDs. Mixing of IDE and SCSI HDDs is not supported.
4. IDE models include a two-drop ATA-100 IDE cable and a two-drop ATA-33 cable. One connector of the ATA-33 cable is attached to the standard CD-ROM and the other connector can be used for an IDE HDD. The CD-ROM must be disconnected to support four IDE HDDs. Maximum storage is based on four 60GB IDE HDDs, which also requires replacing the standard 40GB HDD.
5. Maximum capacity requires replacement of the standard 18.2GB 10,000RPM HDD with a 73.4GB HDD and installing five additional non hot-swap 73.4GB HDDs (total of six).
6. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
7. These models include a Windows 2000 preloaded software package.
8. These models include a PC DOS 2000 licence.
9. These models include a Windows XP Professional preloaded software package.
10. Certain video adapters require additional space, preventing slot one from being used to install an optional PCI adapter. This applies to models with the 3Dlabs Wildcat III 6110 and ATI Fire GL4 adapters.
11. Not available from IBM after this date. Business Partner inventory may be available.

IntelliStation M Pro Processors (dual processor models)

Part Number	Processor Upgrades	SMP Support[1]
24P8402	1.7GHz 256KB Cache Xeon Second Processor.	KDT20xx to KDTB5xx
25P2653	2.0GHz 512KB Cache Xeon Second Processor.	KDT40xx to KDTD6xx
32P8586	2.2GHz 512KB Cache Xeon Second Processor.	KDT50xx to KDTE6xx
24P7456	2.4GHz 512KB Cache Xeon Second Processor.	KDT60xx to KDTG7xx

1. One additional processor may be installed, providing a maximum of two. Both processors must be identical in type, speed, and cache size.

IntelliStation M Pro Memory Configurator (dual processor models)



Part Number	Memory Description[1]
33L3350	128MB PC800 4D ECC RDRAM RIMM (288Mb)
33L3352	256MB PC800 8D ECC RDRAM RIMM (288Mb)
33L3254	512MB 800MHz ECC 16D RDRAM RIMM Memory (288Mb)

1. Memory RIMMs must be installed in pairs using the same option part number according to the following order: RIMM connectors one and two, three and four, five and six, and seven and eight.

Total System Memory[1]		Quantity of RIMMs Added		
256MB (2 x 128) Models	512MB (2 x 256) Models	128MB P/N 33L3350	256MB P/N 33L3352	512MB P/N 33L3254
512MB	768MB	2	-	-
768MB	1024MB	4	-	-
1024MB	1280MB	6	-	-
1280MB	1536MB	4 and	2	-
1792MB	2048MB	4 and	-	2
2304MB	2560MB	-	4 and	2
2560MB	2816MB	2 and	-	4
2816MB	3072MB	-	2 and	4
3328MB	3584MB	-	-	6
4GB (max)[2]	4GB (max)[2]	-	-	8[2]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RIMMs may provide a more cost-effective alternative to using larger RIMMs.
1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires replacing the standard RIMMs.

IntelliStation M Pro Internal Hard Disk Drive (HDD) Storage Configurator (dual processor models)

SCSI Models					
Total Int Storage[1]	**10,000RPM HDDs**			**15,000RPM HDDs**	
	18.2GB P/N 06P5750	**36.4GB P/N 06P5751**	**73.4GB P/N 06P5752**	**18.2GB P/N 06P5765**	**36.4GB P/N 06P5766**
18.2GB	18.2GB Standard on SCSI models (10,000rpm)			18.2GB Standard on SCSI models (10,000rpm)	
36.4GB	1	-	-	1	-
54.6GB	2	-	-	2	-
72.8GB	3	-	-	3	-
91GB	4	-	-	4	-
109.2GB	5	-	-	5	-
127.4GB	4 and	1	-	4 and	1
145.6GB	3 and	2	-	3 and	2
163.8GB	2 and	3	-	2 and	3
182GB	1 and	4	-	1 and	4
200.2GB	-	5	-	-	5
237.2GB	-	4 and	1	-	-
274.2GB	-	3 and	2	-	-
311.2GB	-	2 and	3	-	-
348.2GB	-	1 and	4	-	-
385.2GB	-	-	5	-	-
440.4GB[2]	-	-	6[2]	-	-

This table does not represent all possible HDD configurations. Total Internal Storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then add the quantity of HDDs from all columns within an RPM range to the standard HDD.
2. Requires replacement of the standard HDD.

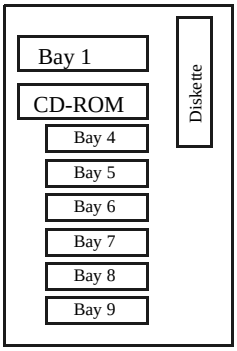
EIDE Models[2]			
Total Internal Storage[1]	**7200RPM EIDE HDDs**		
	20.4GB P/N 19K4461	**40GB P/N 22P7157**	**60GB P/N 09N4207**
40GB	-	Std on EIDE models	-
60.4GB	1	-	-
80GB	-	1	-
100GB	-	-	1
120GB	-	2	-
140GB	-	1	1
160GB	-	-	2
180GB[3]	-	-	3[3]
240GB (max)[4]	-	-	4[4]

This table does not represent all possible HDD configurations. Total Internal Storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then add the quantity of HDDs to the standard HDD.
2. EIDE models support a maximum of four IDE devices including CD-ROM drives, HDDs and IDE tape drives.
3. Requires replacement of the standard HDD.
4. Requires replacement of the standard HDD and disconnection of the CD-ROM drive.

Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	HH	Yes	open[1]
2	133mm (5.25in)	HH	Yes	CD-ROM
3	89mm (3.5in)	SL	Yes	Diskette
4 ... 8	89mm (3.5in)	SL	No	open[2]
9	89mm (3.5in)	SL	No	Std HDD[3]

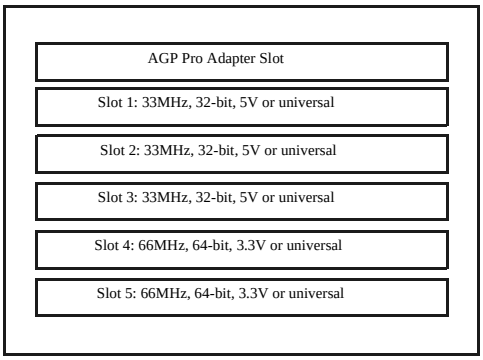
1. Supports removable media devices only. Hard disk drives are not supported.
2. Maximum of six SCSI HDDs supported in SCSI models and a maximum of three IDE HDDs are supported without disconnectingthe CD-ROM drive in IDE models.
3. The standard HDD is installed in bay five in IDE models and in bay nine in SCSI models.



Part Number	Description	RPM	Height	Bays Supported[3]	Max Qty
	IDE HDD[1, 2]				
19K4461	20.4GB ATA-100 (EIDE) HDD	7200	SL	4...9	4[1]
22P7157	40GB ATA-100 (EIDE) HDD	7200	SL	4...9	4[1]
09N4207	60GB ATA-100 (EIDE) HDD	7200	SL	4...9	4[1]
	Ultra160 SCSI HDDs[2, 4]				
06P5750	18.2GB 10,000rpm Ultra160 HDD	10000	SL	4...9	6
06P5751	36.4GB 10,000rpm Ultra160 HDD	10000	SL	4...9	6
06P5752	73.4GB 10,000rpm Ultra160 HDD	10000	SL	4...9	6
06P5765	18.2GB 15,000rpm Ultra160 HDD	15000	SL	4...9	6
06P5766	36.4GB 15,000rpm Ultra160HDD	15000	SL	4...9	6

	Removable Media Devices	**Bays Supported**
10K3790	8X-4X-32X-8X Max CD-RW/DVD-ROM Combination Drive[5,6]	1, 2
22P6950	16X Max RAM-Read DVD-ROM Drive, Black[5,6]	1, 2
10K3782	48X-20X CD-ROM Drive, Black[5]	1, 2
00N8078	250MB IDE Internal Zip Drive	4, 5

1. IDE models support a maximum of four IDE devices including CD-ROM drives, IDE hard disk drives and IDE tape drives.
2. Mixing of IDE and SCSI hard disk drives is not supported.
3. Standard HDD installed in bay nine for SCSI models and bay five for IDE models.
4. SCSI models support a maximum of six SCSI HDDs.
5. Either replace the standard CD-ROM or install in the available media bay. An IDE cable with three connectors is included with the optional optical drive. The included audio cable must be connected in order to support audio (for music CDs but not for DVD-ROM).
6. DVD video playback is not supported for models that include a 3Dlabs Wildcat III 6110 video adapter.



All slots are full-length.

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[2, 3]
	Storage Controllers[4]			
19K4646	PCI Wide Ultra160 SCSI Adapter[5]	Half	32-bit	1 ... 5
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[6]	Half	64-bit	1 ... 5
	Networking[7]			
	Ethernet[8]			
09N3601	10/100 EtherLink PCI Management Adapter by 3Com	Half	32-bit	1 ... 5
22P4501	Intel Pro/100S Desktop Adapter	Half	32-bit	1 ... 5
22P6501	Pro/1000 T Desktop Adapter by Intel	Half	32-bit	1 ... 5
22P4901	10/100 Dual Port Server Adapter	Half	64-bit	1 ... 5
	Token Ring			
34L5001	16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 5
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 5
	Communications[9]			

1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot.
2. IntelliStation M Pro (dual processor) has five full-length PCI expansion slots.
3. A standard AGP graphics adapter is installed in a dedicated slot beside PCI slot one. When the standard graphics adapter is a Fire GL4 or 3Dlabs Wildcat III 6110, slot one is not available to install another adapter.
4. IntelliStation M Pro (dual processor) includes integrated ATA-100 IDE and Ultra160 SCSI storage controllers.
5. PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilised.
6. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI.
7. Wake on LAN and Alert-on-LAN are not supported through the PCI networking adapters.
8. The integrated full duplex 10/100 Intel-based Ethernet controller supports Wake on LAN and Alert-on-LAN.
9. M Pro includes two USB ports, two high-speed serial/asynchronous ports (NS16550A software compatible) and one bidirectional parallel port supporting devices using EPP/ECP protocols, audio in/out jacks and a microphone-in jack.

IntelliStation M Pro Power, Monitors, Accessories (dual processor models)

Part Number	Description
	Power[1, 4]
94G7448	Rack Power Cable Type C12 (3.7m)[4]
	Monitors[2]
T274Axx[5]	G78 Color Monitor 17in (406.4mm, 16in viewable image), stealth black
T57HGxx[5]	T750 Hybrid Flat Panel Color Monitor 17in (433mm, 17in viewable image), stealth black
T52U3xx[5]	P275 Color Monitor 21in (503mm, 19.8in viewable image), stealth black
T39U3xx[5]	P77 Color Monitor 17in (406mm, 16in viewable image), stealth black
T1U3Nxx[5]	P97 Color Monitor 19in (457.3mm, 18in viewable image), stealth black
T56HGxx[5]	T560 Hybrid Flat Panel Monitor 15in (381mm, 15in viewable image), stealth black
T4HB0xx[5]	T860 Hybrid Flat Panel Monitor 18.1in (460mm, 18.1in viewable image), stealth black
T59HGxx[5]	T210 Flat Panel Color Monitor 20.8in (528mm, 20.8in viewable image), stealth black
	Conversion Kits[4]
10L7006	Tower-to-Rack Conversion Kit[4]
	Keyboard and Mouse[3]
22P5xxx[6]	Rapid Access III USB Keyboard with Hub, stealth black
22P51xx[7]	Wireless Keyboard and Mouse
33L3252	SpaceBall 3D Input Device

1. IntelliStation M Pro includes a 480W voltage-sensing power supply and a single standard country power cord.
2. Refer to the the IntelliStation Video Adapter Guide section and M Pro At-a-Glance table to identify which models support digital and/or analog monitors. Digital-to-analog adapters to support analog monitors through digital video adapter connectors are shipped with the appropriate system.
3 IntelliStation M Pro ships with an IBM 104-key keyboard and three-button mouse as standard.
4. If conversion to Rack format is being carried out, Rack Power Cable P/N 94G7448 (type C12) must be ordered if connection to a high voltage UPS or PDU is required.
5. Where 'xx' represents a specific country code as follows: DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.
6. Where 'xxx' represents a specific country code as follows: 189=Belgian/English, 190=Danish, 191=Dutch, 192=French, 193=German, 194=Greek, 195=Icelandic, 196=Italian, 197=Norwegian, 198=Spanish, 199=Swedish/Finnish, 200=Swiss, 201=UK English, 202=US International, 205=Arabic
7. Where 'xx' represents a specific country code as follows: 73=Danish, 74=French, 75=German, 76=Italian, 77=Spanish, 78=UK English, 79=Swedish/Finnish, 80=Belgian/UK, 82=Swiss, 70=US English

IntelliStation M Pro Tape Options (dual processor models)

Part Number	Tape Drives	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	68/50-pin Converter Incl	Ext Tape Encl
20L0549	10/20GB TR5 Internal IDE Tape Drive	1	-	89mm (3.5in) SL or 133mm (5.25in) HH	-	-	-

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

IntelliStation R Pro

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max) (R = RDIMM)	Video Adapter	Form Factor	Onboard Ethernet (Mbps)	Disk Controller (U160=SCSI)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[3]	Bays (Tot/Av)	Slots (Tot/Av)[4]
IntelliStation R Pro At-A-Glance														
KET22xx[1]	28/06/02	1.26[2]	1/2	512	256MB/4GB	Matrox G200 PAL	Rack (1U)	2 x 10/100	IDE	-	20.4GB/ 80GB	24X-10X	4/1	2/0
KET23xx[1]	28/06/02	1.26[2]	1/2	512	256MB4GB	Matrox G200 PAL	Rack (1U)	2 x 10/100	U160[5]	-	18.2GB/ 146.8GB	24X-10X	4/1	2/0

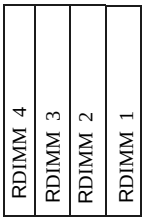
1. Housed in a 19in rack-mountable drawer. Ships standard with a keyboard and mouse. See Rack Cabinets and Options section for supported IBM racks (refer to xSeries 330 information).
2. Intel Pentium III processor with 512KB advanced transfer L2 cache and 133MHz Front-side Bus (FSB).
3. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
4. All models are equipped with a Matrox G200 multimonitor video adapter and an IBM PCI audio adapter.
5. This IntelliStation R Pro model has an integrated single-channel Ultra160 SCSI Controller.

IntelliStation R Pro Processor Upgrades

Part Number	Processor Upgrades	SMP Support[1]	Processor Speed Upgrade
25P2836	xSeries 1.26GHz/133MHz FSB - 512KB Cache Upgrade with Pentium III Processor	KET22xx, KET23xx	-

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed, and cache size.

IntelliStation R Pro Memory Configurator



Part Number	Memory Description[1]
10K0018	128MB PC133MHz ECC SDRAM RDIMM
10K0020	256MB PC133MHz ECC SDRAM RDIMM
10K0022	512MB PC133MHz ECC SDRAM RDIMM
33L3326	1GB PC133MHz ECC SDRAM RDIMM

1. Memory RDIMMs must be installed in sequence from RDIMM connector 1 through connector 4. RDIMM size is not relevant.

Total Memory[1] (1 x 256MB) Standard	Quantity of RDIMMs Added			
	128MB P/N 10K0018	256MB P/N 10K0020	512MB P/N 10K0022	1GB P/N 33L3326
384MB	1	-	-	-
512MB	2 or	1	-	-
640MB	3	-	-	-
768MB	-	2 or	1	-
1024MB	-	3	-	-
1280MB	-	-	2 or	1
1792MB	-	-	3	-
2048MB	-	-	4[2]	-
2304MB	-	-	-	2
3328MB	-	-	-	3
4096MB (max)[2]	-	-	-	4[2]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.
1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires removal of standard memory.

SCSI Models					
Total Int Storage[1]	**10,000RPM HDDs**			**15,000RPM HDDs**	
	18.2GB P/N 06P5750	**36.4GB P/N 06P5751**	**73.4GB P/N 06P5752**	**18.2GB P/N 06P5765**	**36.4GB P/N 06P5766**
18.2GB	18.2GB (10,000 rpm) Standard on SCSI model)			18.2GB (10,000rpm) Standard on SCSI model)	
36.4GB	1	-	-	1	-
54.6GB	-	1	-	-	1
72.8GB[2]	-	2[2]	-	-	2[2]
91.6GB	-	-	1	-	-
146.8GB (max)[2]	-	-	2[2]	-	-

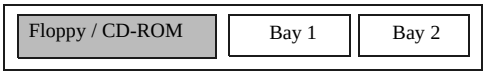
This table does not represent all possible HDD configurations.

1.Select a total storage row then identify the recommended HDDs from within an RPM range according to choice.
Total Internal Storage listed is within ± 0.2 GB unless otherwise noted.
2. Requires replacing standard HDD.

EIDE Models[2]			
Total Internal Storage[1,2]	**7200RPM EIDE HDDs**		
	20.4GB P/N 19K4461	**40GB P/N 22P7157**	**60GB P/N 09N4207**
20.4GB	20.4GB (7200rpm) Std on EIDE model	-	-
40.8GB	1	-	-
60.4GB	-	1	-
80GB[3]	-	2[3]	-
80.4GB	-	-	1
120GB[3]	-		2[3]

This table does not represent all possible HDD configurations.Total Internal Storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then add the quantity of HDDs from both columns to the standard HDD.
2. The R Pro dual integrated EIDE controllers support a maximum of three IDE devices per machine including one CD-ROM and two IDE HDDs.
3. Requires removal of the standard HDD.



Bay	Form Factor	Height	Front Access	Usage
1[1]	89mm (3.5in)	SL	No	HDD[2]
2	89mm (3.5in)	SL	No	Open

1. Boot drive should be located in bay one.
2. All models ship with one standard HDD.

Part Number	Description	RPM	Height	Bays Supported	Max Qty
	IDE HDDs[1, 2]				
19K4461	20.4GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
22P7157	40GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
09N4207	60GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
	Non Hot-Swap Ultra160 SCSI HDDs[2]				
06P5750	18.2GB 10,000rpm Ultra160 HDD	10000	SL	1, 2	2
06P5751	36.4GB 10,000rpm Ultra160 HDD	10000	SL	1, 2	2
06P5752	73.4GB 10,000rpm Ultra160 HDD	10000	SL	1, 2	2
06P5765	18.2GB 15,000rpm Ultra160 HDD	15000	SL	1, 2	2
06P5766	36.4GB 15,000rpm Ultra160 HDD	15000	SL	1, 2	2

1. The R Pro dual integrated EIDE controllers support a maximum of three IDE devices per machine including one CD-ROM and two IDE hard disk drives. IDE HDDs are supported only on IDE models.
2. Mixing of IDE and SCSI hard disk drives is not supported.

Part Number	Description
	Power[1, 9]
94G7448	Rack Power Cable Type C12 (3.7m)[9]
	Uninterruptible Power Supply (UPS)[2]
32P16xx[10]	APC 2U Smart-UPS 1400RMiB[3]
30RIxxx[11]	APC Smart-UPS 3000RMiB[4]
37L6862	APC Smart-UPS 5000RMiB[5]
	Monitors[6]
T274Axx[12]	G78 Color Monitor 17in (406.4mm, 16in viewable image), stealth black[7]
T57HGxx[12]	T750 Hybrid Flat Panel Color Monitor 17in (433mm, 17in viewable image), stealth black
T3147xx[12]	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black[7]
T3247xx[12]	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black[7]
T52U3xx[12]	P275 Color Monitor 21in (503mm, 19.8in viewable image), stealth black
T1U3Nxx[12]	P97 Color Monitor 19in (457.3mm, 18in viewable image), stealth black
T39U3xx[12]	P77 Color Monitor 17in (406mm, 16in viewable image), stealth black
T12ABxx[12]	T541 Flat Panel Color Monitor 15in (381mm, 15in viewable image), stealth black
32P1032	NetBAY 1UFlat Panel Monitor Console Kit (without keyboard)[8]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[8]

1. IntelliStation R Pro includes a worldwide, voltage sensing 200W power supply with auto restart and a standard country power cord.
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
6. Third-party sourcing is required for connecting the rack-mounted R Pro system to remote workstation console devices. Keyboard, video and mouse (KVM) connectivity hardware for IntelliStation R Pro is not available through IBM but can be purchased through various vendors including the following:- AmuletHotKey in London, England on the Web at www.amulet-hotkey.com or telephone +44(0)20 7407 2522. Wey Technology AG in Rotkreuz, Germany at info@wey.ch (E-mail) or telephone +41 41 798 20 49. IBM makes no representations or warranties with respect to non-IBM products. These products are offered and warranted by third parties, not IBM.
7. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
8. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
9. A Rack Power Cable P/N 94G7448 must be ordered for power connection to a high voltage rack-mounted UPS or PDU.
10. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.
11. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
12. Where 'xx' represents a specific country code as follows: DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
	Rack[1, 2]
NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.	
94G7448	Rack Power Cable Type C12 (3.7m)[3]
	Keyboard and Mouse[4, 5]
28L36xx[8]	Space Saver II Keyboard[6, 7]
28L3675	Sleek 2-button Stealth Black Mouse

1. IntelliStation R Pro is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section for the xSeries 330.
2. Note limitations and restrictions required for adequate cooling in the Rack Cabinets and Options section for xSeries 330. If non-IBM racks are to be used, assure that both the front and rear doors offer a minimum of 48% open area uniformly distributed and in line with installed servers. A clearance of 51 to 64mm (2 to 2.5in) must be maintained between the front door and the system unitÕs front bezel. The rear door must maintain the same or greater clearance.
3. A Rack Power Cable P/N 94G7448 must be ordered for power connection to a high voltage rack-mounted UPS or PDU.
4. IntelliStation R Pro supports rack configurations only, and ships with a standard keyboard and mouse.
5. Third-party sourcing is required for connecting the rack-mounted R Pro system to remote workstation console devices. Keyboard, video and mouse (KVM) connectivity hardware for IntelliStation R Pro is not available through IBM but can be purchased through various vendors including the following: AmuletHotKey in London, England on the Web at www.amulet-hotkey.com or telephone +44(0)20 7407 2522. Wey Technology AG in Rotkreuz, Germany at info@wey.ch (E-mail) or telephone +41 41 798 20 49. IBM makes no representations or warranties with respect to non-IBM products. These products are offered and waranted by third parties, not IBM.
6. Installation within a rack requires optional keyboard tray P/N 28L4707. The keyboard stows in a ready-to-use position.
7. Advanced TrackPoint IV features are not available on IntelliStation R Pro systems.
8. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.

IntelliStation Z Pro

Part Number	Withdrawal Date: ddmmyy	Processor Speed[3]	Number of Processors (Std/Max)	L3 ECC Cache	Memory (Std/Max)	Video Adapter	Form Factor	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra, RAID)[4]	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[5]	Bays (Tot/Av)	Slots (Tot/Av)
IntelliStation Z Pro At-A-Glance														
KBK14xx[1,2]	-	800MHz	2/2	2MB	2GB/16GB	Matrox Millennium G450	Tower	10/100	D,U160	4/2	18.2GB/ 182GB	12X-8X-32X	9/7	8/6
KBK16xx[1,2]	-	800MHz	2/2	2MB	2GB/16GB	NVIDIA Quadro2 Pro	Tower	10/100	D,U160	4/2	36.4GB/ 182GB	12X-8X-32X	9/7	8/6

Note: This system is currently targeted at early adopters such as the scientific community and developers who are interested in porting their code to take advantage of the technological benefits of the Itanium processor. Users are advised to check with their sales representative or the Intel Web site regarding availability of operating systems and applications.

1. IntelliStation Z Pro ships with a US English keyboard and mouse. See Power, Monitors, Accessories section for a list of compatible monitors.
2. This model is shipped preloaded with the Microsoft Windows XP 64-bit Edition operating system.
3. Intel Itanium processor with advanced transfer ECC L3 cache and 2x133MHz FSB.
4. IntelliStation Z Pro includes a dual channel Ultra160 SCSI controller installed in slot two. The controller provides two external 0.8mm VHDCI connectors on one channel and three internal connectors on the other channel. Two of the internal connectors are 68-pin, 16-bit Ultra160 (LVD) and the third is a 50-pin, 8-bit Ultra2 connector. A five-drop multi-mode terminated LVD SCSI cable is included.
5. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.

IntelliStation Z Pro Memory Configurator

Memory Card A (top of card)

Bank 1- J4A1	Bank 1- J9A1
Bank 1- J4B1	Bank 1- J9B1
Bank 3- J4B2	Bank 3- J9B2
Bank 3- J4B3	Bank 3- J9B3

Memory Card B (top of card)

Bank 2- J4A1	Bank 2- J9A1
Bank 2- J4B1	Bank 2- J9B1
Bank 4- J4B2	Bank 4- J9B2
Bank 4- J4B3	Bank 4- J9B3

Part Number	Memory Description[1]
33L3258	1GB (4 x 256MB) PC100 ECC SDRAM DIMM KIT
33L3260	2GB (4 x 512MB) PC100 ECC SDRAM DIMM KIT
33L3262	4GB (4 x 1GB) PC100 ECC SDRAM DIMM KIT

1. Due to two- and four-way interleaving, all DIMMs installed in each of the two or four banks must be the same size to achieve maximum performance. Each of the four DIMMs installed in a bank must be the same size and each bank must contain four DIMMs if the bank is populated. DIMMs in other banks can be different sizes, which might affect performance. Install DIMMs in sequence bank one through four. All compatible memory options are available only in kits of four DIMMs.

Total Memory[1]	Quantity of DIMMs Added[2]		
2GB Standard (4x 512MB)	**1GB Kit (4 x 256MB) P/N 33L3258**	**2GB Kit (4 x 512MB) P/N 33L3260**	**4GB Kit (4 x 1GB) P/N 33L3262**
3GB	1	-	-
4GB	2	-	-
5GB	1 and	1	-
6GB	-	2	-
7GB	1 and	2	-
8GB	-	3	-
9GB	1 and	1 and	1
10GB	-	2 and	1
11GB	1 and	-	2
12GB	-	1 and	2
13GB[3]	1 and	-	3[3]
14GB	-	-	3
16GB (max)[3]	-	-	4[3]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller DIMMs may provide a more cost-effective alternative to using larger DIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. To obtain the quantity of memory identified in the ÒTotal MemoryÓ column, select the appropriate row and order the quantity of DIMMs identified in all columns for that row, which will be added to the standard memory noted at the top of the far left column.
3. The addition of four sets of DIMMs requires removal of the standard DIMMs.

IntelliStation Z Pro Internal Hard Disk Drive (HDD) Configurator

Total Internal Storage[1]	10,000RPM HDDs	
	18.2GB P/N 06P5750	36.4GB P/N 06P5751
18.2GB[2]	1[2]	-
36.4GB[3]	-	1[3]
54.6GB	1	1
72.8GB	-	2
91GB	1	2
109.2GB	-	3
127.4GB	1	3
145.6GB	-	4
163.8GB	1	4
182GB[4]	-	5[4]

Note: The HDD quantities shown are the total number required to achieve the desired storage amount. Adjust the HDDs to be ordered according to which model/configuration is the starting point

1. Select a total storage row and then add HDDs from both columns. Total Internal Storage is within +/- 0.2GB unless otherwise noted.
2. Standard on model P/N KBK14xx.
3. Standard on model P/N KBK16xx.
4. This HDD configuration requires replacement of the standard HDD on model P/N KBK14xx.

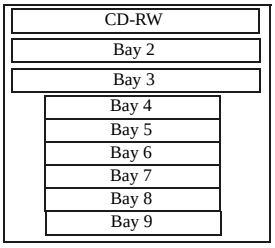
Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	HH	Yes	IDE CD-RW
2	133mm (5.25in)	HH	Yes	open[1]
3	133mm (5.25in)	HH	Yes	open[1]
4 ... 8	89mm (3.5in)	SL	No	open
9	89mm (3.5in)	SL	No	Std HDD

1. Supports removable media devices only. Hard disk drives are not supported.

Part Number	Description	RPM	Height	Bays Supported	Max Qty
Non-Hot-Swap Ultra 160 SCSI HDDs					
06P5750	18.2GB 10,000rpm Ultra160 HDD	10000	SL	4 ... 9[1]	5[2]
06P5751	36.4GB 10,000rpm Ultra160 HDD	10000	SL	4 ... 9[1]	5[2]

1. The standard HDD is installed in bay nine.

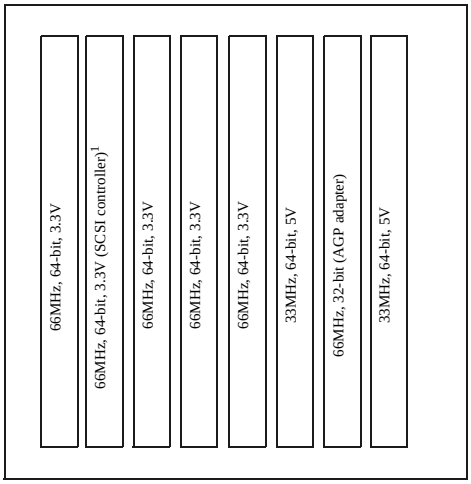
2. The five-drop cable allows installation of a maximum of five HDDs.



IntelliStation Z Pro I/O Options

Part Number	Description	Adapter Length	PCI Support	Slots Supported[2]
Storage Controllers				
19K4646	PCI Wide Ultra160 SCSI Adapter[1]	Half	32-bit	1 ... 8

1. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilised.
2. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 66MHz buses to 33MHz.



All slots are full-length.

1. Dual channel Ultra160 SCSI Adapter installed in slot two.

IntelliStation Z Pro Power, Monitors, Accessories

Part Number	Description
Power	
	IntelliStation Z Pro includes an 800W voltage-sensing power supply and a single standard country power cord.
Monitors	
T274Axx[1]	G78 Color Monitor 17in (406.4mm, 16in viewable image), stealth black
T57HGxx[1]	T750 Hybrid Flat Panel Color Monitor 17in (433mm, 17in viewable image), stealth black
T52U3xx[1]	P275 Color Monitor 21in (503mm, 19.8in viewable image), stealth black
T39U3xx[1]	P77 Color Monitor 17in (406mm, 16in viewable image), stealth black
T1U3Nxx[1]	P97 Color Monitor 19in (457.3mm, 18in viewable image), stealth black
Keyboard and Mouse	
	IntelliStation Z Pro ships standard with an IBM US English keyboard and a three-button mouse.

1. Where 'xx' represents a specific country code as follows: DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

xSeries Business Models Summary

Product Family	Withdrawal Date: ddmmyy	Part Number	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache. (KB)	Memory: (Std/Max)(R=RDIMM)[4]	Form Factor	Power Supply Quantity (Std/Max)	Ethernet (Mbps)(OB=Onboard)	Additional SCSI Controller (Part Number)	Internal Hard Disk Drive Std (Quan/P/N)	Bays (Total/Avail)	Slots (Total/Avail)	Std. Model P/N[1]
Business Models[1]														
xSeries 200	-	K953Gxx	1.13[3]	1/1	512	256MB/1.5GB[5]	Tower	1/1	10/100[OB]	-	2 x 06P5750	7/3	5/4	K952Xxx
xSeries 220	-	K63BGxx	1.13[3]	1/2	512	256MB[R]/4GB[5]	Tower	1/1	10/100[OB]	06P5740	3 x 06P5754	7/2	5/4	K63AXxx
xSeries 232	-	P823Gxx	1.13[3]	1/2	512	512MB[R]/4GB[7]	Tower	2/3	10/100[OB]	06P5740	3 x 06P5754	10/5	5/4	P822Xxx
xSeries 232	-	P843Gxx	1.26[3]	1/2	512	512MB[R]/4GB[7]	Tower	2/3	10/100[OB]	06P5740	3 x 06P5754	10/5	5/4	P842Xxx
xSeries 330	-	K414Gxx	1.13[3]	2/2[2]	512	512MB[R]/4GB[6]	Rack(1U)	1/1	2 x 10/100[OB]	-	2 x 06P5754	4/0	2/2	K411Xxx
xSeries 330	-	K434Gxx	1.26[3]	2/2[2]	512	512MB[R]/4GB[6]	Rack(1U)	1/1	2 x 10/100[OB]	06P5740	2 x 06P5754	4/0	2/1	K431Xxx
xSeries 342	-	K92TGxx	1.13[3]	1/2	512	512MB[R]/4GB[7]	Rack(3U)	2/2	10/100[OB]	06P5740	3 x 06P5754	7/2[8]	5/4	2 x HS P/S
xSeries 342	-	K94TGxx	1.26[3]	1/2	512	512MB[R]/4GB[7]	Rack(3U)	2/2	10/100[OB]	06P5740	3 x 06P5754	7/2[8]	5/4	2 x HS P/S

1. Business Models are standard models shipped with additional options already installed. They provide popular starting configurations that give a price advantage and enable easy installation. The Part Number that in most cases appears in the extreme righthand column, shows the standard model upon which the Business model is based. Refer to the appropriate product section and to this reference part number for more information.
2. One additional processor (of the same type and speed as the standard one) is supplied already installed with this Business Model.
3. Intel Pentium III processor with 133MHz FSB and 512KB advanced transfer cache.
4. High-speed 133MHz SDRAM.
5. The standard memory is replaced in this model with one 256MB DIMM - already installed.
6. One additional 256MB RDIMM memory option is supplied already installed with this Model.
7. The standard memory is replaced in this model with two 256MB DIMMs - already installed.
8. The optional 3-Pack Ultra160 Hot-Swap Expansion Kit (P/N 33L5050) is available, which converts the two available removable media bays into three slim-line (SL) hot-swap bays. This increases the Total Bays and Available Bays number by one (from 7/2 to 8/3), and also increases the total quantity of hot-swap bays from three to six. The available bays in this model would then all be hot-swap capable, allowing for installation of further hot-swap hard disks.

IBM xSeries 200

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache. (KB)	Memory (Std/Max)	Form Factor[5]	Power Supply Quantity (Std/Max)	Adv. System Management Processor	Onboard Ethernet (Mbps)	Disk Controller (U160=SCSI)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[6]	Bays: (Tot/Av)	Slots (Tot/Av)
xSeries 200 At-A-Glance Chart															
K931Xxx	-	1.0[1]	1/1	128	128MB/1.5GB	Tower	1/1	-	10/100	IDE	4/2	20.4/180GB[4]	48X-20X	7/4	5/5
K950Xxx	-	1.13[2]	1/1	512	128MB/1.5GB	Tower	1/1	-	10/100	U160[3]	4/2	0/293.6GB[4]	48X-20X	7/5	5/4
K951Xxx	-	1.13[2]	1/1	512	128MB/1.5GB	Tower	1/1	-	10/100	IDE	4/2	20.4/180GB[4]	48X-20X	7/4	5/5
K952Xxx	-	1.13[2]	1/1	512	128MB/1.5GB	Tower	1/1	-	10/100	U160[3]	4/2	18.2/293.6GB[4]	48X-20X	7/4	5/4
K960Xxx	-	1.26[2]	1/1	512	128MB/1.5GB	Tower	1/1	-	10/100	U160[3]	4/2	0/293.6GB[4]	48X-20X	7/5	5/4
K961Xxx	-	1.26[2]	1/1	512	128MB/1.5GB	Tower	1/1	-	10/100	IDE	4/2	20.4/180GB[4]	48X-20X	7/4	5/5
K962Xxx	-	1.26[2]	1/1	512	128MB/1.5GB	Tower	1/1	-	10/100	U160[3]	4/2	18.2/293.6GB[4]	48X-20X	7/4	5/4

1. Intel® Celeron™ processor with 100MHz FSB.
2. Intel Pentium III processor with advanced transfer L2 cache and 133 MHz FSB.
3. Includes a single-channel, 32-bit Ultra160 SCSI PCI storage adapter installed in slot three.
4. Maximum capacity assumes replacement of the standard hard disk drive and (in IDE models), the tape drive if installed, with the largest supported IBM hard disk drive.
5. Tower to Rack conversion Kit P/N 09N4300 is available if rack mounting is required.
6. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.

xSeries 200 Processor Upgrades

Part Number	Description	Processor Speed Upgrade[1]
32P0652	xSeries 1.26GHz/133MHz FSB - 512KB Cache Upgrade with Pentium III Processor	K950Xxx, K951Xxx, K952Xxx

1.Requires removal of the standard processor. A maximum of one processor may be installed. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.ibm.com/pc/support and enter machine type "Type-Model" in Quick Path. Select "Downloadable files" and then "BIOS".

xSeries 200 Memory Configurator

DIMM Socket
DIMM Socket
DIMM Socket

Part Number	Memory Description
33L3081	128MB 133MHz ECC SDRAM Unbuffered DIMM Memory
33L3083	256MB 133MHz ECC SDRAM Unbuffered DIMM Memory
33L3085	512MB 133MHz ECC SDRAM Unbuffered DIMM Memory

Total System Memory1	DIMMs		
128MB Standard (1 x 128)	128MB P/N 33L3081	256MB P/N 33L3083	512MB P/N 33L3085
192MB	-	-	-
256MB	1	-	-
384MB	2 or	1	-
640MB	-	2 or	1
768MB[2]	-	3[2]	-
1152MB	-	-	2
1536MB (max)[2]	-	-	3[2]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller DIMMs may provide a more cost-effective alternative to using larger DIMMs. Select the desired total memory from the appropriate column (Standard Model 64MB or 128MB), then select a quantity in that row from one of the DIMM columns.

1. Network Operating Systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires removal of standard DIMMs.

xSeries 200 Internal SCSI Cabling

EIDE Models
In xSeries 200 models using the EIDE interface for storage device attachment, a two-drop cable is used to attach the standard EIDE HDD to one of the EIDE connectors. A second EIDE controller provides the interface for the IDE CD-ROM drive. A two-drop cable connects the IDE controller to the IDE CD-ROM. Up to two additional IDE devices can be installed (one connected to each controller).

SCSI Models
xSeries 200 models with a SCSI adapter are cabled internally with a five-drop, 16-bit wide LVD SCSI cable with a built-in multi-mode active terminator at one end of the cable. The other end of the cable is attached to the internal 68-pin connector of the standard Ultra160 SCSI adapter. SCSI devices can be connected to any of the five cable connectors.

Other Configuration Alternatives
In the case where a RAID controller is used to support internal drives in a xSeries 200 SCSI model, the standard cable is moved from the standard PCI storage controller to the RAID adapter. To connect a SCSI tape drive to the standard SCSI controller, use the 16-bit multi-mode terminated, two-drop SCSI cable included with optional Media Bay Tray and LVD Cable Kit P/N 10K2340.

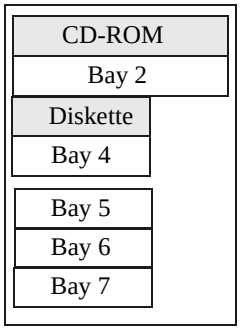
Note: if the Tape Option includes a terminated SCSI cable, the Media Bay Kit is not required. See the **Special Note** in the Tape Options section for more information.

External SCSI support can be obtained by installing an optional SCSI adapter or RAID controller and using appropriate external SCSI cabling.

For additional information regarding internal cabling, refer to Appendix E: Internal Storage Cabling Overview.

Total Internal Storage[1]	10,000RPM Ultra160 SCSI HDDs			15,000RPM Ultra160 SCSI HDD	
	18.2GB P/N 06P5750	36.4GB P/N 06P5751	73.4GB P/N 06P5752	18.2GB P/N 06P5765	36.4GB P/N 06P5766
18.2GB	18.2GB (10,000rpm) Standard on some SCSI Models[3]	-	-	18.2GB (10,000rpm) Standard on some SCSI Models[3]	-
36.4GB	1	-	-	1	-
54.6GB	2 or	1	-	2 or	1
72.8GB	3	-	-	3	-
91.0GB	-	2	-	-	2
127.4GB	-	3	-	-	3
145.6GB[2]	-	4[2]	-	-	4[2]
165.0GB	-	-	2	-	-
238.4GB	-	-	3	-	-
293.6GB (max)[2]	-	-	4[2]	-	-

This table does not represent all possible hard disk drive (HDD) configurations.
1. Select a total storage row then identify the recommended HDDs from within an RPM range according to choice. Total Internal Storage listed is within ± 0.2 GB unless otherwise noted.
2. Requires replacement of standard hard disk drive.
3. xSeries 200 models P/N K950Xxx and K960Xxx are Open Bay models. Recalculate requirements accordingly.



Total Internal Storage[1,2]	7200 RPM IDE HDDs			
	20.4GB P/N 19K4461	30GB P/N 00N8203	40GB P/N 22P7157	60GB P/N 09N4207
20.4GB	20.4GB Standard in EIDE Models	-	-	-
40.8GB	1	-	-	-
50.4GB	-	1	-	-
60.4GB	-	-	1	-
61.2GB	2	-	-	-
80.4GB	-	2	-	-
100.4GB	-	-	2	-
120GB[3]	-	-	3	-
140.4GB	-	-	-	2
180GB[3]	-	-	-	3[3]

This table does not represent all possible hard drive configurations.Total Internal Storage listed is within +/-0.2GB unless otherwise noted.
1. Select a total storage row and then select the quantity of HDDs from a column corresponding to the hard disk drive of choice.
2. The two EIDE controllers support a maximum of four IDE devices per machine including CD-ROM drive, hard disks and IDE tape drive.
3. Requires replacement of the standard HDD.

Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	HH	Yes	IDE CD-ROM
2	133mm (5.25in)	HH	Yes	open[1]
3	89mm (3.5in)	SL	Yes	Diskette
4	89mm (3.5in)	SL	Yes	open
5...7	89mm (3.5in)	SL	No	open

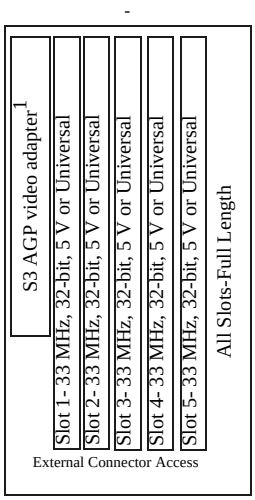
1. Bay 2 supports removable media devices only. Hard disk drives are not supported.

Part Number	Description	RPM	Height	Bays Supported	Max. Qty
IDE HDDs[1, 2]					
19K4461	20.4GB ATA/100 (EIDE) HDD	7200	SL	4...7	3
00N8203	30GB ATA/100 (EIDE) HDD	7200	SL	4...7	3
22P7157	40GB ATA-100 (EIDE) HDD	7200	SL	4...7	3
09N4207	60GB ATA-100 (EIDE) HDD	7200	SL	4...7	3
Non Hot-Swap Ultra160 SCSI HDDs[2]					
06P5750	18.2GB 10,000rpm Ultra160 HDD	10000	SL	4...7	4
06P5751	36.4GB 10,000rpm Ultra160 HDD	10000	SL	4...7	4
06P5752	73.4GB 10,000rpm Ultra160 HDD	10000	SL	4...7	4
06P5765	18.2GB 15,000rpm Ultra160 HDD	15000	SL	4...7	4
06P5766	36.4GB 15,000rpm Ultra160 HDD	15000	SL	4...7	4
Optical Devices		**Bays Supported**			
22P6950	16X Max RAM-Read DVD-ROM Drive[3, 4]	1, 2			
External Storage Expansion Unit[5]		**Form Factor**			
19K11xx[8]	EXP300 Storage Expansion Unit[6, 7]	Rack (3U)			
09N7296	EXP300 Rack-to-Tower Conversion Kit[6]	-			
94G7448	Rack Power Cable Type C12 (3.7m, 12 ft.)[7]	-			

1.The xSeries 200 EIDE controllers support a maximum of four IDE devices per machine including CD-ROM drives, hard disks and IDE tape drive.
2. Mixing of IDE and SCSI hard disk drives is not supported.
3. Either replace the standard CD-ROM or install in the available media bay. An IDE cable with three connectors is included with the optional optical drive. If installing as an additional device, connect the cable to each optical device and to the IDE connector on the system board. Configure the optional device as a master using the preset configuration if replacing the standard device or as a slave if installed as a redundant device. Refer to the Internal SCSI Cabling section for more information.
4. Audio not supported for DVD-ROM drives. The drive provides data input/output only.
5. Not supported by the external SCSI port included in SCSI models. Select an optional SCSI controller then refer to Appendix D: Cables-Storage Units-Controllers to confirm the controller supports the EXP300 External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section.
6. The EXP300 includes a single 2M Ultra2 SCSI cable and dual hot-swap 500 W redundant power supplies, each with its own standard country power cord. To convert an EXP300 to a tower form factor, EXP300 Rack-to-Tower Conversion Kit P/N 09N7296 is required.
7. This unit does not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order one Rack Power Cable for each power supply.
8.Where ‘xx’ represents a specific country code as follows: 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.

xSeries 200 I/O Options

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[2,3]
	Storage Controllers[4, 5]			
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[6]	Full	64-bit	2...5
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[7]	Half	64-bit	2...5
19K4646	PCI Wide Ultra160 SCSI Adapter[8]	Half	32-bit	2...5
02K3454	PCI Fast/Wide Ultra SCSI Adapter[9]	Half	32-bit	2...5
	Networking[10]			
	Ethernet[11]			
09N9901	10/100 EtherLink Server Adapter by 3Com[12]	Half	32-bit	1...5
06P3601	10/100 Ethernet Server Adapter[12]	Half	32-bit	1...5
06P3701	Gigabit Ethernet SX Server Adapter (fibre optic cabling interface)	Half	64-bit	1...5
22P4901	10/100 Dual Port Ethernet Server Adapter[12]	Half	64-bit	1...5
22P7801	NetXtreme 1000 SX Fibre Ethernet Adapter	Half	64-bit	1...5
	Token Ring			
34L5001	16/4 Token-Ring PCI Management Adapter[12]	Half	32-bit	1...5
34L5201	High-speed 100/16/4 Token-Ring PCI Management Adapter[12]	Half	32-bit	1...5
	Communications[13]			
37L14xx[14]	Serial I/O SST 8 and 16 Port Adapters[14]	Half	32-bit	2...5[14]



1. xSeries 200 ships standard with an AGP video adapter. Alternate video adapters are not supported.

1. A 64-bit adapter installed in a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot.
2. The xSeries 200 has five full-length, 33 MHz PCI expansion slots. The number of available slots is model specific.
3. The Ultra160 SCSI adapter shipped standard in SCSI models is installed in slot two.
4. xSeries 200 SCSI models include a standard single channel Ultra160 SCSI Adapter with a five drop multi-mode terminated LVD SCSI Cable. All models include dual IDE controllers. IDE models require an optional SCSI adapter P/N 19K4646 for SCSI functionality. See the At-A-Glance chart for model attributes.
5. Storage controllers are supported in slots two through five only. When a bootable SCSI device (a SCSI adapter attached to the boot HDD), such as the standard Ultra160 SCSI Adapter in SCSI models or an optional RAID Adapter, is installed with a second storage controller, they should be installed in slots two and four or slots three and five (the standard Ultra160 SCSI Adapter is normally installed in slot two). Networking adapters would then be installed in slots one, three or five. Networking and internal storage adapters cannot share slots two and four (paired) or three and five (paired). If a bootable SCSI device is not installed in any PCI slot, then pairing restrictions do not apply.
6. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connections are 0.8mm VHDCI.
7. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connectior is 0.8mm VHDCI.
8. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector and a five-drop multi-mode terminated LVD SCSI cable and one external 0.8-mm VHDCI connector. Only one of the two connectors may be utilised.
9. PCI Fast/Wide Ultra SCSI Adapter P/N 02K3454 provides one external 68-pin high density connector that supports external SCSI devices such as tape enclosures.
10. xSeries 200 includes an integrated full-duplex, 10/100Mbps Ethernet controller. Networking adapters are supported in slots one through five. Slots two and four, or slots three and five are paired and cannot share a networking adapter with a SCSI adapter attached to the bootable SCSI device, within a pair.
11. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. The onboard Ethernet is Intel-based, which is compatible with the Intel-based optional Ethernet adapters listed here: P/Ns 06P3601, 06P3701 and 22P4901.
12. Wake on LAN is supported for this adapter when installed in slots one through five. Networking adapters cannot share slots two and four (paired), or three and five (paired), with a SCSI adapter connected to the boot HDD.
13. xSeries 200 includes two USB ports, two high-speed serial/asynchronous ports, (NS16550A software compatible) and one high-speed parallel port supporting devices using SSP/EPP/ECP protocols adhering to the IEEE 1284 Standard.
14. Serial I/O Adapter P/N 37L1414 provides eight DB-25 RS232 serial connections using an octopus cable. Support for all ports is at 921.6 Kbps simultaneously. Adapter P/N 37L1415 provides sixteen RJ-45 RS232 serial connections in a breakout box. Support for all ports is at 115.2 Kbps simultaneously.A maximum of four Serial I/O adapters may be installed in a host system.

Part Number	Description
	Power[1, 10]
94G7448	Rack Power Cable Type C12 (3.7m)[10]
	Floor Standing Uninterruptible Power Supply (UPS)[2]
SUP072Y	APC Smart-UPS 700
SUP102Y	APC Smart-UPS 1000
SUP142Y	APC Smart-UPS 1400
	Rack Mount Uninterruptible Power Supply (UPS)[2]
32P16xx[12]	APC 2U Smart-UPS 1400RMiB[5]
30RIxxx[11]	APC Smart-UPS 3000RMiB[3]
37L6862	APC Smart-UPS 5000RMiB[4]
	Monitors[6]
T3147xx[13]	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black[7]
T3247xx[13]	E74 Color Monitor 17in (403mm, 15.9in Viewable Image Size), stealth black[7]
T274Axx[13]	G78 Color Monitor 17in (406.4mm, 16.0in Viewable Image Size), stealth black[7]
T12ABxx[13]	T541 Flat Panel Color Monitor 15in (381mm, 15in viewable image), stealth black[8]
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)[9]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[9]

1. The xSeries 200 includes a 330W voltage sensing power supply and a single standard country power cord.
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
6. The xSeries 200 models P/N K931Xxx, K950Xxx, K951Xxx, K952Xxx, K960Xxx, K961Xxx, K962Xxx, contain an ATI Savage-4 LT video adapter. This adapter includes 8MB of memory and is plugged into the standard AGP slot.
7. Installation within a rack requires optional Monitor Compartment (P/N94G7444).
8. Not supported for rack mounting.
9. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
10. The xSeries 200 ships with a standard country power cord. If conversion to Rack format is being carried out, Rack Power Cable P/N 94G7448 (type C12), must be ordered if connection to a high voltage UPS or PDU is required.
11. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
12. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.
13. Where 'xx' represents a specific country code as follows:- DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
	Conversion Kits
09N4300	4Ux20D Tower-to-Rack Kit[7]
	Rack[1, 7]
94G7448	Rack Power Cable Type C12 (3.7m)[7]
NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.	
	Keyboard and Mouse[2]
28L36xx[8]	Space Saver II Keyboard, stealth black[3, 4]
28L36xx[9]	Preferred Keyboard, stealth black[5]
10K38xx[10]	106-key Preferred USB Keyboard with 2-port USB Hub, stealth black[5, 6]
28L3675	Sleek 2-Button Mouse, stealth black
33L3244	Sleek USB Mouse, stealth black

1 Rack installation of an xSeries 200 requires 4Ux20D Tower-to-Rack Kit P/N 09N4300 and one of the Racks listed in the Rack Cabinets and Options section.
2. The xSeries 200 includes both a mouse and non space saver keyboard.
3. Installation within a rack requires optional keyboard tray P/N 28L4707 (stows in "ready-to-use" position).
4. Advanced TrackPoint IV features are not available on IBM xSeries systems.
5. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
6. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
7. The xSeries 200 ships with a standard country power cord. If conversion to Rack format and connection to a high voltage UPS or PDU is being carried out, a Rack Power Cable P/N 94G7448 (type C12), must be ordered.
8. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
9. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.
10. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.

xSeries 200 Tape Options

Part Number	Description (see **General Note** below)	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	68/50-pin Converter Included.	Ext. Tape Enclosures[1]
20L0549	10/20GB TR5 Internal IDE Tape Drive[2]	2	-	89mm (3.5in) SL or 133mm (5.25in) HH	-	-	-
09N4041	12/24GB DDS/3 4mm Internal SCSI Tape Drive[3, 4, 5]	2	8	89mm (3.5in) HH or 133mm (5.25in) HH	Y	Y	10L7440, 03K8756
00N7991	20/40GB DDS/4 4-mm Internal SCSI Tape Drive[5,] (and see **Special Note** below)	2	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y (see **Special Note** below)	-	10L7440[6], 03K8756[7,] (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[7,] (and see **Special Note** below)
00N8016	100/200GB LTO SCSI Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[7,] (and see **Special Note** below)
24P2396	100/200GB LTO SCSI Half-High Tape Drive[5,] (and see **Special Note** below)	2	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	-	03K8756[7,] (and see **Special Note** below)
24P2398	40/80GB DLTVS Internal SCSI Tape Drive[5,] (and see **Special Note** below)	2	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	-	03K8756[7,] (and see **Special Note** below)
	External Tape Enclosures						
10L7440	External Half High SCSI Storage Enclosure[8]	-	8/16	Desktop	N	N	-
03K8756	NetMEDIA Storage Expansion Unit EL[9]	-	16	Rack	Y	N	-
10L7113	NetMEDIA Systems Management Adapter[10]	-	16 LVD	-	Y	N	03K8756
	Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	External	Y	N	10L7440
10K2340	Media Bay Tray and LVD Cable Kit[4,7]	-	16 LVD	Internal	Y	N	03K8756

General Note: x200 SCSI models include an Ultra160 SCSI adapter with a five-drop multi-mode terminated LVD SCSI cable. Single-Ended devices attached to this cable will limit the entire SCSI bus to single-ended performance, therefore sharing of a SCSI bus by Tape and HDDs is not recommended. Internal SCSI tape drives and external tape enclosures are supported by optional PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which includes a five-drop multi-mode LVD SCSI cable and an external 0.8-mm VHDCI connector.

Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit (P/N 10K2340) for SCSI models of the x200, when a RAID adapter is being used for internal disk storage and one of these tape drives is supported for installation internally and is being attached to the standard controller. This cable can also be used in the NetMEDIA Storage Enclosure P/N 03K8756 to provide termination and LVD support for one of these tape drives when they are being attached externally. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable.

1. To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section, and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
2. x200 SCSI and IDE models include a two-drop EIDE cable attached to the CD-ROM drive and capable of supporting an optional IDE tape drive.
3. This single-ended device will limit the SCSI bus to which it is attached to Ultra SCSI speeds. To provide a dedicated tape SCSI bus, install PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which includes a five-drop multi-mode LVD SCSI cable.
4. For RAID configurations (in SCSI models) where the standard SCSI cable is attached to a RAID adapter, the two-drop multi-mode terminated LVD SCSI cable included with Media Bay Tray and LVD Cable Kit P/N 10K2340 is required, to allow attachment of this SCSI Tape Drive to the standard Ultra160 SCSI Adapter.
5. x200 EIDE models require optional PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which includes a five-drop multi-mode LVD SCSI cable, to allow the addition of an internal SCSI Tape Drive.
6. Requires 68-pin External Multimode LVD/SE SCSI Terminator P/N 00N7956.
7. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **Special Note** above), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply. For support of more than two devices in a NetMEDIA Enclosure, refer to the NetMEDIA Adapter information.
8. Provides a black desktop 133 mm (5.25") half-high (HH) tape enclosure. Connector is configurable as 50-pin Centronix or 68-pin high density. Requires either tape drive self termination or 68-pin External Multimode LVD/SE SCSI Terminator P/N 00N7956.
9. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, 19" rack-mountable tape enclosure which includes two full high (FH) or four half high (HH) extended length 133 mm (5.25") bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
10. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in an Expansion Unit P/N 03K8756 to provide repeater function, LVDS interface, aggregate cable lengths up to 12 meters when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8-mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.

Note: Additional tape details can be found in Appendix A: Tape Drive Attributes

Note: For a complete list of all IBM and non-IBM options compatibility with Network Operating Systems and IBM xSeries Servers, access the IBM ServerProven compatibility pages on the Web at URL http://www.ibm.com/pc/us/compat

xSeries 200 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Internet Server

Part Number	Description	Quantity
K951Xxx	x200 1.13GHz/256KB Pentium III, 128MB, 20.4GB EIDE, 48X	1
33L3081	128MB 133Mhz ECC SDRAM DIMM Memory	1[1]
19K4461	20.4GB 7200rpm ATA/100 (EIDE) HDD	1[2]
20L0549	10/20GB TR5 Internal IDE Tape Drive	1
T3147xx	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black	1
SUP072Y	APC Smart-UPS 700	1

1. For a total of 256 MB of system memory.
2. For a total of 40.8 GB of internal storage.

An Internet server handles all requests from the Internet (Intranet or Extranet). Usually, this type of server has the same characteristics as a normal file server. The main difference is that an internet server talks a different language (TCP/IP vs. NETBEUI or IPX/SPX) and often needs to do an extra security check (firewall). In the case of an Internet server, the server itself talks mostly to one client, the Internet Service Provider (ISP), instead of many clients as a file server does.

With this is mind, the the xSeries 200 was selected to provide an affordable price point for the growing Internet server market with an Intel Pentium III processor, 256 MB of system memory (expandable to 1.5 GB), and power protection with an APC Smart-UPS.

The network configuration depends on the method that will be used to connect the server to the Internet. Usually fast Ethernet routers are used, but if other methods are used you can add the appropriate adapter. The configuration includes a tape backup unit for secure backup of critical data in the event of a system or storage failure.

File and Print Server

Part Number	Description	Quantity
K952Xxx	x200 1.13GHz/512KB Pentium III, 128MB, 18.2GB Ultra160, 48X	1
33L3081	128MB 133MHz ECC SDRAM DIMM Memory	1[1]
06P5750	18.2GB 10,000rpm Ultra160 SCSI HDD	2[2]
19K4646	PCI Wide Ultra160 SCSI Adapter	1
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1
T3147xx	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black	1
SUP072Y	APC Smart-UPS 700	1

1. For a total of 256 MB of system memory.
2. For a total of 54.6 GB of internal storage.

A small business or departmental server is usually required to perform all typical server functions while servicing up to 100 users in a normal workgroup computing environment, but doesn't require the high-end performance and fault-tolerance properties of larger servers.

The sample configuration above consists of an xSeries 200 with 256 MB of memory and 54.6 GB of hard disk space. It has enough processor power and memory to run most current network operating systems comfortably and enough hard disk space to store a significant amount of data with additional external storage expansion still available. Demanding network traffic is effectively handled by the standard 100Mbps Ethernet connection.

This configuration also includes a tape backup unit, monitor, and a UPS to keep the system protected during power surges and outages.

Application Server

Part Number	Description	Quantity
K962Xxx	x200 1.26GHz/512KB Pentium III, 128MB, 18.2GB Ultra160, 48X	1
33L3083	256MB 133MHz ECC SDRAM DIMM Memory	1[1]
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	1
06P5750	18.2GB 10,000rpm Ultra160 SCSI HDD	2[2]
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1
10K2340	Media Bay Tray and LVD Cable Kit[3]	1[3]
T3147xx	E54 Colour Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black	1
SUP072Y	APC Smart-UPS 700	1

1. For a total of 384 MB of system memory.
2. Three HDDs are used (in total), for RAID 5 protection. Effective storage capacity is two HDDs (36.4GB).
3. Contains a cable for dedicated attachment of tape to standard controller. See also the **Special Note** in the Tape Options section.

An application server differs from a file and print server in that it has a higher workload, in providing application serving requirements for users. With this in mind, the xSeries 200 was selected to provide an affordable price point for an application server, with Pentium III processing, 384 MB of system memory (expandable to 1.5 GB), and availability features such as RAID-protected internal storage and power protection with an APC Smart-UPS.

IBM xSeries 220

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache. (KB)	Memory (Std/Max) (R=RDIMM)	Form Factor[3]	Power Supply Quantity (Std/Max)	Hot-Swap Hard Disk Capability (H)	Adv. System Management Processor	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[2]	Bays: (Tot/Av)	Slots (Tot/Av)
xSeries 220 At-A-Glance Chart																
K631Xxx	-	1.13[1]	1/2	512	128MB(R)/4GB	Tower	1/1	-	-	10/100	U160	4/2	0/293.6GB	48X-20X	7/5	5/5
K632Xxx	-	1.13[1]	1/2	512	128MB(R)/4GB	Tower	1/1	-	-	10/100	U160	4/2	18.2/293.6GB	48X-20X	7/4	5/5
K63AXxx	-	1.13[1]	1/2	512	256MB(R)/4GB	Tower	1/1	H	-	10/100	U160	4/2	0/220.2GB	48X-20X	7/5	5/5
K641Xxx	-	1.26[1]	1/2	512	128MB(R)/4GB	Tower	1/1	-	-	10/100	U160	4/2	0/293.6GB	48X-20X	7/5	5/5
K642Xxx	-	1.26[1]	1/2	512	128MB(R)/4GB	Tower	1/1	-	-	10/100	U160	4/2	18.2/293.6GB	48X-20X	7/4	5/5
K64AXxx	-	1.26[1]	1/2	512	256MB(R)/4GB	Tower	1/1	H	-	10/100	U160	4/2	0/220.2GB	48X-20X	7/5	5/5
K651Xxx	-	1.4[1]	1/2	512	128MB(R)/4GB	Tower	1/1	-	-	10/100	U160	4/2	0/293.6GB	48X-20X	7/5	5/5
K652Xxx	-	1.4[1]	1/2	512	128MB(R)/4GB	Tower	1/1	-	-	10/100	U160	4/2	18.2/293.6GB	48X-20X	7/4	5/5
K65AXxx	-	1.4[1]	1/2	512	256MB(R)/4GB	Tower	1/1	H	-	10/100	U160	4/2	0/220.2GB	48X-20X	7/5	5/5

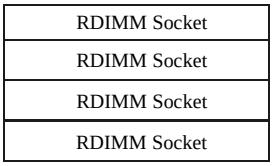
1. Intel Pentium III processor with advanced transfer L2 cache and 133MHz FSB.
2. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
3. Tower to Rack conversion Kit P/N 09N4300 is available if rack mounting is required.

xSeries 220 Processor Upgrades

Part Number	Description	SMP Support[1]	Processor Speed Upgrade[2]
32P0651	xSeries 1.13GHz/133MHz FSB - 512KB Cache Upgrade with Pentium III Processor	K631Xxx, K632Xxx K63AXxx	-
32P0652	xSeries 1.26GHz/133MHz FSB - 512KB Cache Upgrade with Pentium III Processor	K641Xxx, K642Xxx K64AXxx	All K63xXxx
25P2090	xSeries 1.4GHz/133MHz FSB - 512KB Cache Upgrade with Pentium III Processor	K651Xxx, K652Xxx K65AXxx	All K63xXxx, K64xXxx

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed, and cache size.
2.Requires removal of the standard processor. A maximum of two processors may be installed. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.ibm.com/pc/support and enter machine “Type-Model” in Quick Path. Select “Downloadable files” and then “BIOS”.

xSeries 220 Memory Configurator



Part Number	Memory Description[1]
10K0018	128MB PC133 ECC SDRAM RDIMM
10K0020	256MB PC133 ECC SDRAM RDIMM
10K0022	512MB PC133 ECC SDRAM RDIMM
33L3326	1GB PC133 ECC SDRAM RDIMM

1. Install additional RDIMMs in sequence of socket two through four.

Total System Memory[1]		Quantity of RDIMMs Added			
128MB (1 x 128) Models	256MB (1 x 256) Models	128MB P/N 10K0018	256MB P/N 10K0020	512MB P/N 10K0022	1GB P/N 33L3326
256MB	384MB	1	-	-	-
384MB	512MB	2 or	1	-	-
512MB	640MB	3	-	-	-
640MB	768MB	-	2 or	1	-
896MB	1024MB	-	3	-	-
1024MB[2]	-	-	4[2]	-	-
1152MB	1280MB	-	-	2 or	1
1664MB	1792MB	-	-	3	-
2048MB[2]	2048MB[2]	-	-	4[2]	-
2176MB	2304MB	-	-	-	2
3200MB	3328MB	-	-	-	3
4096MB (max)[2]	4096MB (max)[2]	-	-	-	4[2]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB.

Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs. Select the desired total memory from the lefthand column, then select a quantity in that row from one of the DIMM columns.

1. Network Operating Systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires removal of standard memory.

xSeries 220 Internal SCSI Cabling

Non-Hot-Swap Models
xSeries 220 non-hot-swap models are cabled internally with a five-drop, 16-bit wide LVD SCSI cable with a built-in multi-mode active terminator on one end of the cable. The other end of the cable is attached to the internal 68-pin connector of the integrated Ultra160 SCSI controller. SCSI devices can be connected to any of the five cable connectors.

Hot-Swap Models
xSeries 220 hot-swap models are cabled internally with a two-drop, 16-bit wide LVD SCSI cable. One end is connected to the internal 68-pin connector of the integrated Ultra160 SCSI controller. The second drop is connected to the hot-swap SCSI backplane. The SCSI backplane provides termination for the SCSI bus. Installation of a fixed disk in bay 4 of hot-swap models is not supported without the use of PCI Ultra160 SCSI Adapter P/N 19K4646 to provide a separate SCSI bus. A tape option installed in the removeable media bay 2 is not supported on the same SCSI bus as the hot-swap backplane and would also require the use of PCI Ultra160 SCSI Adapter P/N 19K4646 to provide a separate SCSI bus. Mixing of a tape drive and a hard disk on the same SCSI bus is not recommended in any case, due to the performamce impact of the tape drive on the bus.

Other Configuration Alternatives
In the case where a RAID controller is used to support internal drives in a xSeries 220, the standard cable is moved from the onboard controller to the RAID adapter. To connect a tape drive to the onboard SCSI controller, the two-drop cable from the optional Media Bay Tray and LVD Cable Kit P/N 10K2340 must be used.

Note: if the Tape Option includes a terminated SCSI cable, the Media Bay Kit is not required. See the **Special Note** in the Tape Options section for more information.

External SCSI support can be obtained by installing an optional SCSI adapter or RAID controller and using appropriate external SCSI cabling.

For additional information regarding internal cabling, refer to Appendix E: Internal Storage Cabling Overview.

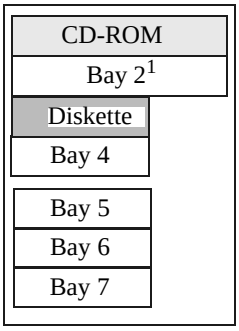
xSeries 220 Internal Hard Disk Drive (HDD) and External Storage Configurator

Total Internal Storage[1] Non H/Swap----> Hot-Swap-------->	10,000RPM Ultra160 SCSI HDDs			15,000RPM Ultra160 SCSI HDDs	
	18.2GB[2] P/N 06P5750 P/N 06P5754	36.4GB[2] P/N 06P5751 P/N 06P5755	73.4GB[2] P/N 06P5752 P/N 06P5756	18.2GB[2] P/N 06P5765 P/N 06P5767	36.4GB[2] P/N 06P5766 P/N 06P5768
0 GB	0GB Standard on most Base Models[4]			0GB Standard on most Base Models[4]	
18.2GB	1	-	-	1	-
36.4GB	2 or	1	-	2 or	1
54.6GB	3	-	-	3	-
72.8GB[3]	4[3] or	2	-	4[3] or	2
109.2GB	-	3	-	-	3
145.6GB[3]	-	4[3]	-	-	4[3]
146.8GB	-	-	2	-	-
220.2GB	-	-	3	-	-
293.6GB (max)[3]	-	-	4[3]	-	-

This table does not represent all possible hard disk drive (HDD) configurations.
1. Select a total storage row then identify the recommended HDDs from within an RPM range according to choice. Total Internal Storage listed is within ± 0.2 GB unless otherwise noted.
2. Both hot-swap and non-hot-swap HDDs are listed. Select the appropriate part number for the model of xSeries 220 being configured.
3. A maximum of three hot-swap drives may be installed in hot-swap models. Installation of a fixed disk in bay 4 of hot-swap models is not supported without the use of PCI Ultra160 SCSI Adapter P/N 19K4646 to provide a separate SCSI bus.
4. xSeries 220 models P/N K632Xxx, K642Xxx and K652Xxx include one 18.2GB Ultra160 SCSI non hot-swap HDD as standard. Recalculate requirements accordingly.

Part Number	Description	RPM	Height	Hot-Swap Models		Non-Hot-Swap Models	
				Bays Supported[2]	Maximum Quantity	Bays Supported	Maximum Quantity
Non Hot-Swap Ultra160 SCSI HDDs[1]							
06P5750	18.2GB 10,000rpm Ultra160 HDD	10000	SL	-	-	4...7	4
06P5751	36.4GB 10,000rpm Ultra160 HDD	10000	SL	-	-	4...7	4
06P5752	73.4GB 10,000rpm Ultra160 HDD	10000	SL	-	-	4...7	4
06P5765	18.2GB 15,000rpm Ultra160 HDD	15000	SL	-	-	4...7	4
06P5766	36.4GB 15,000rpm Ultra160 HDD	15000	SL	-	-	4...7	4
Hot-Swap Ultra160 SCSI HDDs[2]							
06P5754	18.2GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	5...7	3	-	-
06P5755	36.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	5...7	3	-	-
06P5756	73.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	5...7	3	-	-
06P5767	18.2GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	5...7	3	-	-
06P5768	36.4GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	5...7	3	-	-
Optical Devices		**Bays Supported**					
22P6950	16X Max RAM-Read DVD-ROM Drive[3, 4]	1, 2					
External Storage Expansion Unit[5]		**Form Factor**					
19K11xx[8]	EXP300 Storage Expansion Unit[6, 7]	Rack (3U)					
09N7296	EXP300 Rack-to-Tower Conversion Kit[6]	-					
94G7448	Rack Power Cable Type C12 (3.7m, 12 ft.)[7]	-					

1.Non hot-swap HDDs are supported in bays 4...7 of non-hot swap models. Installation of a non hot-swap disk in bay 4 of hot-swap models is not supported without the use of PCI Ultra160 SCSI Adapter P/N 19K4646 to provide a separate SCSI bus.
2.Hot-swap HDDs are supported in bays 5...7 of hot-swap models. Installation of a non hot-swap disk in bay 4 of hot-swap models is not supported withoutthe use of PCI Ultra160 SCSI Adapter P/N 19K4646 to provide a separate SCSI bus.
3. Either replace the standard CD-ROM or install in the available media bay. An IDE cable with three connectors is included with the optional optical drive (same cable is standard in the system). If installing as an additional device, connect the cable to each optical device and the IDE connector on the system board. Configure the optional device as a master using the preset configuration if replacing the standard device, or as a slave if installed as a redundant device.
4. Audio not supported for DVD-ROM drives. The drive provides data input/output only.
5. Not supported by the onboard SCSI controller. Select an optional SCSI controller then refer to Appendix D: Cables-Storage Units-Controllers to confirm the controller supports the EXP300 External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section.
6. The EXP300 includes a single 2M Ultra2 SCSI cable and dual hot-swap 500 W redundant power supplies, each with its own standard country power cord. To convert an EXP300 to a tower form factor, EXP300 Rack-to-Tower Conversion Kit P/N 09N7296 is required.
7. This unit does not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables (one for each power supply).
8.Where 'xx' represents a specific country code as follows: 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.



Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	HH	yes	IDE CD-ROM
2	133mm (5.25in)	HH	yes	open[1]
3	89mm (3.5in)	SL	yes	Diskette
4	89mm (3.5in)	SL	yes	open
5 ... 7	89mm (3.5in)	SL	yes[2]	open

Note: HDDs are installed in the order of bays seven through four, i.e., 7, 6, 5, 4. The boot disk must be installed in bay seven (SCSI ID 0).

1. Bay 2 does not support HDD options. It can be used for removable media devices such as tape drives.
2. Bays 5, 6 and 7 are configured as hot-swap bays on models P/N K63AXxx, K64AXxx, K65AXxx. These bays are not front-accessible in non hot-swap models.

xSeries 220 I/O Options

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[2]
	SCSI Storage Controllers[3]			
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[4]	Full	64-bit	1, 2, 3, 5[5]
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[6]	Half	64-bit	1...5
19K4646	PCI Wide Ultra160 SCSI Adapter[7]	Half	32-bit	1...5
02K3454	PCI Fast/Wide Ultra SCSI Adapter[8]	Half	32-bit	1...5
	Networking[9]			
	Ethernet[10]			
09N9901	10/100 EtherLink Server Adapter by 3Com[11]	Half	32-bit	1...5
06P3601	10/100 Ethernet Server Adapter[11]	Half	32-bit	1...5
06P3701	Gigabit Ethernet SX Server Adapter (fibre optic cabling interface)	Half	64-bit	1...5
22P4901	10/100 Dual Port Ethernet Server Adapter[11]	Half	64-bit	1...5
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)[11]	Half	64-bit	1...5
	Token Ring			
34L5001	16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1...5
34L5201	High-speed 100/16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1...5
	Communications[12]			
37L14xx[13]	Serial I/O SST 8 and 16 Port Adapters[13]	Half	32-bit	1...5[13]
	Systems Management			
09N75xx[14]	Remote Supervisor Adapter	Half	32-bit	2

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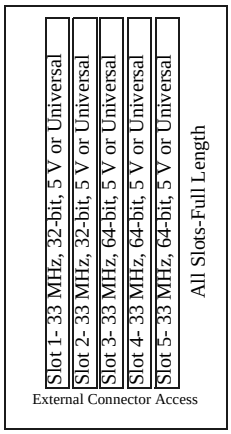


1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. The xSeries 220 has five full-length, 33 MHz PCI expansion slots, three 64-bit and two 32-bit.
3. xSeries 220 has an integrated Ultra160 SCSI Controller with a single internal channel. Non hot-swap models ship with a five-drop, multi-mode terminated LVD SCSI cable. Hot-swap models ship with a two-drop non-terminated LVD SCSI cable. Termination is provided by the hot-swap backplane.
4. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connections are 0.8mm VHDCI.
5. Because the onboard SCSI controller connector is located in-line with slot four, a full-length adapter does not seat properly in slot four if a cable is attached to that connector. If a cable is not attached to that connector, the full-length adapter can be installed in slot four. The interference is created by the battery pack on the ServeRAID-4Mx controller.
6. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connectior is 0.8mm VHDCI.
7. PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) provides a single channel with one internal connector and a five-drop multi-mode terminated LVD SCSI cable and one external 0.8-mm VHDCI connector. Only one of the two connectors may be utilised.
8. PCI Fast/Wide Ultra SCSI Adapter P/N 02K3454 provides one external 68-pin high density connector that supports external SCSI devices such as tape enclosures.
9. The xSeries 220 includes an integrated full-duplex, 10/100 Mbps Ethernet controller.
10. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. The onboard Ethernet is Intel-based, which is compatible with the Intel-based optional Ethernet adapters listed here: P/Ns 06P3601, 06P3701, 22P4901, 22P6801.
11. The Wake on LAN feature of this adapter is supported in slot 1 only.
12. xSeries 220 includes two USB ports, two high-speed serial/asynchronous ports, (NS16550A software compatible) and one high-speed parallel port supporting devices using SSP/EPP/ECP protocols adhering to the IEEE 1284 Standard.
13. Serial I/O Adapter P/N 37L1414 provides eight DB-25 RS232 serial connections using an octopus cable. Support for all ports is at 921.6 Kbps simultaneously. Adapter P/N 37L1415 provides sixteen RJ-45 RS232 serial connections in a breakout box. Support for all ports is at 115.2 Kbps simultaneously.A maximum of four Serial I/O adapters may be installed in a host system.
14. Where 'xx' represents a specific country code as follows:- 86=Europe, 87=Denmark, 88=South Africa, 89=UK, 90=Switzerland, 91=Italy, 92=Israel, 85=USA.

xSeries 220 Power, Monitors, Accessories

Part Number	Description
	Power[1, 10]
94G7448	Rack Power Cable Type C12 (3.7m)[10]
	Free Standing Uninterruptible Power Supply (UPS)[2]
SUP072Y	APC Smart-UPS 700
SUP102Y	APC Smart-UPS 1000
SUP142Y	APC Smart-UPS 1400
	Rack Mount Uninterruptible Power Supply (UPS)[2]
32P16xx[12]	APC 2U Smart-UPS 1400RMiB[5]
30RIxxx[11]	APC Smart-UPS 3000RMiB[3]
37L6862	APC Smart-UPS 5000RMiB,[4]
	Monitors[6]
T3147xx[13]	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black[7]
T3247xx[13]	E74 Color Monitor 17in (403mm, 15.9in Viewable Image Size), stealth black[7]
T274Axx[13]	G78 Color Monitor 17in (406.4mm, 16.0in Viewable Image Size), stealth black[7]
T12ABxx[13]	T541 Flat Panel Color Monitor 15in (381mm, 15in viewable image), stealth black[8]
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)[9]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[9]

1. The xSeries 220 includes a 330W voltage sensing power supply and a single standard country power cord..
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
6. The xSeries 220 includes an integrated SVGA controller(S3 Savage4 Chipset) with 8Mb of video memory
7. Installation within a rack requires optional Monitor Compartment P/N94G7444.
8. Not supported for rack mounting.
9. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
10. The xSeries 220 ships with a standard country power cord. If conversion to Rack format is being carried out, Rack Power Cable P/N 94G7448 (type C12), must be ordered if connection to a high voltage UPS or PDU is required.
11. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
12. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.
13. Where 'xx' represents a specific country code as follows:- DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
	Conversion Kits
09N4300	4Ux20D Tower-to-Rack Kit[7]
	Rack[1, 7]
94G7448	Rack Power Cable Type C12 (3.7m)[7]
NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.	
	Keyboard and Mouse[2]
28L36xx[8]	Space Saver II Keyboard[3, 4]
28L36xx[9]	Preferred Keyboard, stealth black[5]
10K38xx[10]	106-key Preferred USB Keyboard with 2-port USB Hub, stealth black[5, 6]
28L3675	Sleek 2-Button Mouse, stealth black
33L3244	Sleek USB Mouse, stealth black

1 Rack installation of an xSeries 220 requires 4Ux20D Tower-to-Rack Kit (P/N 09N4300) and one of the racks listed in the Rack Cabinets and Options section.
2. The xSeries 220 includes both a mouse and non space saver keyboard.
3. Installation within a rack requires optional keyboard tray P/N 28L4707 (stows in "ready-to-use" position).
4. Advanced TrackPoint IV features are not available on IBM xSeries systems.
5. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
6. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
7. The xSeries 220 ships with a standard country power cord. If conversion to Rack format and connection to a high voltage UPS or PDU is being carried out, a Rack Power Cable P/N 94G7448 (type C12), must be ordered.
8. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
9. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.
10. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.

xSeries 220 Tape Options

Part Number	Description (see **General Note** below)	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	68/50-pin Converter Incl.	Ext. Tape Enclosures[1]
09N4041	12/24GB DDS/3 4mm Internal SCSI Tape Drive[2, 3]	2	8	89mm (3.5in) HH or 133mm (5.25in) HH	Y	Y	10L7440, 03K8756
00N7991	20/40GB DDS/4 4-mm Internal SCSI Tape Drive (see **Special Note** below)	2	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y (see **Special Note** below)	-	10L7440[4], 03K8756[5], (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[5], (and see **Special Note** below)
00N8016	100/200GB LTO Internal SCSI Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[5], (and see **Special Note** below)
24P2396	100/200GB LTO SCSI Half-High Tape Drive (see **Special Note** below)	2	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	-	03K8756[5], (and see **Special Note** below)
24P2398	40/80GB DLTVS Internal SCSI Tape Drive (see **Special Note** below)	2	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	-	03K8756[5], (and see **Special Note** below)
	Tape Autoloaders						
00N7992	120/240GB DDS/4 SCSI Tape Autoloader	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[5], (and see **Special Note** below)
	External Tape Enclosures						
10L7440	External Half High SCSI Storage Enclosure[6]	-	8/16	Desktop	N	N	-
03K8756	NetMEDIA Storage Expansion Unit EL[7]	-	16	Rack	Y	N	-
10L7113	NetMEDIA Systems Management Adapter[8]	-	16 LVD	-	Y	N	03K8756
	Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	External	Y	N	10L7440
10K2340	Media Bay Tray and LVD Cable Kit[3,5]	-	16 LVD	Internal	Y	N	03K8756

General Note: All x220 models include an integrated Ultra160 SCSI Controller. Non hot-swap models include a five-drop multi-mode terminated LVD SCSI cable. Hot-swap models include a two-drop non-terminated cable. Hot-swap models do not support attachment of an additional SCSI device to the bus that supports the hot-swap backplane. If a single-ended device (such as tape drive P/N 09N4041) is attached to the same SCSI bus as the HDDs in non hot-swap models, performance of the bus will be limited to single-ended performance, therefore sharing of a SCSI bus by Tape and HDDs is not recommended. Internal tape drives in non-RAID systems and external tape enclosures, are supported by the optional PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which includes a five-drop multi-mode terminated LVD SCSI cable and an external 0.8-mm VHDCI connector.

Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit (P/N 10K2340) for SCSI models of the x220, when a RAID adapter is being used for internal disk storage and one of these tape drives is supported for installation internally and is being attached to the standard controller. This cable can also be used in the NetMEDIA Storage Enclosure P/N 03K8756 to provide termination and LVD support for one of these tape drives when they are being attached externally. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable.

1. To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section, and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
2. This single-ended device will limit the SCSI bus to which it is attached to Ultra SCSI speeds. To provide a dedicated tape SCSI bus, install PCI Wide ultra160 SCSI Adapter P/N 19K4646 which includes a five-drop multi-mode LVD SCSI cable.
3. For RAID configurations where the standard SCSI cable is attached to a RAID adapter, the two-drop multi-mode terminated LVD SCSI cable included with Media Bay Tray and LVD Cable Kit P/N 10K2340 is required, to allow attachment of this SCSI Tape Drive to the standard Ultra160 SCSI controller.
4. Requires 68-pin External Multimode LVD/SE SCSI Terminator P/N 00N7956.
5. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **Special Note** above), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply. For support of more than two devices in a NetMEDIA Enclosure, refer to the NetMEDIA Adapter information.
6. Provides a black desktop 133 mm (5.25") half-high (HH) tape enclosure. Connector is configurable as 50-pin Centronix or 68-pin high density. Requires either tape drive self termination or 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).
7. NetMEDIA Storage Expansion Unit EL (P/N 03K8756) is a black 3U, 19" rack-mountable tape enclosure which includes two full high (FH) or four half high (HH) extended length 133 mm (5.25") bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
8. NetMEDIA Systems Management Adapter (P/N 10L7113) may be installed in an Expansion Unit P/N 03K8756 to provide repeater function, LVDS interface, aggregate cable lengths up to 12 meters when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8-mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.

Note: Additional tape details can be found in Appendix A: Tape Drive Attributes

Note: For a complete list of all IBM and non-IBM options compatibility with Network Operating Systems and IBM xSeries Servers, access the IBM ServerProven compatibility pages on the Web at URL http://www.ibm.com/pc/us/compat

xSeries 220 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Internet Server

Part Number	Description	Quantity
K65AXxx	x220 1.4GHz/512KB, 256MB ECC, Open-HS, 48X, PCI	1
10K0018	128MB PC133 ECC SDRAM RDIMM	1[1]
06P5754	18.2GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	2[2]
00N7991	20/40 GB DDS/4 4mm Internal Tape Drive	1
19K4646	PCI Wide Ultra160 SCSI Adapter	1
T3147xx	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black	1
SUP072Y	APC Smart-UPS 700	1

1. For a total of 384MB of system memory.
2. For a total of 36.4 GB of internal storage.

An Internet server is a server that handles all requests from the Internet (Intranet or Extranet). Usually, this type of server has the same characteristics as a normal file server. The main difference is that an internet server talks a different language (TCP/IP vs. NETBEUI or IPX/SPX) and often needs to do an extra security check (firewall). In the case of an Internet server, the server itself talks mostly to one client, the Internet Service Provider (ISP), instead of many clients like a file server does.

With this is mind, the xSeries 200 was selected to provide an affordable price point for the growing Internet server market with up to two-way Pentium III processing, 384 MB of system memory (expandable to 4 GB), and power protection with an APC Smart-UPS.

The network configuration depends on the method that will be used to connect the server to the Internet. Usually fast Ethernet routers are used, but if other methods are used you can add the appropriate adapter. The configuration includes a tape backup unit for secure backup of critical data in the event of a system or storage failure.

File and Print Server

Part Number	Description	Quantity
K631Xxx	x220 1.13GHz/512KB, 128MB ECC, Open Bay, 48X	1
10K0018	128MB PC133 ECC SDRAM RDIMM	1[1]
06P5750	18.2GB 10,000rpm Ultra160 SCSI SL HDD	3[2]
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1
19K4646	PCI Wide Ultra160 SCSI Adapter	1
T3147xx	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black	1
SUP072Y	APC Smart-UPS 700	1

1. For a total of 256 MB of system memory.
2. For a total of 54.6 GB of internal storage.

A small business or departmental server is usually required to perform all typical server functions while servicing up to 100 users in a normal workgroup computing environment, but doesn't require the high-end performance and fault-tolerance properties of larger servers.

The sample configuration above consists of an xSeries 220 with 256 MB of memory and 54.6 GB of hard disk space. It has enough processor power and memory to run most current network operating systems comfortably and enough hard disk drive space to store a significant amount of data with additional external storage expansion still available. Demanding network traffic is effectively handled by the standard 100 Mbps Ethernet connection.

This configuration also includes a tape backup unit, monitor, and a UPS to keep the system protected during power surges and outages.

Application Server

Part Number	Description	Quantity
K64AXxx	x220 1.26GHz/512KB, 256MB ECC, Open-HS, 48X	1
32P0652	1.26GHz/133MHz 512KB Cache Upgrade with Pentium III Processor SVR	1
10K0020	256MB PC133 ECC SDRAM RDIMM	1[1]
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	1
06P5754	18.2GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	3[2]
10K2340	Media Bay Tray and LVD Cable Kit[3]	1[3]
00N7991	20/40GB DDS/4 4mm Internal Tape Drive NS Internal SCSI Tape Drive	1
T3147xx	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black	1
SUP072Y	APC Smart-UPS 700	1

1. For a total of 512 MB of system memory.
2. Three HDDs are used (in total) for RAID 5 protection. Effective capacity is two HDDs or 36.4GB
3. Contains a cable for dedicated attachment of tape to standard controller. See also the **Special Note** in the Tape Options section.

An application server differs from a file and print server in that it has a higher workload, in providing application serving requirements for users. With this in mind, the xSeries 220 was selected to provide an affordable price point for an application server, with two-way Pentium III processing, 512MB of system memory (expandable to 4 GB), and availability features such as RAID protected internal storage and power protection with an APC Smart-UPS.

IBM xSeries 232

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max) (RDIMM)[3]	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	Integrated System Management Processor	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Tot/Av)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[7]	Bays (Tot/Av)	Slots (Tot/Av)
xSeries 232 At-A-Glance																	
P821Xxx	-	1.13[2]	1/2	512	256MB/4GB	Tower	1/3	H	O - Power[4]	Y	10/100	D,U160	4/2[5]	0/440.4GB[6]	48X-20X	10/8[8]	5/5
P824Xxx	-	1.13[2]	1/2	512	256MB/4GB	Tower	2/3	P, H, F	S - Power, S - Fans	Y	10/100	D,U160	4/2[5]	0/440.4GB[6]	48X-20X	10/8[8]	5/5
P82TXxx[1]	-	1.13[2]	1/2	512	256MB/4GB	Rack (5U)	2/3	P, H, F	S - Power, S - Fans	Y	10/100	D,U160	4/2[5]	0/440.4GB[6]	48X-20X	10/8[8]	5/5
P841Xxx	-	1.26[2]	1/2	512	256MB/4GB	Tower	1/3	H	O - Power[4]	Y	10/100	D,U160	4/2[5]	0/440.4GB[6]	48X-20X	10/8[8]	5/5
P84RXxx[1]	-	1.26[2]	1/2	512	256MB/4GB	Rack (5U)	1/3	H	O - Power[4]	Y	10/100	D,U160	4/2[5]	0/440.46GB[6]	48X-20X	10/8[8]	5/5
P844Xxx	-	1.26[2]	1/2	512	256MB/4GB	Tower	2/3	P, H, F	S - Power, S - Fans	Y	10/100	D,U160	4/2[5]	0/440.4GB[6]	48X-20X	10/8[8]	5/5
P84TXxx[1]	-	1.26[2]	1/2	512	256MB/4GB	Rack (5U)	2/3	P, H, F	S - Power, S - Fans	Y	10/100	D,U160	4/2[5]	0/440.4GB[6]	48X-20X	10/8[8]	5/5
K854Xxx	-	1.4[2]	1/2	512	256MB/4GB	Tower	2/3	P, H, F	S - Power, S - Fans	Y	10/100	D,U160	4/2[5]	0/440.4GB[6]	48X-20X	10/8[8]	5/5
K85TXxx[1]	-	1.4[2]	1/2	512	256MB/4GB	Rack (5U)	2/3	P, H, F	S - Power, S - Fans	Y	10/100	D,U160	4/2[5]	0/440.4GB[6]	48X-20X	10/8[8]	5/5

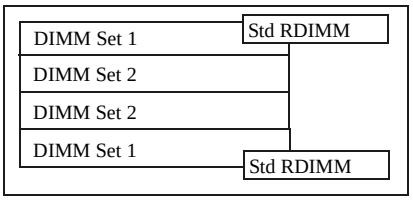
1. Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
2. Intel Pentium III processor with advanced transfer L2 cache and 133MHz FSB.
3. High-speed, 133MHz SDRAM.
4. Power supply redundancy requires removal of the standard 385W power supply and the addition of either two or three 250W Hot-Swap Redundant Power Supply P/N 33L37xx and a Hot-Swap Power Conversion Kit P/N 24P3513. See xSeries 232 Power, Monitors, Accessories for additional information.
5. xSeries 232 includes two available removable media bays that can be converted to three slim-line (SL) hot-swap bays with the addition of optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050.
6. The optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050 is available, which converts the two available removable media bays into three slim-line (SL) hot-swap bays. This increases the Total Bays and Available Bays from 10/8 to 11/9 and the number of hot-swap disk bays from 6 to 9, thereby allowing the internal hot-swap hard disk drive capacity to increase to 660.6GB.
7. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
8. The total number of bays can be increased to 11, by installing an optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050, which converts the two available removable media bays into 3x SL hot-swap HDD bays.

xSeries 232 Processor Upgrades

Part Number	Description	SMP Support[1]	Processor Speed Upgrade[2]
22P1997	xSeries 1.13GHz/133MHz, 512KB Cache Upgrade with Pentium III Processor	P821Xxx, P824Xxx, P82TXxx	-
22P1998	xSeries 1.26GHz/133MHz, 512KB Cache Upgrade with Pentium III Processor	P841Xxx, P84RXxx, P844Xxx, P84TXxx	P821Xxx, P824Xxx, P82TXxx
48P7467	xSeries 1.4GHz/133MHz, 512KB Cache Upgrade with Pentium III Processor	K854Xxx, K85TXxx	P821Xxx, P824Xxx, P82TXxx, P841Xxx, P84RXxx, P844Xxx, P84TXxx

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed, and cache size.
2. Requires removal of the standard processor. A maximum of two processors may be installed. All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter machine Type-Model in Quick Path. Select Downloadable files then BIOS

xSeries 232 Memory Configurator



Part Number	Memory Description[1]
33L3320	IBM 128MB PC133 ECC SDRAM RDIMM
33L3322	IBM 256MB PC133 ECC SDRAM RDIMM
33L3324	IBM 512MB PC133 ECC SDRAM RDIMM
33L3326	IBM 1GB PC133 ECC SDRAM RDIMM

1. Due to two-way interleaving, memory options are required to be installed in pairs beginning with set 1.

Total Memory[1]	Quantity of RDIMMs Added			
256MB (2x128) Models	128MB P/N 33L3320	256MB P/N 33L3322	512MB P/N 33L3324	1GB P/N 33L3326
512MB	2	-	-	-
768MB	-	2	-	-
1GB[2]	-	4[2]	-	-
1.25GB	-	-	2	-
2.0GB[2]	-	-	4[2]	-
2.25GB	-	-	-	2
4GB(max)[2]	-	-	-	4[2]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs. RDIMMs must be added in pairs to support interleaving technology,
1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires removal of standard memory.

xSeries 232 Internal SCSI Cabling

The xSeries 232 contains 10 drive bays. The six 3.5in hot-swap bays are located on the lower half of the xSeries 232 tower models or on the left side of the rack models. These bays support various hot-swap drive options. There are four bays on the top portion of tower models or the right side of rack models, which are primarily designed for removable media devices. One bay contains the standard 3.5in SL diskette drive and another bay contains the standard CD-ROM drive. The remaining two 5.25in half-high bays can support tape back-up or other devices. Using an optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050, these two bays can be converted to support three 3.5in SL hot-swap HDDs.

The xSeries 232 contains a backplane supporting six hot-swap drive bays.The backplane is connected to the integrated dual-channel, Ultra160 SCSI controller connector through a 16-bit LVD SCSI cable. If internal RAID support is required, this cable can be used to connect to a supported RAID adapter rather than the integrated SCSI controller. A two-drop, 16-bit SCSI cable with integrated terminator is included with the Media Bay Tray and LVD Cable Kit P/N 10K2340. The two-drop cable supports up to two internal devices in the open 5.25in media device bays. This cable can be attached to the integrated Ultra160 SCSI controller connector if a RAID adapter is used to support the internal hot-swap drive bays, or to the second channel of the integrated controller, if the first channel is used to suppport the hot-swap drive bays.

Note: if the Tape Option includes a terminated SCSI cable, the Media Bay Kit is not required. See the **Special Note** in the Tape Options section for more information.

The 48X-20X IDE CD-ROM is cabled directly to the IDE port. To attach external SCSI devices, a supported SCSI adapter is required.

For additional information regarding internal cabling, refer to Appendix E: Internal Storage Cabling Overview.

xSeries 232 Internal Hard Disk Drive (HDD) and External Storage Configurator

Total Int Storage[1]	10,000RPM HDDs			15,000RPM HDDs	
	18.2GB P/N 06P5754	36.4GB P/N 06P5755	73.4GB P/N 06P5756	18.2GB P/N 06P5767	36.4GB P/N 06P5768
0GB	0GB Standard on base models			0GB Standard on base models	
18.2GB	1	-	-	1	-
36.4GB	2 or	1	-	2 or	1
54.6GB	3	-	-	3	-
72.8GB	4 or	2	-	4 or	2
91.0GB	5	-	-	5	-
109.2GB	6 or	3	-	6 or	3
145.6GB	-	4	-	-	4
182.0GB	-	5	-	-	5
218.4GB	-	6	-	-	6
327.6GB[2]	-	9[2]	-	-	9[2]
440.4GB	-	-	6	-	-
660.6GB[3]	-	-	9[3]	-	-

This table does not represent all possible HDD configurations.
1. Select a total storage row then identify the recommended HDDs from within an RPM range according to choice. Total Internal Storage listed is within ± 0.2 GB unless otherwise noted.
2. Internal storage using 36.4GB HDD can be increased to 327.6GB by converting the two available removable bays to three hot-swap HDD bays using an optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050.
3. Internal storage using 73.4GB HDD can be increased to 660.6GB by converting the two available removable media bays to three hot-swap HDD bays using an optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050.

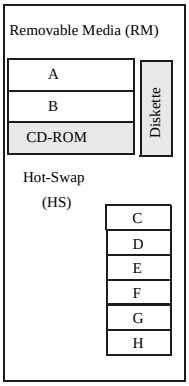
Bay	Form Factor	Height	Front Access	Usage
A[1]	133mm (5.25in)	HH[2]	Yes	Open
B[1]	133mm (5.25in)	HH[2]	Yes	Open
-	133mm (5.25in)	HH	Yes	IDE CD-ROM
-	89mm (3.5in)	SL	Yes	Diskette
C ... H	HS	SL	Yes	Open

1. Bays A and B can be converted to three hot-swap HDDs using the optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050.

2. Two Half-High (HH) bays can be combined to support a single Full-High device.

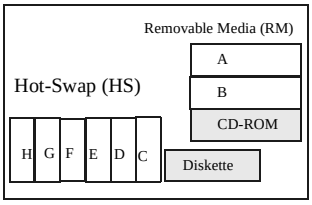
Part Number	Description	RPM	Height	Bays Supported	Max Qty[1]
Hot-Swap Ultra160 SCSI HDDs					
06P5754	18.2GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	C ... H	6
06P5755	36.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	C ... H	6
06P5756	73.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	C ... H	6
06P5767	18.2GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	C ... H	6
06P5768	36.4GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	C ... H	6
Associated Options		-			
33L37xx[12]	250W Hot-Swap Redundant Power Supply	-			
24P3513	xSeries Hot-Swap Power Conversion Kit[2]	-			
33L5050	IBM 3-Pack Ultra160 H/Swap Expansion Kit[3]	-			
Optical Devices		**Bays Supported**			
22P6950	16X Max RAM-Read DVD-ROM Drive[4, 5]	A, B			
External Storage Expansion Units[6]		**Form Factor**			
19K11xx[13]	EXP300 Storage Expansion Unit[7, 11]	Rack (3U)			
09N7296	EXP300 Rack-to-Tower Conversion Kit	-			
19K11xx[14]	FAStT200 Storage Server[8, 9, 11]	Rack (3U)			
19K11xx[15]	FAStT200 HA Storage Server[8, 11]	Rack (3U)			
19K1121	FAStT200 Redundant RAID Controller[9]	-			
00N71xx[16]	FAStT EXP500 Storage Expansion Unit[10,11]	Rack (3U)			
94G7448	Rack Power Cable Type C12 3.7m[11]	-			

Tower Model View



For purposes of clarity, bay labels in these diagrams are for reference by the accompanying tables and are not the actual labels. Refer to information shipped with the system for further details on actual labels.

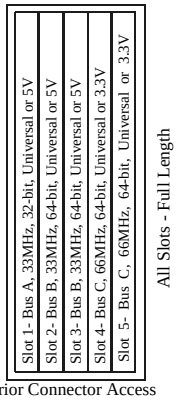
Rack Model View



1. Maximum quantity of HDDs can be increased to nine by converting the two removable media bays to three SL HDD bays using the 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050.
2. xSeries Hot-Swap Power Conversion Kit P/N 24P3513 contains a hot-swap power backplane that supports installation for up to three 250W hot-swap power supplies.
3. Bays A and B can be converted to three hot-swap bays using the optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050. The hot-swap backplane can be cabled as an independent bus or as an extension of the standard backplane using the included jumper cable.
4. Replace standard CD-ROM only. Not compatible with the other media bays.
5. Audio not supported for DVD-ROM drives. The drive provides data input/output only.
6. To configure an external SCSI storage devices, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
7. The EXP300 includes a single 2 M Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with it's own standard country power cord.
8. The FAStT200 Storage Server and HA Storage Server each include two hot-swap, 350 W auto-ranging redundant power supplies each with it's own standard country power cord.
9. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller (P/N 19K1121).
10. The FAStT EXP500 Storage Expansion Unit (P/N 00N71xx) includes dual hot-swap 350W power supplies each with it's own standard country power cord.
11. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables (one for each power supply).
12 Where 'xx' represents a specific country code as follows: 60=Saudi Arabia, 61=Europe, 62=Denmark, 63=Israel, 64=Italy, 65=South Africa, 66=Switzerland, 67=United Kingdom&Arabia.
13.Where 'xx' represents a specific country code as follows: 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.
14. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/ English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
15. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/ English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
16. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/ Language Line Cords/Publications are included as indicated.

xSeries 232 I/O Options

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[1]
	Storage Controllers[2]			
37L6889	ServeRAID-4H Ultra160 SCSI Controller[3]	Full	64-bit	2...5
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[4]	Full	64-bit	2...5
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[5]	Half	64-bit	1...5
19K4646	PCI Wide Ultra160 SCSI Adapter[6]	Half	32-bit	1...5
02K3454	PCI Fast/Wide Ultra SCSI Adapter[7]	Half	32-bit	1...5
	Fibre Storage Controllers and Options[8]			
00N6881	FAStT Host Adapter	Half	64-bit	1...5
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1...5
	Networking[9]			
	Ethernet[10, 11]			
06P3601	10/100 Ethernet Server Adapter[11]	Half	32-bit	1...5
06P3701	Gigabit Ethernet SX Server Adapter (fibre optic cabling interface)	Half	64-bit	1...5
09N9901	10/100 EtherLink Server Adapter by 3Com[11]	Half	32-bit	1...5
22P4901	10/100 Dual Port Ethernet Server Adapter	Half	64-bit	1...5
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)[11]	Half	64-bit	1...5
	Token Ring[11]			
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1...5
34L5001	16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1...5
	Communications[12]			
37L14xx[13]	Serial I/O SST 8 and 16 Port Adapters[13]	Half	32-bit	1...3[13]
	Systems Management			
09N75xx[15]	Remote Supervisor Adapter[14]	Half	32-bit	1



1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 66MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. xSeries 232 includes a dual-port, dual-channel Ultra160 SCSI controller for internal use only. No standard external port is available. See Internal SCSI Cabling for cabling alternatives.
3. ServeRAID-4H Ultra160 SCSI Controller is powered by a 266MHz PowerPC 750 processor and provides four channels and 128MB of battery-backed ECC cache, with two internal and up to four external Ultra160 connectors. (a combination of four connectors may be utilised). External connectors are 0.8mm VHDCI.
4. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connections are 0.8mm VHDCI.
5. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI.
6. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilised.
7. PCI Fast/Wide Ultra SCSI Adapter P/N 02K3454 provides one external 68-pin high density connector that supports external SCSI devices such as tape enclosures.
8. See Fibre Channel Solutions Overview section for additional configuration information.
9. xSeries 232 includes a full-duplex, 10/100Mbps Ethernet PCI controller.
10. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible.The onboard Ethernet is Intel-based, which is compatible with the Intel-based optional Ethernet adapters listed here: P/Ns 06P3601, 06P3701, 22P4901, 22P6801.
11. This server supports Wake on LAN and Alert-on-LAN functions through the integrated Ethernet controller only. These functions are not supported for optional PCI adapters.
12. xSeries 232 includes two USB ports and two serial ports.
13. Serial I/O Adapter P/N 37L1414 provides eight DB-25 RS232 serial connections using an octopus cable. Support for all ports is at 921.6 Kbps simultaneously. Adapter P/N 37L1415 provides sixteen RJ-45 RS232 serial connections in a breakout box. Support for all ports is at 115.2 Kbps simultaneously. A maximum of four Serial I/O adapters may be installed in a host system.
14. Disables the Integrated System Management processor when installed in xSeries 232 and provides full system management functionality through a customer-supplied Ethernet cable or modem connection or as part of an interconnected system management bus (option includes all interconnect hardware).
15. Where 'xx' represents a specific country code as follows:- 86=Europe, 87=Denmark, 88=South Africa, 89=UK, 90=Switzerland, 91=Italy, 92=Israel, 85=USA.

Part Number	Power[1, 12]
33L37xx[13]	250W Hot-Swap Redundant Power Supply[2, 12]
24P3513	xSeries Hot-Swap Power Conversion Kit[3]
94G7448	Rack Power Cable Type C12 (3.7m)[12]
Floor-Standing Uninterruptible Power Supply (UPS)[4]	
SUP102Y	APC Smart-UPS 1000
SUP142Y	APC Smart-UPS 1400
Rack-Mount Uninterruptible Power Supply (UPS)[4]	
32P16xx[15]	APC 2U Smart-UPS 1400RMiB[7]
30RIxxx[14]	APC Smart-UPS 3000RMiB[5]
37L6862	APC Smart-UPS 5000RMiB[6]
Monitors[8]	
T3147xx[16]	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black[9]
T3247xx[16]	E74 Color Monitor 17in (403mm, 15.9in Viewable Image Size), stealth black[9]
T274Axx[16]	G78 Color Monitor 17in (406.4mm, 16in Viewable Image Size), stealth black[9]
T12ABxx[16]	T541 Flat Panel Color Monitor 15in (381mm, 15in viewable image), stealth black[10]
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)[11]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[11]

1. xSeries 232 models P/N P821Xxx, P841Xxx, P84RXxx include a single 385W power supply and a single standard country power cord. Power supply redundancy may be achieved by removing the standard power supply and installing two or three optional 250W Hot-Swap Redundant Supplies P/N 33L37xx. xSeries Hot-Swap Power Conversion Kit P/N 24P3513 is required when optional power supplies are added to the above base models. The Models P/N P824Xxx, P82TXxx, P844Xxx, P84TXxx, P854Xxx, P85Txx, shipping standard with power redundancy, are equipped with two hot-swap 250W power supplies. A third hot-swap 250W power supply may be added for robust configurations. The hot-swap power supply backplane is included in redundant models. To assist in determining when an additional power supply is required to preserve redundancy, a Non-Redundant LED is a standard feature.
2. 250W Hot-Swap Redundant Power Supply P/N 33L37xx includes a single standard country power cord. xSeries Hot-Swap Power Supply Conversion Kit P/N 24P3513 must be installed prior to adding optional power supplies in those base models that include a single 385W power supply.
3. xSeries Hot-Swap Power Supply Conversion Kit P/N 24P3513 includes a hot-swap power backplane. Use when installing hot-swap power supplies in 385W models (removal of standard power supply required). See also Notes 1 and 2.
4. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
5. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
6. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
7. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
8. xSeries 232 uses an SVGA controller (S3 Savage4 chipset) with 8MB of video memory.
9. Installation within a rack requires optional Monitor Compartment P/N 94G7444.
10. Not supported for rack mounting.
11. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
12. Rack Power Cable P/N 94G7448 (one for each power supply), must be ordered for power connection of a Rack model to a high voltage UPS or PDU.
13. Where 'xx' represents a specific country code as follows: 60=Saudi Arabia, 61=Europe, 62=Denmark, 63=Israel, 64=Italy, 65=South Africa, 66=Switzerland, 67=UK/Arabia.
14. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=UK, EUR=Europe.
15. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.
16. Where 'xx' represents a specific country code as follows: DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
Conversion Kits	
21P9593	5Ux24D Tower-to-Rack Kit II[7]
Rack[1, 7]	
94G7448	Rack Power Cable Type C12 (3.7m)[7]
NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.	
Keyboard and Mouse[2]	
28L36xx[8]	Space Saver II Keyboard[3, 4]
28L36xx[9]	Preferred Keyboard (stealth black)[5]
10K38xx[10]	106-key Preferred USB Keyboard with 2-port USB Hub, stealth black[5, 6]
22P51xx[11]	TrackPoint USB Space Saver Keyboard, stealth black[3, 4, 6]
28L3675	Sleek 2-Button Stealth Black Mouse
33L3244	Sleek USB Mouse, stealth black

1. xSeries 232 rack models are housed in a 19in rack-mountable drawer and require one of the racks listed in the Rack Cabinets and Options section.
2. Tower models include both a standard keyboard and mouse. Rack models include neither.
3. Installation within a rack requires optional keyboard tray P/N 28L4707, which stows in ready-to-use position.
4. Advanced TrackPoint IV features are not available on IBM xSeries systems.
5. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
6. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
7. The xSeries 232 ships with a standard country power cord. For connection of a Rack model to a high voltage UPS or PDU, or if a Tower model is being converted for rack installation and is to be connected to a UPS or PDU, a Rack Power Cable P/N 94G7448 (one for each power supply), must be ordered.
8. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
9. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.
10. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.
11. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 68=French, 55=German, 56=Italian, 57=Spanish, 58=UK English, 59=Swedish/Finnish, 60=Belgian/English, 61=Russian, 62=Polish, 63=Portuguese, 65=Swiss, 67=US International.

xSeries 232 Tape Options

Part Number	Description (see **General Note** below)	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	68/50-pin Converter Incl	Ext Tape Enclosures[1]
00N7991	20/40GB DDS/4 4mm Internal SCSI Tape Drive (see **Special Note** below)	A, B	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y (see **Special Note** below)	-	10L7440[3], 03K8756[2], (and see **Special Note** below)
00N7990	40/80GB DLT Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
00N8016	100/200GB LTO Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
24P2396	100/200GB LTO Internal SCSI HH Tape Drive (see **Special Note** below)	A, B	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
24P2398	40/80GB DLTVS Internal SCSI Tape Drive (see **Special Note** below)	A, B	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
	Tape Autoloaders						
00N7992	120/240GB DDS/4 Internal SCSI Tape Autoloader (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
00N79xx[12]	DLT SCSI Tape Autoloader	-	16	Desktop	Y	-	-
09N40xx[13]	3600 Series 900GB/1.8TB LTO SCSI Tape Autoloader[4]	-	16 Ultra2 LVD	Tower or 6U Rack	Y	-	-
	External Tape Libraries[5]						
00N79xx[14]	DLT SCSI Tape Library	-	16	Desktop or Rack	Y	-	-
21P99xx[15]	3600 Series 2/4TB LTO SCSI Tape Library (Rack)	-	16 Ultra2 LVD	5U Rack	Y	-	-
21P99xx[16]	3600 Series 2-Drive, 20-Cartridge Expander Module[6]	-	16 Ultra2 LVD	5U Rack	Y	-	-
09N4048	3600 Series LTO Drive Upgrade Option[7]	-	16 Ultra2 LVD	-	N	-	-
	External Tape Enclosures						
10L7440	External Half High SCSI Storage Enclosure[8]	-	8/16	Desktop	N	N	-
03K8756	NetMEDIA Storage Expansion Unit EL[9]	-	16	Rack	Y	N	-
10L7113	NetMEDIA Systems Management Adapter[10]	-	16 LVD	-	Y	N	03K8756
	Associated Options						
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	Ext.	Y	N	10L7440, 03K8705
10K2340	Media BayTray and LVD Cable Kit[2]	-	16 LVD	Int	Y	N	03K8756
24P3513	xSeries Hot-Swap Power Conversion Kit[11]	-	-	-	-	-	-
33L37xx[17]	250W Hot-Swap Redundant Power Supply	-	-	-	-	-	-

General Note: Power - additional power is not required when installing a SCSI device in bay A or B. If adding additional power supplies to base models for redundancy, removal of the standard 385W power supply is required before adding both Hot-Swap Power Conversion Kit P/N 24P3513 and two or three optional 250W Hot-Swap Redundant Power Supplies P/N 33L37xx. Models shipped standard with redundant power contain two hot-swap 250W power supplies (maximum of three). **Tape Support** - external tape enclosures are supported by PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which has an external 0.8mm VHDCI connector.

Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit P/N 10K2340 for the x232, to attach one of these tape drives internally to the standard SCSI controller. This cable can also be used in the NetMEDIA Storage Enclosure P/N 03K8756 to provide termination and LVD support for one of these tape drives when they are being attached externally. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable.

1. To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section, and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
2. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **Special Note** above), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply unless a NetMEDIA Systems Management Adapter P/N 10L7113 is installed.. See the NetMEDIA Adapter information.
3. Requires 68-pin External Multimode LVD/SE SCSI terminator P/N 00N7956.
4. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.
5. Tape library attributes and prerequisites are defined in Appendix B: Tape Library Attributes.
6. Supported only with the 3600 Series LTO Tape Library (Rack) P/N 21P99xx. Allow one additional EIA space when installing either one or two (maximum) units to accommodate a filler plate for cable routing. Up to two 3600 Series LTO Drive Upgrade Options can be installed in each module or the module can operate off the LTO drives installed in the LTO tape library.
7 .Install in second drive bay of 3600 Series LTO Tape Libraries or in either of the two bays of 3600 Series 2-drive, 20-cartridge Expander Module to increase performance. Includes an LTO (Ultrium) drive and a one-meter external LVD SCSI cable.
8. Provides a black desktop 133 mm (5.25") half-high (HH) tape enclosure. Connector is configurable as 50-pin Centronix or 68-pin high density. Requires either tape drive self termination or 68-pin External Multimode LVD/SE SCSI Terminator P/N 00N7956.
9. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, 19in rack mountable tape enclosure which includes two full-high (FH) or four half-high (HH) extended length 133mm (5.25in) bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
10 NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Storage Expansion Unit to provide repeater function, LVDS interface, aggregate cable lengths up to 12m when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.
11. IBM eServer xSeries Hot-Swap Power Conversion Kit P/N 24P3513 includes a hot-swap power backplane. Required when upgrading standard power on base models P/Ns P821Xxx, P841Xxx and P84RXxx, which are shipped with a single 385W power supply that must be removed when adding this option.
12. Where 'xx' represents a country specific power cord code: 70=UK, 71=Swiss, 72=Italy, 73=Israel, 33L4981=EU1, 33L4982=Denmark, 33L4983=South Africa/India.
13. Where 'xx' represents a specific country code as follows:- 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.
14. Where 'xx' represents a country specific power cord code: *Tower versions* - 74=EU1, 75=Denmark, 76=India/South Africa, 77=UK, 78=Swiss, 79=Italy, 80=Israel: *Rack versions* - 81=EU1, 82=Denmark, 83=India/South Africa, 84=UK, 85=Swiss, 86=Italy, 87=Israel.
15. Where 'xx' represents a specific country code as follows:- *Rack version* - 78=Europe, 79=Denmark, 80=South Africa, 77=UK, 81=Swiss, 82=Italy, 83=Israel.
16. Where 'xx' represents a specific country code as follows:- 85=Europe, 86=Denmark, 87=South Africa, 84=UK, 88=Swiss, 89=Italy, 90=Israel.
17. Where 'xx' represents a specific country code as follows: 60=Saudi Arabia, 61=Europe, 62=Denmark, 63=Israel, 64=Italy, 65=South Africa, 66=Switzerland, 67=United Kingdom&Arabia.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

Note: For a complete list of all IBM and non-IBM options compatibility with Network Operating Systems and IBM xSeries Servers, access the IBM ServerProven compatibility pages on the Web at URL http://www.ibm.com/pc/us/compat

xSeries 232 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Internet Server

Part Number	Description	Quantity
K854Xxx	xSeries 232 1.4GHz/512KB Pentium III, 256MB ECC, Open, 48X	1
33L3320	128MB PC133 ECC SDRAM RDIMM	2[1]
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	1
06P5755	36.4GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	4[2]
24P2396	100/200GB LTO Internal SCSI HH Tape Drive	1
10K2340	Media Bay Tray and LVD Cable Kit[3]	1[3]
T3147xx	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
SUP102Y	APC Smart-UPS 1000	1

1. For a total of 512MB of system memory.
2. Three HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is two HDDs or 72.8GB.
3. Contains a cable for dedicated attachment of tape to standard controller. See also the **Special Note** in the Tape Options section.

An Internet server handles all requests from the Internet (Intranet or Extranet). Usually this type of server has the same characteristics as a file server. The main difference is that an Internet server uses a different protocol (TCP/IP vs NETBEUI or IPX/SPX) and often needs to perform an extra security check (firewall). In the case of an Internet server, the server itself communicates primarily with one client, the Internet Service Provider (ISP), instead of many clients as applies to a file server.

With this in mind, the xSeries 232 was selected to provide an affordable price point for the growing Internet server market with two-way Pentium processing, 512MB of system memory (expandable to 4GB), availability features such as RAID-protected internal hot-swap storage and power protection with an APC Smart-UPS.

The network configuration depends on the method that will be used to connect the server to the Internet. Usually fast Ethernet routers are used, but if other methods are preferable, you can add the appropriate adapter. The configuration includes a tape back-up unit for secure storage of critical data in the event of a system or storage media failure.

File and Print Server

Part Number	Description	Quantity
P821Xxx	xSeries 232 1.13GHz/512KB Pentium III, 256MB ECC, Open, 48X	1
33L3322	256MB PC133 ECC SDRAM RDIMM	2[1]
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller	1
06P5754	18.2GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	5[2]
24P2396	100/200GB LTO Internal SCSI HH Tape Drive	1
10K2340	Media Bay Tray and LVD Cable Kit[3]	1[3]
T3147xx	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
SUP102Y	APC Smart-UPS 1000	1
24P3513	xSeries Hot-Swap Power Conversion Kit	1
33L37xx	250W Hot-Swap Redundant Power Supply	2

1. For a total of 768MB of system memory.
2. Four HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is three HDDs or 54.6GB.
3. Contains a cable for dedicated attachment of tape to standard controller. See also the **Special Note** in the Tape Options section.

A small business or departmental server is usually required to perform all typical server functions while servicing up to 100 users in a normal workgroup computing environment, but does not require the high-end performance and fault-tolerance properties of larger servers. The sample configuration above consists of an xSeries 232 with 768MB of memory (expandable to 4GB) and 54.6GB of RAID-protected hard disk drive space. It has enough processor power and memory to run most current network operating systems comfortably and enough hard disk drive space to store a significant amount of data with additional external storage expansion still available. Demanding network traffic is effectively handled by the standard 100Mbps Ethernet connection. This configuration also includes a tape back-up unit, monitor, and a UPS to protect the system during power surges and outages.

Rack-Mounted Application Server

Part Number	Description	Quantity
P82TXxx	xSeries 232 1.13GHz/512KB Pentium III, 256MB ECC, Open, 48X, PCI (5U Rack)	1
22P1997	xSeries 1.13GHz/133MHz 512KB Cache Upgrade with Pentium III Processor SVR	1
33L3324	512MB PC133 ECC SDRAM RDIMM	2[1]
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1
06P5754	18.2GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	5[2]
24P2396	100/200GB LTO Internal SCSI HH Tape Drive	1
10K2340	Media Bay Tray and LVD Cable Kit[3]	1[3]
T3147xx	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
32P16xx	APC 2U Smart-UPS 1400RMiB	1
33L37xx	250W Hot-Swap Redundant Power Supply	1
Industry Standard 19in Rack, EIA-310D, min depth of 28in (711mm)		
9306250	NetBAY25 Standard Rack Cabinet	1
28L36xx	Space Saver II Keyboard	1
94G6670	Blank Filler Panel Kit	2

1. For a total of 1.25GB of system memory.
2. Five HDDs are used for RAID 5 protection. Effective capacity is four HDDs or 72.8GB.
3. Contains a cable for dedicated attachment of tape to standard controller. See also the **Special Note** in the Tape Options section.

An application server differs from a file and print server in that it services a larger workload in providing application serving requirements for users. With this in mind, the xSeries 232 was selected to provide an affordable price point for an application server with two-way Pentium III processing, 1.25GB of system memory (expandable to 4GB), and availability features such as battery-backed cache, RAID-protected internal hot-swap storage and power protection with an APC Smart-UPS.

IBM xSeries 235

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max)[2]	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)[3]	Redundancy (Optional, Standard)[4]	Integrated System Management Processor	Onboard Ethernet (Mbps)[5]	SCSI Controller (Dual, Ultra)	Removable Media Bays (Total/Avail)[6]	Internal Hard Disk Drive (Std/Max)[7]	CD-ROM (IDE)[8]	Bays (Tot/Av)[9]	Slots (Tot/Av)
xSeries 235 At-A-Glance																	
K111Xxx	-	1.8[1]	1/2	512	256MB/6GB	Tower	1/2	S, H, F	O - Power, S - Fans	Y	10/100/ 1000	D,U320	4/2[6]	0/440.4GB[7]	48X-20X	10/8[9]	6/6
K11AXxx	-	1.8[1]	1/2	512	512MB/6GB	Tower	2/2	P, S, H, F	S - Power, S - Fans	Y	10/100/ 1000	D,U320	4/2[6]	0/440.4GB[7]	48X-20X	10/8[9]	6/6
K121Xxx	-	2.0[1]	1/2	512	256MB/6GB	Tower	1/2	S, H, F	O - Power, S - Fans	Y	10/100/ 1000	D,U320	4/2[6]	0/440.4GB[7]	48X-20X	10/8[9]	6/6
P12AXxx	-	2.0[1]	1/2	512	512MB/6GB	Tower	2/2	P, S, H, F	S - Power, S - Fans	Y	10/100/ 1000	D,U320	4/2[6]	0/440.4GB[7]	48X-20X	10/8[9]	6/6
K131Xxx	-	2.2[1]	1/2	512	256MB/6GB	Tower	1/2	S, H, F	O - Power, S - Fans	Y	10/100/ 1000	D,U320	4/2[6]	0/440.4GB[7]	48X-20X	10/8[9]	6/6
P13AXxx	-	2.2[1]	1/2	512	512MB/6GB	Tower	2/2	P, S, H, F	S - Power, S - Fans	Y	10/100/ 1000	D,U320	4/2[6]	0/440.4GB[7]	48X-20X	10/8[9]	6/6
K141Xxx	-	2.4[1]	1/2	512	256MB/6GB	Tower	1/2	S, H, F	O - Power, S - Fans	Y	10/100/ 1000	D,U320	4/2[6]	0/440.4GB[7]	48X-20X	10/8[9]	6/6
K14AXxx	-	2.4[1]	1/2	512	512MB/6GB	Tower	2/2	P, S, H, F	S - Power, S - Fans	Y	10/100/ 1000	D,U320	4/2[6]	0/440.4GB[7]	48X-20X	10/8[9]	6/6

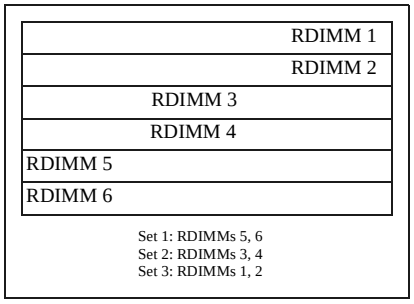
1. Intel Xeon processor with advanced transfer L2 cache and 4x100MHz (quad-pumped) access to memory and I/O buses.
2. High-speed, two-way interleaved 133MHz DDR PC2100 RDIMM memory.
3. Includes two hot-plug PCI-X 64-bit 133MHz slots, three 64-bit 100MHz non hot-plug slots and one 32-bit 33MHz slot. See I/O Options section for additional information.
4. Power supply redundancy for Models P/N K111Xxx, K121Xxx, K131Xxx, K141Xxx (shipping without redundancy as standard), requires removal of the 560W non hot-swap power supply and the addition of two 560W hot-swap power supplies and a hot-swap power backplane, provided with the 560W Hot-swap Power Upgrade Kit P/N 33P29xx. Redundant Models P/N K11AXxx, K12AXxx, K13AXxx, K14AXxx, include two standard 560W hot-swap power supplies and the hot-swap power backplane as standard. See xSeries 235 Power, Monitors, Accessories for additional information.
5. Broadcom 5703 integrated Ethernet controller is standard.
6. xSeries 235 includes two available removable media bays that can be converted to three slim-line (SL) hot-swap bays with the addition of optional Ultra320 3-Pack Kit P/N 33P2751.
7. The optional Ultra320 3-Pack Kit P/N 33P2751 is available, which converts the two available removable media bays into three SL hot-swap bays. This increases the Total Bays and Available Bays from 10/8 to 11/9 and the number of hot-swap disk bays from 6 to 9, thereby allowing the internal hot-swap hard disk drive capacity to increase to 660.6GB.
8. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
9. The total number of bays can be increased to 11, and hot-swap bays from 6 to 9, by installing an optional Ultra320 3-pack Kit P/N 33P2751, which converts the two available removable media bays to three SL hot-swap HDD bays.

xSeries 235 Processor Upgrades

Part Number	Processor Upgrades	SMP Support[1]	Processor Speed Upgrade[2]
19K4642	1.8GHz/400MHz - 512KB L2 Cache Upgrade Option with Xeon Processor	K111Xxx, K11AXxx	-
33P2931	2GHz/400MHz - 512KB L2 Cache Upgrade Option with Xeon Processor	K121Xxx, K12AXxx	K111Xxx, K11AXxx
33P2932	2.2GHz/400MHz - 512KB L2 Cache Upgrade Option with Xeon Processor	K131Xxx, K13AXxx	K111Xxx, K11AXxx K121Xxx, K12AXxx
37L3533	2.4GHz/400MHz - 512KB L2 Cache Upgrade Option with Xeon Processor	K141Xxx, K14AXxx	K111Xxx, K11AXxx K121Xxx, K12AXxx K131Xxx, K13AXxx

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed, and cache size.
2. Requires removal of the standard processor. A maximum of two processors may be installed. All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter machine ÒType-ModelÓ in Quick Path. Select ÒDownloadable filesÓ then ÒBIOS.Ó

xSeries 235 Memory Configurator



Part Number	Memory Description[1]
33L5036	128MB DDR PC2100 ECC RDIMM
33L5037	256MB DDR PC2100 ECC RDIMM
33L5038	512MB DDR PC2100 ECC RDIMM
33L5039	1GB DDR PC2100 ECC RDIMM

1. Due to two-way interleaving, installation of memory options in matched pairs beginning with set 1 is required.

Total System Memory[1]		Quantity of RDIMMs Added			
256MB (2x128) Models	512MB (2x256) Models	128MB P/N 33L5036	256MB P/N 33L5037	512MB P/N 33L5038	1GB P/N 33L5039
512MB	768MB	2	-	-	-
768MB	1024MB	4	-	-	-
1024MB	1280MB	2 and	2	-	-
1280MB	1536MB	-	4	-	-
1792MB	2048MB	-	2 and	2	-
2304MB	2560MB	-	-	4	-
2560MB	2816MB	2 and	-	-	2
2816MB	3072MB	-	2 and	-	2
3328MB	3584MB	-	-	2 and	2
4352MB	4608MB	-	-	-	4
6GB (max)[2]	6GB (max)[2]	-	-	-	6[2]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires replacing the standard RDIMM.

xSeries 235 Internal SCSI Cabling

The xSeries 235 contains 10 drive bays in the standard base configuration. The six 3.5in hot-swap bays on the lower half of the chassis front support Ultra320 or Ultra160 hot-swap HDDs. The four media bays above the HDD bays include a 3.5in bay for the standard floppy disk drive (FDD) and a 5.25in bay containing the standard CD-ROM. The two open 5.25in media bays are available for removable media devices such as tape drives, or an Ultra320 3-bay kit can be installed in two available media bays to provide a hot-swap backplane that supports three slim-line hot-swap HDDs.

The standard six-bay hot-swap backplane connects to one channel of the dual-channel integrated Ultra320 storage controller through a single-drop 16-bit LVD SCSI cable. If internal RAID is required, this cable cannot be used to connect optional ServeRAID 4Mx or 4Lx controllers to the hot-swap backplane. Instead, optional Internal SCSI Interface Kit P/N 33P3168 must be purchased. If the RAID controller is ServeRAID-5i, a cable is not required and both channels of the integrated controller are managed by ServeRAID-5i. The standard SCSI cable cannot be used to connect to an optional SCSI media device because it is not terminated.

One full-high or one half-high tape drive is supported in the available media bays. The terminated LVD SCSI cable provided with the tape drive can be used to connect the tape drive to the integrated controller if ServeRAID 4Mx or 4Lx are installed. If ServeRAID-5i is installed, some supported tape drives can be connected to the RAID bus (see Tape Options section). If the tape drive is not supported for RAID attachment or the configuration does not require the tape drive to be installed on the RAID bus, an Ultra160 storage controller is required.

External tape drive support requires installation of External SCSI Interface Kit P/N 32P8164 to connect the external port to the second channel of the integrated controller. The external port cannot be enabled if both channels of the integrated controller are connected internally. If ServeRAID-5i is installed, only RAID-supported tape drives can be installed in the external tape enclosure. An external tape enclosure can also be supported by installing PCI Wide Ultra160 SCSI Adapter P/N 19K4646, in which case the External SCSI Interface Kit is no longer required.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 235 Internal Hard Disk Drive (HDD) and External Storage Configurator

Total Internal Storage[1]	10,000RPM HDDs			15,000RPM HDDs	
	18.2GB P/N 06P5754	36.4GB P/N 06P5755	73.4GB P/N 06P5756	18.2GB P/N 06P5767	36.4GB P/N 06P5768, P/N 06P5776[4]
0GB	Standard on base models			Standard on base models	
18.2GB	1	-	-	1	-
36.4GB	2 or	1	-	2 or	1
54.6GB	3	-	-	3	-
72.8GB	4 or	2	-	4 or	2
91GB	5	-	-	5	-
109.2GB	6 or	3	-	6 or	3
145.6GB	-	4	-	-	4
182GB	-	5	-	-	5
218.4GB	-	6	-	-	6
327.6GB[2]	-	9	-	-	9
440.4GB	-	-	6	-	-
660.6GB[3]	-	-	9	-	-

This table does not represent all possible HDD configurations.

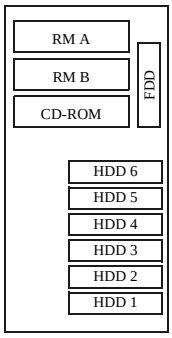
Total Internal Storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. Internal storage using 36.4GB HDD can be increased to 327.6GB by converting the two available removable bays to three hot-swap HDD bays using the optional Ultra320 3-Pack Kit P/N 33P2751.
3. Maximum internal storage using 73.4GB HDD can be increased to 660.6GB by converting the two available removable media bays to three hot-swap HDD bays using the optional Ultra320 3-Pack Kit P/N 33P2751.
4. When an Ultra320 HDD is installed in the same SCSI bus as an Ultra160 HDD, performance of the entire bus is reduced to Ultra160 speeds.

Bay	Form Factor	Height	Front Access	Usage
A[1]	133mm (5.25in)	HH[2]	Yes	Open
B[1]	133mm (5.25in)	HH[2]	Yes	Open
C[3]	133mm (5.25in)	HH	Yes	IDE CD-ROM
D[4]	89mm (3.5in)	SL	Yes	Diskette
1 ... 6	HS	SL	Yes	Open

1. Removable media bays A and B can be converted to three hot-swap HDD bays using the optional Ultra320 3-Pack Kit P/N 33P2751.
2. These two half-high (HH) bays support one half-height or one full-height device when combined.
3. This bay supports optical drives only.
4. This bay supports a floppy disk drive only.

x235 front view



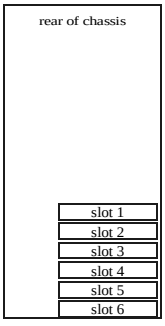
Part Number	Description	RPM	Height	Bays Supported[1]	Max Qty[2]
	Hot-Swap Ultra160 SCSI HDDs				
06P5754	18.2GB 10Krpm Ultra160 Hot-Swap HDD	10000	SL	1 ... 6	6
06P5755	36.4GB 10Krpm Ultra160 Hot-swap HDD	10000	SL	1 ... 6	6
06P5756	73.4GB 10Krpm Ultra160 Hot-swap HDD	10000	SL	1 ... 6	6
06P5767	18.2GB 15Krpm Ultra160 Hot-swap HDD	15000	SL	1 ... 6	6
06P5768	36.4GB 15Krpm Ultra160 Hot-swap HDD	15000	SL	1 ... 6	6
	Hot-Swap Ultra320 SCSI HDD				
06P5776	36.4GB 15Krpm Ultra320 Hot-swap HDD	15000	SL	1 ... 6	6
	Associated Options				
33P2751	Ultra320 3-Pack Kit[3]	-	-	A+B	1
	Optical Devices	**Bays Supported**			
22P6950	16X Max RAM-Read DVD-ROM Drive[4, 5]	A, B, C			
	External Storage Expansion Units[6]	**Form Factor**			
19K11xx[12]	EXP300 Storage Expansion Unit[7, 11]	Rack (3U)			
09N7296	EXP300 Rack-to-Tower Conversion Kit	-			
19K11xx[13]	FAStT200 Storage Server[8, 9, 11]	Rack (3U)			
19K11xx[14]	FAStT200 HA Storage Server[8, 11]	Rack (3U)			
19K1121	FAStT200 Redundant RAID Controller[9]	-			
00N71xx[15]	FAStT EXP500 Storage Expansion Unit[10, 11]	Rack (3U)			
94G7448	Rack Power Cable Type C12 3.7m[11]	-			

1. Install HDDs in the order indicated in the system bay diagram (from bottom of chassis). If an Ultra320 3-pack Kit P/N 33P2751 is installed, install HDDs from bottom to top.
2. Maximum quantity of HDDs can be increased to nine by converting the two removable media bays to three SL HDD bays using the 3-Pack Ultra320 3-Pack Kit P/N 33P2751.
3. Removable media bays A and B can be converted to three SL hot-swap bays using the optional Ultra320 3-Pack Kit P/N 33P2751. The hot-swap backplane is cabled as an independent bus. All HDDs installed in the bus must be Ultra320 in order for the bus to operate at Ultra320. If one or more HDDs installed are Ultra160, the entire bus will operate at Ultra160 speeds.
4. Either replace standard CD-ROM or install in one of the media bays. An IDE cable with three connectors is included with the optional optical drive. If installing as an additional device, connect the cable to each optical device and the IDE connector on the system board. Configure the optional device as a master using the preset configuration if replacing the standard device or as a slave if installed as a redundant device.
5. Audio and video are not supported for DVD-ROM drives. The drive provides data input/output only.
6. To configure a SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
7. The EXP300 includes a single 2m Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with its own standard country power cord. To convert an EXP300 to a tower form factor, EXP300 Rack-to-Tower Conversion Kit P/N 09N7296 is required.
8. The FAStT200 Storage Server and HA Storage Server each include two hot-swap, 350w auto-ranging redundant power supplies, each with its own standard country power cord.
9. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
10. The FAStT EXP500 Storage Expansion Unit includes dual hot-swap 350w power supplies, each with its own standard country power cord.
11. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables (one for each power supply).
12.Where 'xx' represents a specific country code as follows: 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.
13. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/ English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
14. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/ English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
15. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/ Language Line Cords/Publications are included as indicated.

xSeries 235 I/O Options

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[1]	Hot-Plug[2]	PCI Voltage Key	MHz
	Storage Controllers[3]						
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[4]	Full	64-bit	2 ... 6	X	Universal	66
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[5]	Half	64-bit	1 ... 6	X	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter[6]	Half	32-bit	1 ... 6	-	Universal	33
25P3492	ServeRAID-5i Controller[7]	Full	64-bit	4	-	Universal	66
	Internal RAID Cable						
33P3168	Internal SCSI Interface Kit	-	-	-	-	-	-
	Fibre Storage Controllers and Options[8]						
00N6881	FAStT Host Adapter	Half	64-bit	1 ... 6	X	Universal	66
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1 ... 6	X	Universal	66
	Networking[9]						
	Ethernet[10]						
06P3601	10/100 Ethernet Server Adapter[11]	Half	32-bit	1 ... 6	X	Universal	33
06P3701	Gigabit Ethernet SX Server Adapter (fibre)[11]	Half	64-bit	1 ... 6	X	Universal	66
09N9901	10/100 EtherLink Server Adapter by 3Com[12]	Half	32-bit	1 ... 6	X	Universal	33
22P4901	10/100 Dual Port Server Adapter[11]	Half	64-bit	1 ... 6	X	Universal	66
22P6801	PRO/1000XT Server Adapter by Intel (with CD, manuals)[11]	Half	64-bit	1 ... 6	X	Universal	133
	Token Ring[11]						
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 6	X	Universal	33
34L5001	16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 6	X	Universal	33
	Communications[13]						
37L14xx[14]	Serial I/O SST 8- and 16-port adapters[14]	Half	32-bit	1[14]	-	5	33
	Systems Management						
09N75xx[16]	Remote Supervisor Adapter[15]	Half	32-bit	1	-	5	33

1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 66MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. Slots five and six (bus 2) are hot-plug capable. For Network Operating System support, access www.pc.ibm.com/us/compat.
3. xSeries 235 includes a dual-channel Ultra320 SCSI controller with two internal connectors. An external 0.8mm VHDCI connector can be enabled using optional External SCSI Interface Kit P/N 31P8164 to connect channel B to the external connector. External connection using this option and the external knockout is not supported if both channels of the integrated controller are connected internally, in which case a supported PCI SCSI controller is required to support an external SCSI device. See Internal SCSI Cabling section for cabling alternatives.
4. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connections are 0.8mm VHDCI. Connection of this adapter requires optional Internal SCSI Interface Kit P/N 33P3168, which is a 24in single-drop nonterminated LVD SCSI cable.
5. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI. Connection of this adapter requires optional Internal SCSI Interface Kit P/N 33P3168, which is a 24in single-drop nonterminated LVD SCSI cable.
6. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilised.
7. ServeRAID-5i P/N 25P3492 supports both Ultra320 and Ultra160 HDDs in a dedicated or mixed environment, allowing each HDD to perform at rated capacity. The adapter installs into PCI slot four and converts both channels of the onboard SCSI controller to RAID in conjunction with the LSI 1020/30 chipset. Both the standard and the optional SCSI HDD backplanes as well as tape drives cable directly to the onboard controller connectors. Supports up to 528MB/s data transfers across the PCI bus with 128MB ECC SDRAM write-back cache with battery backup. Supports RAID levels 0, 1, 10, 5, 50 and 1E. The option includes brackets for installation in both low-profile and standard PCI slots.
8. See Fibre Channel Solutions Overview section for additional configuration information.
9. xSeries 235 includes an integrated 10/100/1000Mb/s Broadcom (BCM5703) single-port Ethernet controller.
10. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible.The onboard Ethernet is Broadcom-based. The four optional adapters listed here are Intel-based P/N 06P3601, 06P3701, 22P4901, 22P6801.
11. The Wake on LAN function provided by this Ethernet PCI adapter is supported in this system.
12. Not supported when greater than 4GB of random access memory (RAM) is installed.
13. xSeries 235 provides three USB ports (two on the rear of the chassis and one on the front), two serial ports, two RS-485 ports for system management and one parallel port.
14. Serial I/O Adapter P/N 37L1414 provides eight DB-25 RS232 serial connections using an octopus cable. Support for all ports is at 921.6 Kbps simultaneously. Adapter P/N 37L1415 provides sixteen RJ-45 RS232 serial connections in a breakout box. Support for all ports is at 115.2 Kbps simultaneously.
15. Disables the Integrated System Management processor when installed in xSeries 235 and provides full system management functionality through a customer-supplied Ethernet cable or modem connection or as part of an interconnected system management bus (option includes all interconnect hardware).
16. Where 'xx' represents a specific country code as follows:- 86=Europe, 87=Denmark, 88=South Africa, 89=UK, 90=Switzerland, 91=Italy, 92=Israel, 85=USA.



Slot 1: Bus 0, 32-bit, 33MHz, 5v, full-length
Slot 2: Bus 1 (primary), 64-bit, 100MHz, 3.3v, full-length PCI-X
Slot 3: Bus 1 (primary), 64-bit, 100MHz, 3.3v, full-length PCI-X
Slot 4: Bus 1 (secondary), 64-bit, 100MHz, 3.3v, full-length PCI-X (supports RAID 5i)
Slot 5: Bus 2, 64-bit, 100MHz, 3.3v, full-length Active PCI-X
Slot 6: Bus 2, 64-bit, 100MHz, 3.3v, full-length Active PCI-X

Part Number	Description
	Power[1, 11]
33P29xx[12]	560W Hot-Swap Power Upgrade Kit[2]
94G7448	Rack Power Cable Type C12 (3.7m)[11]
	Floor-standing Uninterruptible Power Supply (UPS)[3]
SUP102Y	APC Smart-UPS 1000
SUP142Y	APC Smart-UPS 1400
	Rack Mount Uninterruptible Power Supply (UPS)[3]
32P16xx[15]	APC 2U Smart-UPS 1400RMiB[6]
30RIxxx[14]	APC Smart-UPS 3000RMiB[4]
37L6862	APC Smart-UPS 5000RMiB[5]
	Monitors[7]
T3147xx[13]	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black[8]
T3247xx[13]	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black[8]
T274Axx[13]	G78 Color Monitor 17in (406mm, 16in viewable image), stealth black[8]
T12ABxx[13]	T541 Flat Panel Color Monitor (381mm, 15in viewable image), stealth black[9]
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)[10]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[10]

1. xSeries 235 redundant power Models P/N K11AXxx, K12AXxx, K13AXxx, K14AXxx, include two hot-swap 560W power supplies, each with two power cords. Non-redundant power Models P/N K111Xxx, K121Xxx, K131Xxx, K141Xxx, include a single non hot-swap 560W power supply with a single power cord. N+N power supply redundancy for these models may be achieved by removing the standard power supply and installing a hot-swap power backplane and two 560W hot-swap redundant power supplies provided in the 560W Power Upgrade Kit P/N 33P29xx.
2. 560W Hot-Swap Power Upgrade Kit P/N 33P29xx includes two standard country power cords for connection to low or high voltage power sources.
3. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
4. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
6. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
7. xSeries 235 uses an integrated ATI Rage XL video controller with 8MB of memory.
8. Installation within a rack requires optional Monitor Compartment P/N 94G7444.
9. Not supported for rack mounting.
10. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
11. Rack Power Cable P/N 94G7448 (one for each power supply), must be ordered if power connection to a high voltage UPS or PDU is required as part of a conversion from a Tower to a Rack model.
12.Where 'xx' represents a specific country code as follows: 54=Europe, 55=Denmark, 56=Israel, 57=Italy, 58=South Africa, 59=Switzerland, 60=UK,
13. Where 'xx' represents a specific country code as follows: DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.
14. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=UK, EUR=Europe.
15. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.

Part Number	Description
	Conversion Kits
59P4211	5Ux24D Tower-to-Rack Kit III[7]
	Rack[1, 7]
94G7448	Rack Power Cable Type C12 (3.7m)[7]
	NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.
	Keyboard and Mouse[2]
28L36xx[8]	Space Saver II Keyboard, stealth black[3, 4]
10K38xx[9]	106-key Preferred USB Keyboard with 2-port USB Hub, stealth black[5, 6]
22P51xx[10]	TrackPoint USB Space Saver Keyboard, stealth black[3, 4, 6]
28L3675	Sleek 2-Button Mouse, stealth black
33L3244	Sleek USB Mouse, stealth black

1. Rack installations require a supported IBM rack and a tower-to-rack conversion kit.
2. xSeries 235 standard models are Tower format and ship with a keyboard and mouse.
3. Installation within a rack requires optional keyboard tray P/N 28L4707, which stows in ready-to-use position.
4. Advanced TrackPoint IV features are not available on IBM xSeries systems.
5. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
6. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
7. The xSeries 235 ships with standard country power cord(s). If a Tower model is being converted for rack installation and is to be connected to a UPS or PDU, a Rack Power Cable P/N 94G7448 (one for each power supply), must be ordered.
8. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
9. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.
10. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 68=French, 55=German, 56=Italian, 57=Spanish, 58=UK English, 59=Swedish/Finnish, 60=Belgian/English, 61=Russian, 62=Polish, 63=Portuguese, 65=Swiss, 67=US International.

xSeries 235 Tape Options

Part Number	Description (see **General Note** below)	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures
00N7991	20/40GB DDS/4 4mm Internal SCSI HH Tape Drive (supported by ServeRAID 5i - see **note**[1]and **Special Note** below)	A, B	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y (see **Special Note** below)	10L7440[3], 03K8756[2], (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	03K8756[2], (and see **Special Note** below)
00N8016	100/200GB LTO Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	03K8756[2], (and see **Special Note** below)
24P2396	100/200GB LTO Internal SCSI HH Tape Drive (supported by ServeRAID 5i - see **note**[1]and **Special Note** below)	A, B	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	03K8756[2], (and see **Special Note** below)
24P2398	40/80GB DLTVS Internal SCSI HH Tape Drive (supported by ServeRAID 5i - see **note**[1]and **Special Note** below)	A, B	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	03K8756[2], (and see **Special Note** below)
	Tape Autoloaders					
00N7992	120/240GB DDS/4 Internal SCSI Tape Autoloader (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	03K8756[2], (and see **Special Note** below)
09N40xx[12]	3600 Series 900GB/1.8TB LTO SCSI Tape Autoloader[4]	-	16 Ultra2 LVD	Tower or 6U Rack	Y	-
49P32xx[13]	3607 Series 1760GB/3.5TB SDLT SCSI Tape Autoloader	-	16 Ultra2 LVD	2U Rack	Y	-
	External Tape Libraries[5]					
21P99xx[14]	3600 Series 2/4TB LTO Tape Library (Rack)	-	16 Ultra2 LVD	5U Rack	Y	-
21P99xx[15]	3600 Series 2-Drive, 20-Cartridge Expander Module[6]	-	16 Ultra2 LVD	5U Rack	Y	-
09N4048	3600 Series LTO Drive Upgrade Option[7]	-	16 Ultra2 LVD	-	N	-
	External Tape Enclosures					
10L7440	External Half-High SCSI Storage Enclosure[8]	-	8, 16	Desktop	N	-
03K8756	NetMEDIA Storage Expansion Unit EL[9]	-	16	Rack	Y	-
10L7113	NetMEDIA Systems Management Adapter[10]	-	16 LVD	-	Y	03K8756
	Associated Options					
10K2340	Media BayTray and LVD Cable Kit[2]	-	16 LVD	Int	Y	03K8756
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	Ext	Y	10L7440
32P8164	External SCSI Interface Kit (see **note**[11]and **General Note** below)	-	16 LVD	Int	Y	-

General Note: Optional External SCSI Interface Kit P/N 31P8164 is required to connect to the second channel (B) of the integrated Ultra320 controller and enable the external 0.8mm VHDCI connector on the rear of the chassis to support external tape enclosures. Alternatively, attachment of an internal media bay device (tape) to the second channel (B) of the controller requires a supported terminated SCSI cable that is provided with the internal tape drives listed here. If the hot-swap HDD backplane (normally supported by channel A of the controller) is connected to a ServeRAID 4Mx or 4Lx adapter, the internal tape drive can be connected to channel B of the integrated controller. Only one half-height or one full-height tape drive is supported internally in the x235. If ServeRAID-5i is installed and thereby managing the function of the Dual U320 integrated controller in RAID mode, support for the internal HDD backplane is provided through channel A of the controller. Also, some tape drives can be supported internally on the RAID bus connected to channel B of the integrated controller, if Microsoft Windows 2000 is installed. Alternatively, ServeRaid-5i supports the same tape drives in an external tape enclosure on the second channel, if the external SCSI port is enabled using the External SCSI Interface Kit. Note: the external port cannot be enabled if both channels of the integrated controller are connected internally. Optional PCI Wide Ultra160 SCSI Adapter P/N 19K4646 can also support external tape enclosures and internal tape drives.

Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable allows the tape drive to be connected to the second channel (B) of the Dual Ultra320 SCSI integrated controller of the x235. This cable can also be used in the NetMEDIA Storage Enclosure P/N 03K8756 to provide termination and LVD support for one of these tape drives when they are being attached externally. Bear in mind that this is a single-drop cable and only one tape drive is supported internally in the x235. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable.

1. This tape drive is supported by ServeRAID-5i when installed, on an internal bus connected to channel B of the integrated controller, or in an external tape enclosure when connected to channel B of the controller, through the external SCSI connector enabled by Kit P/N 32P8164. Those tape drives that are not supported in this way must be connected (internally or externally) to PCI Wide Ultra160 SCSI Adapter P/N 19K4646.
2. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit EL P/N 03K8756 requires replacement of the standard single-ended internal cables with either the cable shipped with the tape option (see **Special Note** above), or the two-drop multimode terminated cable from Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard single-ended cables in the NetMEDIA enclosure are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply unless a NetMEDIA Systems Management Adapter P/N 10L7113 is installed. See the NetMEDIA Adapter information.
3. Requires 68-pin External Multimode LVD/SE SCSI terminator P/N 00N7956.
4. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.
5. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.
6. Supported only with the 3600 Series LTO Tape Library (Rack) P/N 21P99xx. Allow one additional EIA space when installing either one or two (maximum) units to accommodate a filler plate for cable routing. Up to two 3600 Series LTO Drive Upgrade Options can be installed in each module or the module can operate off the LTO drives installed in the LTO tape library.
7. Install in second drive bay of 3600 Series LTO Tape Libraries or in either of the two bays of 3600 Series 2-drive 20-Cartridge Expander Module to increase performance. Includes an LTO (Ultrium) drive and a one-meter external LVD SCSI cable.
8. Black desktop 133mm (5.25in) half-high (HH) tape enclosure. Connector is configurable as 50-pin Centronix or 68-pin high density. Requires either tape drive self-termination or 68-pin External Multimode LVD/SE SCSI Terminator P/N 00N7956.
9. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, rack-mountable tape enclosure which includes two full high (FH) or four half high (HH) extended length133mm (5.25in) bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
10. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Enclosure, to provide repeater function, LVDS interface, aggregate cable lengths up to 12m when attached to an LVD SCSI controller, and auto-termination when the enclosure is powered off. External connector is 0.8mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.
11. Required to connect the second chanel (B) the integrated Dual Ultra320 storage controller to the 0.8mm VHDCI external port. This port cannot be enabled if both channels of the integrated controller are connected internally.
12. Where 'xx' represents a specific country code as follows:- 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.
13. Where 'xx' represents a country specific code: 40=UK, 41=Eur, 42=Denmark, 43=South Africa, 44=Switzerland, 45=Italy, 46=Israel.
14. Where 'xx' represents a specific country code as follows:- *Rack version* - 78=Europe, 79=Denmark, 80=South Africa, 77=UK, 81=Swiss, 82=Italy, 83=Israel.
15. Where 'xx' represents a specific country code as follows:- 85=Europe, 86=Denmark, 87=South Africa, 84=UK, 88=Swiss, 89=Italy, 90=Israel.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

Note: For a complete list of all IBM and non-IBM options compatibility with Network Operating Systems and IBM xSeries Servers, access the IBM ServerProven compatibility pages on the Web at URL http://www.ibm.com/pc/us/compat

xSeries 235 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

File and Print Server (large user base)

Part Number	Description	Quantity
K121Xxx	xSeries 235 2GHz/512KB Xeon, 256MB ECC, open, 48X	1
33L5036	128MB DDR PC2100 ECC DIMM	2[1]
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2[2]
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	4[3]
25P3492	ServeRAID-5i Controller	1
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1
T3247xx	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black	1
SUP142Y	APC Smart-UPS 1400	1

1. For a total of 512MB of system memory.
2. Two HDDs are used to provide NOS mirroring.
3. Three HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is two HDDs or 72.8GB.

High-availability Microsoft Exchange Server Solution

Part Number	Description	Quantity
P12AXxx	xSeries 235 2GHz/512KB Xeon, 512MB ECC, open, 48X	1
33P2931	2GHz/400MHz - 512KB L2 Cache Upgrade Option with Xeon Processor	1[1]
33L5037	256MB DDR PC2100 ECC DIMM	2
25P3492	ServeRAID-5i Controller	1
09N75xx	Remote Supervisor Adapter	1
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2[2]
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	4[3]
32P8164	External SCSI Interface Kit	1
33P29xx	560w Power Upgrade Kit	1
32P1474	7U Tower-to-Rack Conversion Kit	1
9306250	NetBAY25 Standard Rack Cabinet	1
03K8756	NetMEDIA Storage Expansion Unit EL	1
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive	1
T3247xx	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black	1
32P16xx	APC 2U Smart-UPS 1400RMB	1
94G6670	Blank Filler Panel Kit	1

1. For a total of 1GB of system memory.
2. Two HDDs are used to provide NOS mirroring.
3. Three HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is two HDDs or 72.8GB.

IBM xSeries 255

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L3 ECC Cache	Memory (Std/Max)[4]	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	System Management Processor	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[7]	Bays (Tot/Av)	Slots (Tot/Av)
xSeries 255 At-A-Glance																	
K511Xxx[1]	-	1.4[3]	1/4	512KB	512MB/12GB	Tower	2/4	P, S, H, F	S-Fans O-Power[5]	Y	10/100/1000	D,U160	4/2	0/440.4GB[6]	48X-20X	10/8[6]	7/7
K51RXxx[2]	-	1.4[3]	1/4	512KB	512MB/12GB	Rack (7U)	2/4	P, S, H, F	S-Fans O-Power[5]	Y	10/100/1000	D,U160	4/2	0/440.4GB[6]	48X-20X	10/8[6]	7/7
P521Xxx[1]	-	1.5[3]	1/4	512KB	1GB/12GB	Tower	2/4	P, S, H, F	S-Fans O-Power[5]	Y	10/100/1000	D,U160	4/2	0/440.4GB[6]	48X-20X	10/8[6]	7/7
K52RXxx[2]	-	1.5[3]	1/4	512KB	1GB/12GB	Rack (7U)	2/4	P, S, H, F	S-Fans O-Power[5]	Y	10/100/1000	D,U160	4/2	0/440.4GB[6]	48X-20X	10/8[6]	7/7
P531Xxx[1]	-	1.6[3]	1/4	1MB	1GB/12GB	Tower	2/4	P, S, H, F	S-Fans O-Power[5]	Y	10/100/1000	D,U160	4/2	0/440.4GB[6]	48X-20X	10/8[6]	7/7
K53RXxx[2]	-	1.6[3]	1/4	1MB	1GB/12GB	Rack (7U)	2/4	P, S, H, F	S-Fans O-Power[5]	Y	10/100/1000	D,U160	4/2	0/440.4GB[6]	48X-20X	10/8[6]	7/7

Note: xSeries 255 supports the IXA Adapter for connection to iSeries models for Microsoft Windows 2000 Server and Advanced Server.

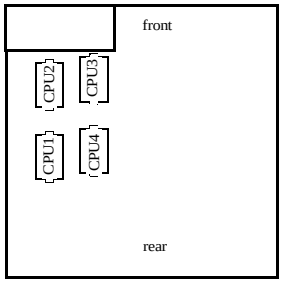
1. Ships with keyboard and mouse as standard.
2. Housed in a 19in rack-mountable drawer and ships without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
3. Intel Xeon MP processor with integrated full-speed ECC L3 cache and 400MHz (quad-pumped) access to memory and I/O buses.
4. Advanced Chipkill ECC memory corrects two-, three-, and four-bit memory errors. Standard memory supports two-way interleaving. The first two optional DIMMs are installed as a pair to support four-way interleaving in conjunction with the standard memory. All additional memory options are added in groups of four, supporting four-way interleaving.
5. Two optional 370W Reversed Fan Hot-swap Redundant Power Supplies P/N 31P6133 are required to support N+N redundancy. Refer to the Power section in xSeries 255 Power, Monitors, Accessories for additional information.
6. The optional 6-Pack Ultra320 Hot-Swap Expansion Kit P/N 32P8163 is available, which adds a second hot-swap backplane supporting an additional 6 disks. This increases the Total Bays and Available Bays from 10/8 to 16/14 and the number of hot-swap disk bays from 6 to 12, thereby allowing the internal hot-swap hard disk drive capacity to increase to 880.8GB. Both the standard and optional hot-swap HDD backplanes are Ultra320 and are capable of supporting both Ultra320 and Ultra160 HDDs. The entire bus is limited to the speed of the slowest HDD.
7. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.

xSeries 255 Processor Upgrades

Part Number	Description	SMP Support[1]	Processor Speed Upgrade[2]
59P5111	xSeries 1.4GHz/400MHz-512KB Xeon MP Processor	K511Xxx, K51RXxx	-
59P5106	xSeries 1.5GHz/400MHz-512KB Xeon MP Processor	P521Xxx, K52RXxx	K511Xxx, K51RXxx
59P5107	xSeries 1.6GHz/400MHz-1MB Xeon MP Processor	P531Xxx K53RXxx	K511Xxx, K51RXxx, P521Xxx, K52RXxx

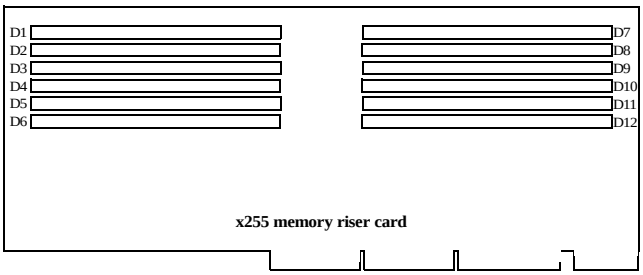
1. Three additional processors may be installed, providing a maximum of four. All processors must be identical in type, speed, and cache size. See diagram for order of installation.
2. Requires removal of the standard processor. A maximum of four processors may be installed (see xSeries 255 system board diagram for order of installation). All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter Machine Type-Model in Quick Path. Select Downloadable files and then BIOS.

Top view of x255 system board



Part Number	Memory Description
33L3281	256MB PC1600 ECC DDR SDRAM RDIMM
33L3283	512MB PC1600 ECC DDR SDRAM RDIMM
33L3285	1GB PC1600 ECC DDR SDRAM RDIMM

1. Due to four-way interleaving, optional RDIMMs must be installed in sets of four after the first two are installed. All RDIMMs in a set must be the same size, but each set is not required to match other sets. The two standard RDIMMs support two-way interleaving before two additional RDIMMs are installed in that set, then four-way interleaving is enabled for that set. Chipkill support is provided on the memory card. See RDIMM Order of Installation table below.



RDIMM Order of Installation and Hot Spare Memory Configuration

Interleaving	RDIMM Set	Total Quantity of RDIMMs	Bank	Hot Spare Memory[2]
2-way	D2, D8	2[1]	3	-
4-way	D1, D2, D7, D8	4	3	-
4-way	D3, D4, D9, D10	8	2	Bank 3
4-way	D5, D6, D11, D12	12	1	Bank 3

1. Two RDIMMs installed in D2 and D8 are standard in base models with two-way interleaving enabled. To complete the bank, RDIMMs must be installed in D1 and D7.
2. If Hot Spare memory is enabled in the system BIOS, memory Bank 3 is used as a spare bank in the event of RDIMM failure. Bank 3 serves as a hot spare for both banks 1 and 2. If only two RDIMMs are installed (sockets D2 and D8), two-way interleaving is enabled and an additional two RDIMMs may be installed in sockets D1 and D7 of bank 3 (Hot Spare Memory does not apply for the two standard RDIMMs in this situation). Hot Spare Memory is not addressable by the CPU until activated. Memory density and technology must be the same in both the active and spare banks.

Total Memory[1]		Quantity of RDIMMs Added[2]		
512MB (2 x 256MB) Models	1GB (2 x 512MB) Models)	256MB P/N 33L3115	512MB P/N 33L3147	1GB P/N 33L3119
1GB	standard	2	-	-
2GB	-	6	-	-
-	2GB	-	2	-
3GB	-	10	-	-
-	3GB	4 and	2	-
4GB	-	2 and	4	-
-	4GB	8 and	2	-
5GB	-	2 and	8	-
-	5GB	4 and	6	-
-	6GB	-	2 and	4
7GB	-	2 and	4 and	4
-	7GB	4 and	2 and	4
-	8GB	-	6 and	4
9GB	-	2 and	-	8
10GB[3]	-	-	4 and	8[3]
-	10GB	-	2 and	8
12GB[3]	12GB[3]	-	-	12[3]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. To obtain the Quantity of memory identified in the Total Memory column, select the appropriate row and order the quantity of RDIMMs identified in all columns for that row.
3. Requires removal of standard RDIMMs.

xSeries 255 Internal SCSI Cabling

The xSeries 255 contains 10 standard bays in total with the option of adding an additional six HDD bays. The six standard slim-line hot-swap HDD bays are located on the upper left half of the front of both tower and rack models. Four removable media bays are located on the right-side front of the chassis. The top bay contains the standard floppy disk drive and the second bay from the top contains the standard CD-ROM drive. The remaining two removable media bays support tape or optical drive options.

The standard Ultra320 hot-swap backplane supports six hot-swap HDD bays. The backplane is connected to the integrated dual-channel, Ultra160 SCSI controller through a standard 16-bit LVD SCSI cable. If internal RAID support is required, this cable can be used to connect the backplane to a supported RAID controller. A second optional hot-swap backplane with six hot-swap HDD bays is supported for installation directly below the standard backplane. The optional backplane can be configured as an independent SCSI bus with the addition of an optional SCSI storage controller or it can be configured with the six standard hot-swap HDD bays by connecting each of the hot-swap backplanes to separate connectors of a two- or four-channel RAID controller. The optional backplane cannot be connected to the integrated SCSI controller if the standard backplane remains connected, and there is no accommodation for connecting the two backplanes together.

Supported internal tape drives include a 34-inch terminated SCSI cable for connecting optional tape drives to either a supported SCSI controller or to channel A of the integrated SCSi controller if the hot-swap backplane is connected to an optional controller. The standard CD-ROM is cabled to the IDE port on the planar through a two-drop IDE cable.

External attachment of supported SCSI devices requires installation of the optional External SCSI Interface Kit P/N 32P8164, which provides a SCSI cable with an external 0.8mm VHDCI connector that attaches to the rear of the chassis and connects at the other end to the 68-pin connector of channel B of the integrated controller.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

xSeries 255 Internal Hard Disk Drive (HDD) and External Storage Configurator

Total Int Storage[1]	10,000RPM HDDs			15,000RPM HDDs	
	18.2GB P/N 06P5754[2]	36.4GB P/N 06P5755[2]	73.4GB P/N 06P5756[2]	18.2GB P/N 06P5767[2]	36.4GB P/N 06P5768[2]
0GB	Standard on base models			Standard on base models	
18.2GB	1	-	-	1	-
36.4GB	2 or	1	-	2 or	1
54.6GB	3	-	-	3	-
72.8GB	4 or	2	-	4 or	2
91.0GB	5	-	-	5	-
109.2GB	6 or	3	-	6 or	3
127.4GB	7[3]	-	-	7[3]	-
145.6GB	8[3] or	4	-	8[3] or	4
163.8GB	9[3]	-	-	9[3]	-
182.0GB	10[3] or	5	-	10[3] or	5
218.4GB	-	6	-	-	6
254.8GB	-	7[3]	-	-	7[3]
291.2GB	-	8[3]	-	-	8[3]
327.6GB	-	9[3]	-	-	9[3]
364.0GB	-	10[3]	-	-	10[3]
367.0GB	-	-	5	-	-
440.4GB	-	-	6	-	-
513.8GB	-	-	7[3]	-	-
587.2GB	-	-	8[3]	-	-
660.6GB	-	-	9[3]	-	-
734.0GB	-	-	10[3]	-	-
807.4GB	-	-	11[3]	-	-
880.8GB	-	-	12[3]	-	-

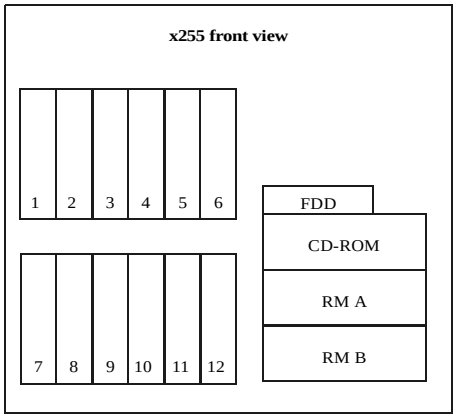
This table does not represent all possible HDD configurations.Total Internal Storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
2. xSeries 255 ships standard with a dual-channel, Ultra160 SCSI storage controller. The standard backplane supports Ultra160 HDDs at Ultra160 speeds when connected to the standard integrated storage controller or at Ultra320 speeds (320MBps) with the addition of an optional Ultra320 storage controller (future). If Ultra160 and Ultra320 HDDs are mixed on the same bus, the entire bus is limited to Ultra160 speeds.
3. Installation of this quantity of hard drives requires the second hot-swap backplane to be installed. This is provided by optional 6-Pack Ultra320 Hot-Swap Expansion Kit P/N 32P8163.

Bay	Form Factor	Height	Front Access	Usage
-	89mm (3.5in)	SL	Yes	FDD
-	133mm (5.25in)	HH	Yes	CD-ROM
RM A	133mm (5.25in)	HH[1]	Yes	Open
RM B	133mm (5.25in)	HH[1]	Yes	Open
1 ... 12	HS	SL[2]	Yes	Open

1. Two half-high (HH) bays can be combined to support a single full-high (FH) device
2. Optional 6-pack DASD Upgrade Kit P/N 32P8163 is required to support bays seven through twelve.

Note: Install HDDs in the same order as bays are numbered, i.e., bays one to 12.



Part Number	Description	RPM	Height	Bays Supported[2]	Max Qty[2]
	Ultra160 SCSI HDDs[1]				
06P5754	18.2GB 10Krpm Ultra160 Hot-Swap HDD	10000	SL	1 ... 12	12
06P5755	36.4GB 10Krpm Ultra160 Hot-Swap HDD	10000	SL	1 ... 12	12
06P5756	73.4GB 10Krpm Ultra160 Hot-Swap HDD	10000	SL	1 ... 12	12
06P5767	18.2GB 15Krpm Ultra160 Hot-Swap HDD	15000	SL	1 ... 12	12
06P5768	36.4GB 15Krpm Ultra160 Hot-Swap HDD	15000	SL	1 ... 12	12
	Associated Options				
32P8163	6-pack Ultra320 Hot-swap Expansion Kit[3]	-	-	6 ... 12	1

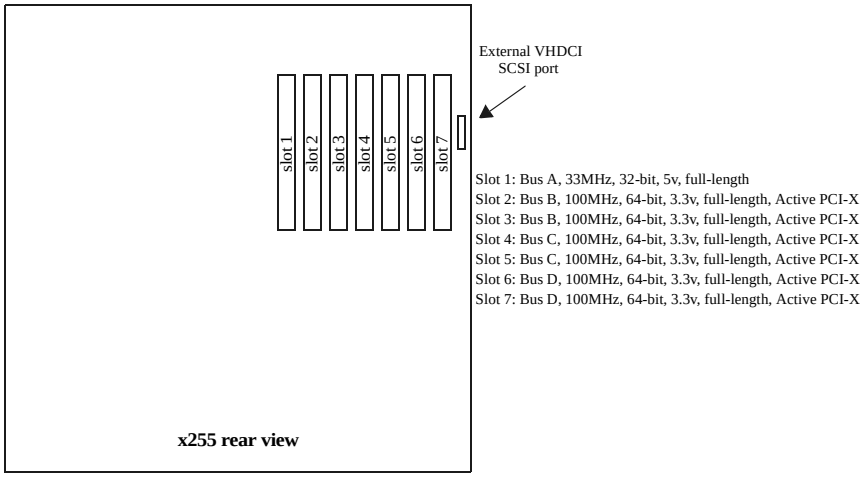
	Optical Devices	Bays Supported
22P6965	24X/10X/40X Max Black CD-RW Drive[4]	A, B
	External Storage Expansion Units[5]	**Form Factor**
19K11xx[11]	EXP300 Storage Expansion Unit[6, 10]	Rack (3U)
09N7296	EXP300 Rack-to-Tower Conversion Kit	-
19K11xx[12]	FAStT200 Storage Server[7, 8, 10]	Rack (3U)
19K11xx[13]	FAStT200 HA Storage Server[7, 10]	Rack (3U)
19K1121	FAStT200 Redundant RAID Controller[8]	-
00N71xx[14]	FAStT EXP500 Storage Expansion Unit[9, 10]	Rack (3U)
94G7448	Rack Power Cable Type C12 3.7m[10]	-

1. xSeries 255 contains an Ultra320 hot-swap backplane which supports Ultra160 HDDs at Ultra160 bus speeds when connected to the standard integrated storage controller
2. Maximum number of HDD bays requires installation of optional 6-pack Ultra320 Hot-swap Expansion Kit P/N 32P8163, which enables bays seven through twelve.
3. xSeries 6-pack Ultra320 Hot-swap Expansion Kit P/N 32P8163 is used to provide an additional hot-swap backplane supporting a single SCSI channel with up to six HDDs.
4. Either replace standard CD-ROM or install in one of the media bays. An IDE cable with three connectors is included with the optional optical drive. If installing as an additional device, connect the cable to each optical device and the IDE connector on the system board. Configure the optional device as a master using the preset configuration if replacing the standard device or as a slave if installed as a redundant device.
5. Not supported by the onboard external SCSI port. To configure an external SCSI storage devices, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm that the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
6. EXP300 includes a single 2m Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with its own standard country power cord. To convert an EXP300 to a tower form factor, EXP300 Rack-to-Tower Conversion Kit P/N 09N7296 is required.
7.The FAStT200 Storage Server and HA Storage Server each include two hot-swap, 350W auto-ranging redundant power supplies, each with its own standard country power cord.
8. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
9. FAStT EXP500 Storage Expansion Unit includes dual hot-swap 350W power supplies, each with its own standard country power cord.
10. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables (one for each power supply).
11.Where 'xx' represents a specific country code as follows: 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.
12. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/ German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
13. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/ German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
14. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/Language Line Cords/Publications are included as indicated.

xSeries 255 I/O Options

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[1]	Hot-Plug[2]	PCI Voltage Key	MHz
	Storage Controllers[3]						
37L6889	ServeRAID-4H Ultra160 SCSI Controller[4]	Full	64-bit	1 ... 7	X	Universal	33
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[5]	Full	64-bit	1 ... 7	X	Universal	66
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[6]	Half	64-bit	1 ... 7	X	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter[7]	Half	32-bit	1 ... 7	-	Universal	66
	Fibre Storage Controllers and Options[8]						
00N6881	Netfinity FAStT Host Adapter	Half	64-bit	1 ... 7	X	Universal	66
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1 ... 7	X	Universal	66
	Networking[9]						
	Ethernet[10]						
06P3601	10/100 Ethernet Server Adapter[11]	Half	32-bit	1 ... 7	X	Universal	33
06P3701	Gigabit Ethernet SX Server Adapter (fibre)	Half	64-bit	1 ... 7	X	Universal	66
22P6801	PRO/1000XT Server Adapter by Intel (with CD, manuals)	Half	64-bit	1 ... 7	X	Universal	133
	Token Ring						
34L5001	16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1 ... 7	X	Universal	33
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1 ... 7	X	Universal	33
	Communications[12]						
	Systems Management						
09N75xx[14]	Remote Supervisor Adapter[13]	Half	32-bit	1	-	5	33

1. The 5v slots support universal or 5v adapters. The 3.3v slots support universal or 3.3v adapters. A higher frequency adapter plugged into a lower frequency slot will operate at the slot frequency. A lower frequency (e.g., 33MHz) adapter plugged into a higher frequency (e.g., 66MHz) slot limits other adapters installed on the same bus to the lower frequency. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. Slots two through seven are hot-pluggable. For Network Operating System support access www.pc.ibm.com/us/compat.
3. All models include a dual-port, dual-channel, 64-bit Wide Ultra160 SCSI controller with one internal connector connected to the standard hot-swap backplane with a standard Ultra160 SCSI cable. The second connector supports one external port, which is enabled by installing an External SCSI Interface Kit P/N 32P8164 with a 0.8mm Very High Density Connection Interface (VHDCI).
4. ServeRAID-4H Ultra160 SCSI Controller is powered by a 266MHz PowerPC 750 processor and provides 128MB of battery-backed ECC cache with two internal and four external Ultra160 connectors (a combination of four connectors may be utilised). External connectors are 0.8mm VHDCI.
5. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connections are 0.8mm VHDCI.
6. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI.
7. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilised.
8. See Fibre Channel Solutions Overview section for additional configuration information.
9. xSeries 255 includes an integrated Broadcom 10/100/1000Mbps Ethernet controller, which supports Wake on LAN.
10. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. The onboard Ethernet is Broadcom-based. The optional PCI Ethernet adapters listed are Intel-based (P/N 06P3601, 06P3701, 22P6801).
11. The Wake on LAN function of this option is not supported by this server.
12. xSeries 255 includes four USB ports, one external serial port and two integrated RS-485 system management interconnect ports located on the back of the system chassis. Connection of the standard service processor to other servers in an interconnect network requires a customer-supplied Cat5 cable.
13. When installed in an xSeries 255, the optional adapter is connected externally to the integrated service processor using the integrated RS-485 ports. The optional adapter serves only as an Ethernet and interconnect gateway. The onboard Integrated System Management Processor (ISMP) provides all service processor data.
14. Where 'xx' represents a specific country code as follows:- 86=Europe, 87=Denmark, 88=South Africa, 89=UK, 90=Switzerland, 91=Italy, 92=Israel, 85=USA.



Part Number	Description
	Power[1, 11]
31P6133	370w Reversed Fan Hot-swap Redundant Power Supply
94G7448	Rack Power Cable Type C12 (3.7m)[11]
	Floor-standing Uninterruptible Power Supply (UPS)[2]
SUP142Y	APC Smart-UPS 1400
	Rack Mount Uninterruptible Power Supply (UPS)[2]
32P16xx[14]	APC 2U Smart-UPS 1400RMiB[5]
30RIxxx[13]	APC Smart-UPS 3000RMiB[3]
37L6862	APC Smart-UPS 5000RMiB[4]
	Monitors[6]
T3147xx[12]	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black[7]
T3247xx[12]	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black[8]
T274Axx[12]	G78 Color Monitor 17in (406mm, 16in viewable image), stealth black[8]
T12ABxx[12]	T541 Flat Panel Color Monitor (381mm, 15in viewable image), stealth black[9]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[10]

1. xSeries 255 includes two 370W hot-swap power supplies, to support up to a fully loaded system, with the ability to accept two additional 370W Reversed Fan Hot-swap Redundant Power Supplies P/N 31P6133 for full redundancy. Each of the two standard power supplies is installed on a separate bus. Two standard country power cords are included with the base models, one for each bus. The two optional power supplies required for full power redundancy are installed one on each bus. Additional power cords are not required.
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
6. xSeries 255 uses an SVGA controller (S3 Trio 3D chipset) with 4MB of video memory.
7. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
8. Installation within a rack requires optional Flat Panel Monitor Rack Mount Kit II P/N 37L6888 and Rack Keyboard Tray P/N 28L4707. A space saver keyboard may coexist within the same 28L4707 keyboard tray.
9. Not supported for rack mounting.
10. Includes a 15in Flat Panel Monitor.
11. Two Rack Power Cables P/N 94G7448 (one for each power supply bus), must be ordered if power connection to a high voltage UPS or PDU is required as part of a conversion from a Tower to a Rack model.
12. Where 'xx' represents a specific country code as follows: DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.
13. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=UK, EUR=Europe.
14. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.

Part Number	Description
	Conversion Kits
32P1474	7Ux26D Tower-to-Rack Kit
	Rack[1]
94G7448	Rack Power Cable Type C12 (3.7m)[7]
	NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.
	Keyboard and Mouse[2]
28L36xx[7]	Space Saver II Keyboard, stealth black[3, 5]
28L36xx[8]	Preferred Keyboard, stealth black[4]
10K38xx[9]	106-key Preferred USB Keyboard with 2-port USB Hub, stealth black[4, 6]
22P51xx[10]	TrackPoint USB Space Saver Keyboard, stealth black[3, 5, 6]
33L3244	Sleek USB Mouse, stealth black
28L3675	Sleek 2-Button Mouse, stealth black

1. xSeries 255 Rack models are housed in a 19in rack-mountable drawer and require one of the racks listed in the Rack Cabinets and Options section.
2. xSeries 255 Tower models include both a standard keyboard and mouse. Rack models include neither.
3. Installation within a rack requires optional keyboard tray P/N 28L4707, which stows in ready-to-use position.
4. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
5. Advanced TrackPoint IV features are not available on IBM xSeries systems.
6. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
7. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
8. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.
9. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.
10. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 68=French, 55=German, 56=Italian, 57=Spanish, 58=UK English, 59=Swedish/Finnish, 60=Belgian/English, 61=Russian, 62=Polish, 63=Portuguese, 65=Swiss, 67=US International.

xSeries 255 Tape Options

Part Number	Description	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures
00N7991	20/40GB DDS/4 4mm Internal SCSI HH Tape Drive (see **Special Note** below)	A, B	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y (see **Special Note** below)	03K8756[1], (and see **Special Note** below)
00N7990	40/80GB DLT Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	24P24xx, 03K8756[1], (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	24P24xx, 03K8756[1], (and see **Special Note** below)
00N8016	100/200GB LTO Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	24P24xx, 03K8756[1], (and see **Special Note** below)
24P2396	100/200GB LTO Internal SCSI HH Tape Drive (see **Special Note** below)	A, B	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	03K8756[1], (and see **Special Note** below)
24P2398	40/80GB DLTVS Internal SCSI HH Tape Drive (see **Special Note** below)	A, B	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	03K8756[1], (and see **Special Note** below)
	Tape Autoloaders					
49P32xx[10]	3607 Series 1760GB/3.5TB SDLTpro Tape Autoloader	-	16	2U Rack	Y	-
00N7992	120/240GB DDS/4 Tape Autoloader (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	03K8756[1], (and see **Special Note** below)
09N40xx[11]	3600 Series 900GB/1.8TB LTO Tape Autoloader[2]	-	16 Ultra2 LVD	Tower or 6U Rack	Y	-
	External Tape Libraries[3]					
21P99xx[12]	3600 Series 2/4TB LTO Tape Library (Rack)	-	16 Ultra2 LVD	5U Rack	Y	-
21P99xx[13]	3600 Series 2-Drive, 20-Cartridge Expander Module[4]	-	16 Ultra2 LVD	5U Rack	Y	-
09N4048	3600 Series LTO Drive Upgrade Option[5]	-	16 Ultra2 LVD	-	N	-
	External Tape Enclosures					
24P24xx[14]	Full-High SCSI Tape Enclosure[6]	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
03K8756	NetMEDIA Storage Expansion Unit EL[7]	-	16	Rack	Y	-
10L7113	NetMEDIA Systems Management Adapter[8]	-	16 LVD	-	Y	03K8756
	Associated Options					
32P8164	External SCSI Interface Kit[9]	-	16 Ultra2 LVD	-	Y	-
10K2340	Media BayTray and LVD Cable Kit[1]	-	16 LVD	Int	Y	03K8756

Genral Note: xSeries 255 includes an external 0.8mm VHDCI connector for support of external SCSI devices. External SCSI Interface Kit P/N 32P8164 is required to enable the external port.

Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable allows the tape drive to be connected to an optional controller or to the integrated controller of the x255, if the hot-swap HDD backplane is connected to a RAID adapter. This cable can also be used in the NetMEDIA Storage Enclosure P/N 03K8756 to provide termination and LVD support for one of these tape drives when they are being attached externally. Bear in mind that this is a single-drop cable and only one tape drive is supported internally in the x255. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable.

1. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit EL P/N 03K8756 requires replacement of the standard single-ended internal cables with either the cable shipped with the tape option (see **Special Note** above), or the two-drop multimode terminated cable from Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard single-ended cables in the NetMEDIA enclosure are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply unless a NetMEDIA Systems Management Adapter P/N 10L7113 is installed. See the NetMEDIA Adapter information.
2. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.
3. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.
4. Supported only with the 3600 Series LTO Tape Library Rrack) P/N 21P99xx. Allow one additional EIA space when installing either one or two (maximum) units to accommodate a filler plate for cable routing. Up to two 3600 Series LTO Drive Upgrade Options can be installed in each module or the module can operate off the LTO drives installed in the LTO tape library.
5. Install in second drive bay of 3600 Series LTO Tape Libraries or in either of the two bays of 3600 Series 2-Drive 20-Cartridge Expander Module to increase performance. Includes an LTO (Ultrium) drive and a one-meter external LVD SCSI cable.
6. Black desktop or 3U rack tape enclosure supports 133mm (5.25in) full-high LVD tape devices including DLT technology. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Supports the following full-high tape options: 00N8015, 00N8016, 00N7992, 00N7990.
7. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, rack-mountable tape enclosure which includes two full high (FH) or four half high (HH) extended length133mm (5.25in) bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
8. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Enclosure to provide repeater function, LVDS interface, aggregate cable lengths up to 12m when attached to an LVD SCSI controller, and auto-termination when the Enclosure is powered off. External connector is 0.8mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.
9. External SCSI Interface Kit P/N 32P8164 is an internal terminated LVD SCSI cable with two screws for fastening to the rear of the chassis providing an external 0.8mm VHDCI connector, connecting to the 68-pin channel A connector located on the planar near PCI slot six.
10. Where 'xx' represents a country specific code: 40=UK, 41=Eur, 42=Denmark, 43=South Africa, 44=Switzerland, 45=Italy, 46=Israel.
11. Where 'xx' represents a specific country code as follows:- 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.
12. Where 'xx' represents a specific country code as follows:- *Rack version* - 78=Europe, 79=Denmark, 80=South Africa, 77=UK, 81=Swiss, 82=Italy, 83=Israel.
13. Where 'xx' represents a specific country code as follows:- 85=Europe, 86=Denmark, 87=South Africa, 84=UK, 88=Swiss, 89=Italy, 90=Israel.
14. Where 'xx' represents a country specific code: 35=UK, 39=Swiss, 40=Italy, 41=Israel, 36=EU, 37=Denmark, 38=South Africa.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

xSeries 255 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

High-availability, High-performance Seibel Application Server Solution

Part Number	Description	Quantity	Usage
K53RXxx	xSeries 255 1.6GHz/1MB Xeon MP, 2x512MB ECC, open, 48x (7U rack)	1	-
59P5107	xSeries 1.6GHz/400MHz - 1MB L3 Cache Xeon MP Processor Option	3	Total of 4 SMP processors
33L3283	512MB PC1600 ECC DDR SDRAM RDIMM	6	4GB total memory (4-way interleaved)
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1	RAID adapter
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2	18.2GB HDDs mirrored for NOS
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	8[1]	218.4GB RAID 5 with hot-spare
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	1	2 Ethernet ports total
09N75xx	Remote Supervisor Adapter	1	system management adapter
32P8163	6-pack Ultra320 Hot-swap Expansion Kit	1	-
32P8164	External SCSI Interface Kit	1	enables external 0.8mm VHDCI connector
00N8015	110/220GB Super DLT Internal SCSI Tape Drive	1	-
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (w/o keyboard)	1	-
28L36xx	Space Saver II Keyboard	1	-
31P6133	370w Reversed Fan Hot-swap Redundant Power Supply	2	Full power redundancy
32P16xx	APC 2U Smart-UPS 1400RMiB	1	-
	External Storage		
19K11xx	EXP300 Storage Expansion Unit	1	Includes 2m Ultra2 cable
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-Swap SL HDD	14	RAID 5 storage with hot-spare
	Rack		
9306250	NetBAY25 Standard Rack Cabinet	1	-
94G6670	Blank Filler Panel Kit	1	

1. Eight HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is six HDDs or 218.4GB.

High-availability Microsoft Exchange Server Solution

Part Number	Description	Quantity	Usage
K52RXxx	xSeries 255 1.5GHz/512KB Xeon MP 2x512MB ECC, open, 48x (7U rack)	1	-
59P5106	xSeries 1.5GHz/400MHz - 512KB L3 Cache Xeon MP Processor Option	3	Total of 4 SMP processors
33L3283	512MB PC1600 ECC DDR SDRAM RDIMM	2	2GB total system memory
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1	RAID adapter
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	1	2 Ethernet ports total
09N75xx	Remote Supervisor Adapter	1	system management adapter
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2	18.2GB HDDs mirrored for NOS
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	8[1]	218.4GB RAID 5 with hot-spare
32P8163	6-pack Ultra320 Hot-swap Expansion Kit	1	-
00N7990	40/80GB DLT Internal SCSI Tape Drive	1	-
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (w/o keyboard)	1	-
28L36xx	Space Saver II Keyboard	1	-
31P6133	370w Reversed Fan Hot-swap Redundant Power Supply	2	Full power redundancy
32P16xx	APC 2U Smart-UPS 1400RMiB	1	-
	Rack		
9306250	NetBAY25 Standard Rack Cabinet	1	-
94G6670	Blank Filler Panel Kit	2	-

1. Eight HDDs are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is six HDDs or 218.4GB.

File and Print Server (large user base)

Part Number	Description	Quantity	Usage
K511Xxx	xSeries 255 1.4GHz/512KB Xeon MP, 2x256MB ECC, open, 48X	1	-
59P5111	xSeries 1.4GHz/400MHz - 512KB L3 Cache Xeon MP Processor Option	1	2 processors
33L3281	256MB PC1600 ECC DDR SDRAM RDIMM	2	1GB total memory (4-way interleaved)
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	1	2 Ethernet ports total
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1	RAID adapter
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2	18.2GB HDDs mirrored for NOS
06P5755	36.4GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	6[1]	72.8GB RAID 5 with hot-spare
32P8163	6-pack Ultra320 Hot-swap Expansion Kit	1	-
00N7991	20/40GB DDS/4 4mm Internal Tape Drive	1	-
31P6133	370W Reversed Fan Hot-swap Redundant Power Supply	2	Full power redundancy
T274Axx	G78 Color Monitor 17in (406.4mm, 16in viewable image), stealth black	1	-
SUP142Y	APC Smart-UPS 1400	1	-

1. Six HDDs per backplane are used for RAID 5 protection. One HDD is identified as a hot-spare. Effective capacity is four HDDs or 145.6GB per backplane.

IBM xSeries 300

Part Number	Withdrawal Date: ddmmyy	Processor Speed	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max) (R = RDIMM)	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Adv System Management Processor	Onboard Ethernet (Mbps	Disk Controller (U160 = SCSI)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[4]	Bays (Tot/Av)	Slots (Tot/Av)[5]
xSeries 300 At-A-Glance Chart																
K252Xxx[1]	-	950MHz[2]	1/1	128	128MB/1.5GB	Rack (1U)	1/1	-	N	2x10/100	IDE	-	20.4GB/ 120.0GB	24X-10X	4/1	2/2
K253Xxx[1]	-	950MHz[2]	1/1	128	128MB/1.5GB	Rack (1U)	1/1	-	N	2x10/100	U160[5]	-	18.2GB/ 146.8GB	24X-10X	4/1	2/1
K282Xxx[1]	-	1GHz[3]	1/1	256	256MB/1.5GB	Rack (1U)	1/1	-	N	2x10/100	IDE	-	20.4GB/ 120.0GB	24X-10X	4/1	2/2
K283Xxx[1]	-	1GHz[3]	1/1	256	256MB/1.5GB	Rack (1U)	1/1	-	N	2x10/100	U160[5]	-	18.2GB/ 146.8GB	24X-10X	4/1	2/1

1. Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
2. Intel Celeron processor with 100MHz FSB. xSeries 300 does not support processor upgrades.
3. Intel Pentium III processor with advanced transfer L2 cache and 133MHz FSB. xSeries 300 does not support processor upgrades.
4. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
5. A single-channel Ultra160 SCSI controller installed in slot two is standard in SCSI models. The external connector is not supported.

xSeries 300 Memory Configurator

DIMM Socket
DIMM Socket
DIMM Socket

Part Number	Memory Description
33L3081	128MB 133MHz ECC SDRAM Unbuffered Memory
33L3083	256MB 133MHz ECC SDRAM Unbuffered Memory
33L3085	512MB 133MHz ECC SDRAM Unbuffered Memory

Total System Memory (Standard Models)[1]		DIMMs		
128MB (1 x 128)	**256MB (1 x 256)**	**128MB P/N 33L3081**	**256MB P/N 33L3083**	**512MB P/N 33L3085**
256MB	384MB	1	-	-
384MB	512MB	2	-	-
512MB	640MB	1	1	-
640MB	768MB	-	2	-
896MB	1024MB	-	1	1
1152MB	1280MB	-	-	2
1536MB (max)[2]	1536MB (max)[2]	-	-	3[2]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller DIMMs may provide a more cost-effective alternative to using larger DIMMs. Select the desired total memory from the appropriate column (Standard 128MB or 256MB models), then add the quantities in that row from the DIMM columns.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires removal of standard DIMMs.

xSeries 300 Internal SCSI Cabling

EIDE Configuration Cabling

The xSeries 300 contains two integrated ATA-100 EIDE controllers. One controller is cabled directly to the 24x-10x IDE CD-ROM. xSeries 300 models that ship with a standard EIDE HDD use the second EIDE controller to attach the standard HDD. This controller supports up to two EIDE HDDs through the use of a two-drop cable.

SCSI Configuration Cabling

xSeries 300 SCSI models contain a single channel, Ultra160 SCSI adapter. A two-drop, terminated 16-bit LVD SCSI cable is attached to the internal connector of this adapter to support the standard Ultra160 HDD. The second drop can be used to attach a second SCSI HDD. In configurations where external SCSI device attachment is required, a supported SCSI adapter or ServeRAID controller must be installed.

For additional information regarding internal cabling, refer to Appendix E: Internal Storage Cabling Overview.

xSeries 300 Internal Hard Disk Drive (HDD) and External Storage Configurator

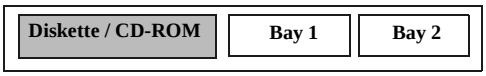
	SCSI Models				
Total Internal Storage[1]	**10,000RPM SCSI HDDs**			**15,000RPM SCSI HDD**	
	18.2GB P/N 06P5750	**36.4GB P/N 06P5751**	**73.4GB P/N 06P5752**	**18.2GB P/N 06P5765**	**36.4GB P/N 06P5766**
18.2GB	18.2GB (10,000rpm) Standard on SCSI models			18.2GB (10,000rpm) Standard on SCSI models	
36.4GB	1	-	-	1	-
54.6GB	-	1	-	-	1
72.8GB[2]	-	2[2]	-	-	2[2]
91.6GB	-	-	1	-	-
146.8GB[2]	-	-	2[2]	-	-

This table does not represent all possible HDD configurations.
1. Select a total storage row then identify the recommended HDDs from within an RPM range according to choice. Total Internal Storage listed is within ± 0.2 GB unless otherwise noted.
2. Assumes replacement of standard hard disk drive.

	EIDE Models		
Total Internal Storage[1]	**7200RPM IDE HDDs[2]**		
	20.4GB P/N 19K4461	**40GB P/N 22P7157**	**60GB P/N 09N4207**
20.4GB	20.4GB Standard on EIDE models		
40.8GB	1	-	-
60.4GB	-	1	-
80GB[3]	-	2[3]	-
80.4GB	-	-	1
120GB (max)[3]	-	-	2[3]

This table does not represent all possible HDD configurations.Total Internal Storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then select the quantity of HDDs from the appropriate column.
2. The xSeries 300 dual integrated EIDE controllers support a maximum of three IDE devices per machine including one CD-ROM and two IDE HDDs.
3. Maximum capacity assumes replacement of standard hard disk drive with the largest supported hard disk drive.



Bay	Form Factor	Height	Front Access	Usage
1[1]	89mm (3.5in)	SL	No	HDD
2	89mm (3.5in)	SL	No	Open

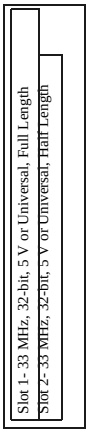
1. Boot drive should be located in bay 1.

Part Number	Description	RPM	Height	Bays Supported	Max Qty
	IDE HDDs[1, 2]				
19K4461	20.4GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
22P7157	40GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
09N4207	60GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1, 2	2
	Non Hot-Swap Ultra160 SCSI HDDs[2]				
06P5750	18.2GB 10,000rpm Ultra160 HDD	10000	SL	1, 2	2
06P5751	36.4GB 10,000rpm Ultra160 HDD	10000	SL	1, 2	2
06P5752	73.4GB 10,000rpm Ultra160 HDD	10000	SL	1, 2	2
06P5765	18.2GB 15,000rpm Ultra160 HDD	15000	SL	1, 2	2
06P5766	36.4GB 15,000rpm Ultra160 HDD	15000	SL	1, 2	2
	External Storage Expansion Units[3]	**Form Factor**			
19K11xx[9]	EXP300 Storage Expansion Unit[4, 8]	Rack (3U)			
19K11xx[10]	FAStT200 Storage Server[5, 6, 8]	Rack (3U)			
19K11xx[11]	FAStT200 HA Storage Server[5, 8]	Rack (3U)			
19K1121	FAStT200 Redundant RAID Controller[6]	-			
00N71xx[12]	FAStT EXP500 Storage Expansion Unit[7, 8]	Rack (3U)			
94G7448	Rack Power Cable Type C12 (3.7m)[8]	-			

1. The xSeries 300 dual integrated EIDE controllers support a maximum of three IDE devices per machine including one CD-ROM, and two IDE hard disk drives.
2. Mixing of internal IDE and SCSI hard disk drives is not supported.
3. xSeries 300 does not include an external SCSI connector. To configure a SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
4. The EXP300 includes a single 2M Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with its own standard country power cord.
5. The FAStT200 Storage Server and HA Storage Server each inlcude two hot-swap, 350W auto-ranging redundant power supplies, each with its own standard country power cord.
6. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
7. The FAStT EXP500 Storage Expansion Unit P/N 00N71xx includes dual hot-swap 350W power supplies, each with its own standard country power cord.
8. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables according to the number of power supplies.
9.Where 'xx' represents a specific country code as follows: 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.
10. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/ English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
11. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/ English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
12. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/ Language Line Cords/Publications are included as indicated.

xSeries 300 I/O Options

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[1,2]
	Storage Controllers[3, 14]			
37L6889	ServeRAID-4H Ultra160 SCSI Controller[4]	Full	64-bit	1
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[5]	Full	64-bit	1
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[6]	Half	64-bit	1, 2
19K4646	PCI Wide Ultra160 SCSI Adapter[7]	Half	32-bit	1, 2
02K3454	PCI Fast/Wide Ultra SCSI Adapter[8]	Half	32-bit	1, 2
	Fibre Storage Controller[9]			
00N6881	FAStT Host Adapter	Half	64-bit	1, 2
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1, 2
	Networking[10]			
	Ethernet[11]			
09N9901	10/100 EtherLink Server Adapter by 3Com[12]	Half	32-bit	1, 2
06P3601	10/100 Ethernet Server Adapter[12]	Half	32-bit	1, 2
22P4901	10/100 Dual Port Server Adapter[12]	Half	64-bit	1, 2
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)[12]	Half	64-bit	1, 2
	Token Ring			
34L5001	16/4 Token-Ring PCI Management Adapter[12]	Half	32-bit	1, 2
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter[12]	Half	32-bit	1, 2
	Communications[13]			



Exterior Connector Access

1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. Slot one only is available for SCSI models (Ultra160 SCSI Controller is installed in slot two). The external connector does not support external SCSI devices.
3. xSeries 300 has dual integrated EIDE (ATA-100) bus master controllers. SCSI models ship standard with a single-channel Ultra160 SCSI Adapter in slot two. The SCSI Adapter includes a two-drop cable for connection to two internal HDDs. External connection of a SCSI device requires a supported SCSI adapter.
4. ServeRAID-4H Ultra160 SCSI Controller is powered by a 266MHz PowerPC 750 processor and 128MB of battery-backed ECC cache. The internal connectors are not accessible due to a cabling interference. Four external Ultra160 0.8mm VHDCI connectors are available. Some operating systems will function with this adapter only if the latest version of IPSSEND is installed.
5. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connections are 0.8mm VHDCI.
6. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI. If attached to the internal HDDs, installation is supported only in slot one.
7. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector and one external 0.8mm VHDCI Ultra160 connector. Support for external SCSI devices only. A five-drop terminated LVD SCSI cable is included but not supported for use in this server.
8. PCI Fast/Wide Ultra SCSI Adapter P/N 02K3454 provides one external 68-pin high density connector that supports external SCSI devices such as tape enclosures.
9. See the Fibre Channel Solutions Overview section for additional configuration information.
10. xSeries 300 includes dual full-duplex, 10/100Mbps Ethernet controllers.
11. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. The onboard Ethernet is Intel-based, which is compatible with the Intel-based optional Ethernet adapters listed here: P/Ns 06P3601, 06P3701, 22P4901, 22P6801.
12. The Wake on LAN function provided with this networking adapter is supported by this server.
13. xSeries 300 includes two USB ports and a high speed serial/asynchronous port (NS16550A compatible).
14. When storage controllers are installed in both PCI slots, the BIOS for the integrated storage controller must be disabled. i.e it cannot support either external or internal storage media. If the two storage controllers in slots one and two are both RAID adapters, the boot media must be attached to the RAID adapter in slot one.

Part Number	Description
	Power[1, 9]
94G7448	Rack Power Cable Type C12 (3.7m)[9]
	Uninterruptible Power Supply (UPS)[2]
32P16xx[11]	APC 2U Smart-UPS 1400RMiB[5]
30RIxxx[10]	APC Smart-UPS 3000RMiB[3]
37L6862	APC Smart-UPS 5000RMiB[4]
	Monitors[6]
T3147xx[12]	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black[7]
T3247xx[12]	E74 Color Monitor 17in (403mm, 15.9in Viewable Image Size), stealth black[7]
T274Axx[12]	G78 Color Monitor 17in (406.4mm, 16in Viewable Image Size), stealth black[7]
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)[8]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[8]

1. Most xSeries 300 models include a worldwide, voltage-sensing 200W power supply with auto restart and a standard country power cord.
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
6. xSeries 300 uses an SVGA controller (S-3 Savage4 chipset) with 8MB of video memory.
7. Installation within a rack requires optional Monitor Compartment P/N94G7444.
8. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
9. Rack Power Cable P/N 94G7448 must be ordered for power connection to a high voltage UPS or PDU.
10. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe
11. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.
12. Where 'xx' represents a specific country code as follows:- DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
	Rack and NetBAY[1, 2, 8]
94G7448	Rack Power Cable Type C12 (3.7m)[8]
NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.	
	Keyboard and Mouse[3]
28L36xx[9]	Space Saver II Keyboard[4, 6]
28L36xx[10]	Preferred Keyboard (stealth black)[5]
10K38xx[11]	106-key Preferred USB Keyboard with 2-port USB Hub, stealth black[5, 7]
28L3675	Sleek 2-button Stealth Black Mouse
33L3244	Sleek USB Mouse, stealth black

1. xSeries 300 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
2. Note limitations and restrictions for adequate cooling in the Rack Cabinets and Options section. If non-IBM racks are to be used, assure that both the front and rear doors offer a minimum of 48% open area uniformly distributed and in line with installed servers. A clearance of 51 to 64mm (2 to 2.5in) must be maintained between the front door and the system unit front bezel. The rear door must maintain the same or greater clearance.
3. xSeries 300 supports rack configurations only and ships without a keyboard or mouse.
4. Installation within a rack requires optional keyboard tray P/N 28L4707, which stows in ready-to-use position.
5. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
6. Advanced TrackPoint IV features are not available on IBM xSeries systems.
7. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
8. The xSeries 300 ships with a standard country power cord. For connection to a high voltage UPS or PDU, a Rack Power Cable P/N 94G7448 must be ordered.
9. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
10. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.
11. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.

xSeries 300 Tape Options

Part Number	Description (see **General Note** below)	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	68/50-pin Converter Incl	Ext Tape Enclosures[1]
09N4041	12/24GB DDS/3 4mm SCSI Tape Drive	-	8	89mm (3.5in) HH or 133mm (5.25in) HH	Y	Y	03K8756
00N7991	20/40GB DDS/4 4mm SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below
24P2396	100/200GB LTO SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below
24P2398	40/80GB Half-High DLTVS SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below
00N8015	110/220GB Super DLT SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below
00N8016	100/200GB LTO Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below
	External Tape Enclosures						
03K8756	NetMEDIA Storage Expansion Unit EL[3]	-	16	Rack	Y	N	-
10L7113	NetMEDIA Systems Management Adapter[4]	-	16 LVD	-	Y	N	03K8756
	Associated Options						
10K2340	Media BayTray and LVD Cable Kit[2]	-	16 LVD	Int	Y	N	03K8756

General Note: xSeries 300 does not support internal installation of tape drives and does not include an external SCSI connector. A tape drive with an appropriate external enclosure, SCSI adapter and cable must be selected. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which has an external 0.8mm VHDCI connector. Select tape drive, enclosure and supported adapter then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.

Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit P/N 10K2340 to provide termination and LVD support, when attaching one of these tape drives externally in the NetMEDIA Storage Enclosure P/N 03K8756. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable. Finally, also bear in mind that it will take time for these newly equipped tape drives to work through into the supply chain. In the meantime, it may be better to order the Media Bay Kit for a small additional cost, and possibly to have too many cables (surplus to be used elsewhere), than risk ending up without the necessary cable.

1. To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section, and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
2. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **Special Note** above), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply. For support of more than two devices in a NetMEDIA Enclosure, refer to the NetMEDIA Adapter information.
3. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, 19in rack mountable tape enclosure which includes two full-high (FH) or four half-high (HH) extended length 133mm (5.25in) bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
4. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Storage Expansion Unit to provide repeater function, LVDS interface, aggregate cable lengths up to 12m when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

Note: For a complete list of all IBM and non-IBM options compatibility with Network Operating Systems and IBM xSeries Servers, access the IBM ServerProven compatibility pages on the Web at URL http://www.ibm.com/pc/us/compat

xSeries 300 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Internet Server[1]

Part Number	Description	Quantity
K283Xxx	xSeries 300 1GHz/256KB Pentium III, 256MB ECC, 18.2GB Ultra160 SCSI HDD, 24X	1
06P5750	18.2GB 10,000rpm Ultra160 SCSI HDD	1[2]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)	1
28L36xx	Space Saver II Keyboard	1
32P16xx	APC 2U Smart-UPS 1400RMiB	1

1. This example shows a 19in rackable configuration. The rack components are not included.
2. For a total of 36.4GB of internal storage.

An Internet server handles all requests from the Internet (Intranet or Extranet). Usually, this type of server has the same characteristics as a normal file server. The main difference is that an Internet server talks a different language (TCP/IP vs. NETBEUI or IPX/SPX) and often needs to do an extra security check (firewall). In the case of an Internet server, the server itself talks mostly to one client, the Internet Service Provider (ISP), instead of many clients as a file server does.

With this is mind, the xSeries 300 was selected to provide an affordable price point for the growing Internet server market with Pentium III processing, 256MB of system memory (expandable to 1.5GB), and power protection with an APC Smart-UPS.

The network configuration depends on the method that will be used to connect the server to the Internet. Usually fast Ethernet routers are used, but if other methods are used you can add the appropriate adapter.

File and Print Server[1]

Part Number	Description	Quantity
K253Xxx	xSeries 300 950MHz/128KB Celeron, 128MB ECC, 18.2GB Ultra160 SCSI HDD, 24X	1
33L3083	256MB 133MHz ECC SDRAM DIMM Memory	1[2]
06P5751	36.4GB 10,000rpm Ultra160 SCSI HDD	2[3]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)	1
28L36xx	Space Saver II Keyboard	1
32P16xx	APC 2U Smart-UPS 1400RMiB	1

1. This example shows a 19in rackable configuration. The rack components are not included.
2. For a total of 384MB of system memory.
3. For a total of 72.8GB of internal storage - the standard 18.2GB disk has to be removed.

A small business or departmental server is usually required to perform all typical server functions while servicing up to 100 users in a normal workgroup computing environment, but does not require the high-end performance and fault-tolerance properties of larger servers.

The sample configuration above consists of an xSeries 300 with 384MB of memory and 72.8GB of HDD space. It has enough processor power and memory to run most current network operating systems comfortably and enough HDD space to store a significant amount of data with additional external storage expansion still available. Demanding network traffic is effectively handled by the standard 100Mbps Ethernet connection.

This configuration also includes a UPS to keep the system protected during power surges and outages.

Application Platform[1]

Part Number	Description	Quantity
K283Xxx	xSeries 300 1GHz/256KB Pentium III, 256MB ECC, 18.2GB Ultra160 SCSI HDD, 24X	1
33L3085	512MB 133MHz ECC SDRAM Unbuffered DIMM Memory	1[2]
06P5750	18.2GB 10,000rpm Ultra160 SCSI HDD	1[3]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)	1
28L36xx	Space Saver II Keyboard	1
32P16xx	APC 2U Smart-UPS 1400RMiB	1

1. This example shows a 19in rackable configuration. The rack components are not included.
2. For a total of 768MB of system memory.
3. For a total of 36.4GB of internal storage.

An application server differs from a file and print server in that it has a higher workload in providing application serving requirements for users. As an appliance platform, this server efficiently delivers task-specific solutions using a single application, e.g., Web hosting, Web caching, firewalls or gateways. With this in mind, the xSeries 300 was selected to provide an affordable price point for an application server with Pentium III processing, 768MB of system memory (expandable to 1.5GB), and availability features such as power protection with an APC Smart-UPS. The internal SCSI controller can be upgraded by selecting an optional ServeRAID adapter to provide even higher availability.

IBM xSeries 330

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std./Max)	L2 ECC Cache (KB)	Memory (Std./Max) (R = RDIMM)	Form Factor	Power Supply Quantity (Std./Max)	Hot-Swap (Power, Slots, HDD, Fans)	Adv. System Management Processor	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Total/Avail)	Internal Disk Drive (Std./Max)	CD-ROM (IDE)[3]	Bays: (Tot/Av)	Slots(Tot/Av)
xSeries 330 At-A-Glance Chart																
K411Xxx[1]	-	1.13[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1	H	Y	2x10/100	U160	-	0/ 146.8GB	24X-10X	4/2	2/2
K412Xxx[1]	-	1.13[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1	-	Y	2x10/100	IDE	-	20.4GB/ 120GB	24X-10X	4/1	2/2
K413Xxx[1,4]	-	1.13[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1	-	Y	2x10/100	U160	-	18.2/ 146.8GB[4]	24X-10X	4/1	2/2
K431Xxx[1]	-	1.26[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1	H	Y	2x10/100	U160	-	0/ 146.8GB	24X-10X	4/2	2/2
K432Xxx[1]	-	1.26[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1	-	Y	2x10/100	IDE	-	20.4GB/ 120GB	24X-10X	4/1	2/2
K433Xxx[1,4]	-	1.26[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1	-	Y	2x10/100	U160	-	18.2/ 146.8GB[4]	24X-10X	4/1	2/2
K43AXxx[1,5]	-	1.26[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1[5]	H	Y	2x10/100	U160	-	0/ 146.8GB	24X-10X	4/2	2/2
K4N1Xxx[1,5]	-	1.26[2]	2/2	512	1GB(R)/1GB[5]	Rack(1U)	1/1[5]	H	Y	2x10/100	U160	-	36.4GB/ 36.4GB[7]	24X-10X	4/0	2/2
K441Xxx[1]	-	1.4[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1	H	Y	2x10/100	U160	-	0/ 146.8GB	24X-10X	4/2	2/2
K442Xxx[1]	-	1.4[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1	-	Y	2x10/100	IDE	-	40GB/ 120GB	24X-10X	4/1	2/2
K443Xxx[1,4]	-	1.4[2]	1/2	512	256MB(R)/4GB	Rack(1U)	1/1	-	Y	2x10/100	U160	-	18.2/ 146.8GB[4]	24X-10X	4/1	2/2
K54MXxx[1,6]	-	1.4[2]	1/2	512	512MB(R)/4GB	Rack(1U)	1/1	H	Y	2x10/100	U160	-	0/ 146.8GB	24X-10X	4/2	2/2

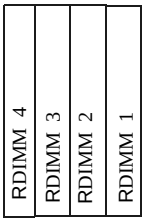
1. Housed in a 19" Rack mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
2. Intel Pentium III processor with 133MHz FSB and 512KB advanced transfer cache.
3. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
4. This model does not support hot-swap HDDs.
5. These direct current (DC) power models includes a 200W, -48V direct current power supply requiring a direct current power source for utilisation in a telecommunications network infrastructure. Model P/N K4N1Xxx is Network Equipment Building System (NEBS) Level 3 compliant. Only the standard shipped configuration is supported for this model.
6. This MXT (Memory Xpansion Technology) system uses an advanced memory controller and caching process for increased performance. Advanced Chipkill ECC memory technology corrects two-, three-, and four-bit memory errors.
7. Two 18.2GB Ultra160 hot-swap 10,000rpm HDDs ship standard with this specific Network Equipment Building System (NEBS) configuration. Please address any questions regarding different NEBS-compliant configurations to your local IBM contact.

xSeries 330 Processor Upgrades

Part Number	Processor Upgrades Description	SMP Support[1]	Processor Speed Upgrade[2]
25P2835	xSeries 1.13GHz/133MHz FSB, 512KB Cache Upgrade with Pentium III Processor	K411Xxx, K412Xxx K413Xxx	-
25P2836	xSeries 1.26GHz/133MHz FSB, 512KB Cache Upgrade with Pentium III Processor	K431Xxx, K432Xxx, K433Xxx, K43AXxx	K411Xxx, K412Xxx K413Xxx
48P7466	xSeries 1.4GHz/133MHz FSB, 512KB Cache Upgrade with Pentium III Processor	K441Xxx, K442Xxx, K443Xxx, K54MXxx	K41xXxx to K43xXxx

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed, and cache size.
2. Requires removal of the standard processor. A maximum of two processors may be installed. All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.ibm.com/pc/support and enter machine "Type-Model" in Quick Path. Select "Downloadable files" and then "BIOS".

Models P/N K411Xxx to K443Xxx (including NEBS-compliant Model P/N K4N1Xxx)



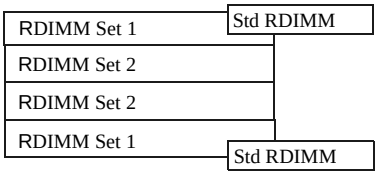
Part Number	Memory Description[1]
10K0018	IBM 128MB PC133 ECC SDRAM RDIMM
10K0020	IBM 256MB PC133 ECC SDRAM RDIMM
10K0022	IBM 512MB PC133 ECC SDRAM RDIMM
33L3326	IBM 1GB PC133 ECC SDRAM RDIMM

1. Memory RDIMMs must be installed in sequence from RDIMM connector 1 through connector 4. RDIMM size is not relevent.

Total Memory[1]	Quantity of RDIMMs Added			
256MB Standard (1 x 256)	128MB P/N10K0018	256MB P/N10K0020	512MB P/N10K0022	1GB P/N33L3326
384MB	1	-	-	-
512MB	2 or	1	-	-
640MB	3	-	-	-
768MB	-	2 or	1	-
1024MB	-	3	-	-
1280MB	-	-	2 or	1
1792MB	-	-	3	-
2048MB[2]	-	-	4[2]	-
2304MB	-	-	-	2
3328MB	-	-	-	3
4096MB (max)[2]	-	-	-	4[2]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.
1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Requires removal of standard memory.

Model P/N K54MXxx



Recommended order of installation: Set 1-2.

Total Memory[1]	Quantity of RDIMMs Added		
512MB Standard (2 x 256)	256MB P/N 33L3322	512MB P/N 33L3324	1GB P/N 33L3326
1024MB	2	-	-
1536MB	-	2	-
2560MB	-	-	2
3072MB[2]	-	2	2[2]
4GB[2, 3]	-	-	4[2, 3]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs. RDIMMs must be added in pairs to support interleaving technology.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. Addition of two pairs of RDIMMs requires removal of the standard memory.
3. When memory options total 4GB, slot two does not support dual address cycle (DAC) PCI options (RAID controllers, gigabit Ethernet adapters, Fibre Channel host adapters) in 8675 models.

Part Number	Memory Description[1]
33L3322	256MB PC133 ECC SDRAM RDIMM
33L3324	512MB PC133 ECC SDRAM RDIMM
33L3326	1GB PC133 ECC SDRAM RDIMM[2]

1. Due to two-way interleaving, installation of memory options in pairs beginning with set 1 is required. Chipkill support is provided on the memory card.
2. When four 1GB RDIMMs are installed in Model P/N K54MXxx, slot two does not support dual address cycle (DAC) PCI options (RAID controllers, gigabit Ethernet adapters, Fibre Channel host adapters).

xSeries 330 Internal SCSI Cabling

xSeries 330 hot-swap models contain a DASD backplane supporting two hot-swap, SCA-2 compliant drive bays. The backplane is connected to the internal connector of the integrated Ultra160 SCSI controller through a 16-bit LVD SCSI cable. If internal RAID is required, the cable can be attached to the internal connector of the optional RAID adapter. The cable is of sufficient length to attach to adapters in slot one but not slot two.

xSeries 330 non hot-swap models contain either of the following:
- o 20.4GB or 40GB EIDE HDD cabled directly to an integrated EIDE controller through a two-drop cable that can support up to two EIDE HDDs
- o 18.2GB 10,000RPM Ultra160 SCSI HDD cabled directly to the Ultra160 SCSI controller through a terminated two-drop LVDS SCSI cable that can support up to two HDDs.

In configurations where external SCSI device attachment is required, a supported SCSI adapter or ServeRAID controller must be installed.

For additional information regarding internal cabling, refer to Appendix E: Internal Storage Cabling Overview.

xSeries 330 Internal Hard Disk Drive (HDD) and External Storage Configurator

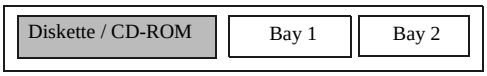
	SCSI Models				
Total Internal Storage[1, 3]	**10,000RPM Ultra160 SCSI HDDs**			**15,000RPM Ultra160 SCSI HDDs**	
	18.2GB[2]	**36.4GB[2]**	**73.4GB[2]**	**18.2GB[2]**	**36.4GB[2]**
Non H/Swap--->	**P/N 06P5750**	**P/N 06P5751**	**P/N 06P5752**	**P/N 06P5765**	**P/N 06P5766**
Hot-Swap------->	**P/N 06P5754**	**P/N 06P5755**	**P/N 06P5756**	**P/N 06P5767**	**P/N 06P5768**
0 GB	0GB Standard on Hot-Swap SCSI Models, except P/N K4N1Xxx[3]			0GB Standard on Hot-Swap SCSI Models, except P/N K4N1Xxx[3]	
18.2 GB	1	-	-	1	-
36.4 GB	2[4] or	1	-	2[4] or	1
72.8 GB	-	2[4]	-	-	2[4]
73.4GB	-	-	1	-	-
146.8GB (max)[4]	-	-	2[4]	-	-

This table does not represent all possible hard disk drive (HDD) configurations.
1. Select a total storage row then identify the recommended HDDs from within an RPM range according to choice and type of disk required (hot-swap or non hot-swap). Total Internal Storage listed is within ± 0.2 GB unless otherwise noted.
2. Both hot-swap and non-hot-swap HDDs are listed. Select the appropriate part number for the model of xSeries 330 being configured.
3. Models P/N K413Xxx, K433Xxx, K443Xxx support only non hot-swap disks and ship standard with one 18.2GB non hot-swap disk P/N 06P5750. Model P/N K4N1Xxx supports hot-swap disks and ships standard with two 18.2GB hot-swap disks P/N 06P5754. Recalculate storage requirements accordingly, using appropriate disk P/Ns.
4. Requires replacing standard HDD(s) in SCSI models P/N K413Xxx, K433Xxx, K443Xxx, K4N1Xxx.

IDE Models				
Total Internal Storage[1]		**7200RPM HDDs[2]**		
20.4GB models	**40GB models**	**20.4GB P/N19K4461**	**40GB P/N22P7157**	**60GB P/N 09N4207**
40.8GB	60.4GB	1	-	-
60.4GB	80GB	-	1	-
80.4GB	100GB	-	-	1
120GB(max)[3]	120GB(max)[3]	-	-	2[3]

This table does not represent all possible HDD configurations. Total Internal Storage listed is within +/-0.2GB unless otherwise noted.

1. Select a total storage row then identify the recommended HDD to achieve the desired total.
2. The xSeries 330 dual integrated EIDE controllers support a maximum of three IDE devices per machine including one CD-ROM and two IDE HDDs.
3. Requires replacing the standard HDD.



Bay	Form Factor	Height	Front Access	Usage
1[1]	HS or 89mm (3.5in)[2]	SL	Yes	Open[3]
2	HS or 89mm (3.5in)[2]	SL	Yes	Open[3]

1. Boot drive should be located in bay 1.
2. x330 now includes IDE and SCSI non hot-swap and SCSI hot-swap disk models.
3. SCSI non hot-swap models and IDE models ship with one standard HDD. Bays one and two in these models are not front-accessible.

Part Number	Description	RPM	Height	Bays Supported	Max. Qty.
	IDE HDDs[1, 2]				
19K4461	20.4GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1 ... 2	2
22P7157	40GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1 ... 2	2
09N4207	60GB 7200rpm ATA-100 (EIDE) HDD	7200	SL	1 ... 2	2
	Non Hot-Swap Ultra160 SCSI HDDs[2, 3]				
06P5750	18.2GB 10,000rpm Ultra160 HDD	10000	SL	1 ... 2	2
06P5751	36.4GB 10,000rpm Ultra160 HDD	10000	SL	1 ... 2	2
06P5752	73.4GB 10,000rpm Ultra160 HDD	10000	SL	1 ... 2	2
06P5765	18.2GB 15,000rpm Ultra160 HDD	15000	SL	1 ... 2	2
06P5766	36.4GB 15,000rpm Ultra160 HDD	15000	SL	1 ... 2	2
	Hot-Swap Ultra160 SCSI HDDs[4]				
06P5754	18.2GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	1...2	2
06P5755	18.2GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	1...2	2
06P5756	73.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	1...2	2
06P5767	18.2GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	1...2	2
06P5768	36.4GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	1...2	2
	External Storage Expansion Units[5]	**Form Factor**			
19K11xx[11]	EXP300 Storage Expansion Unit[6, 10]	Rack (3U)			
19K11xx[12]	FAStT 200 Storage Server[7, 8, 10]	Rack (3U)			
19K11xx[13]	FAStT 200 HA Storage Server[7, 10]	Rack (3U)			
19K1121	FAStT 200 Redundant RAID Controller[8]	-			
00N71xx[14]	FAStT EXP500 Storage Expansion Unit[9, 10]	Rack (3U)			
94G7448	Rack Power Cable Type C12 (3.7m)[10]	-			

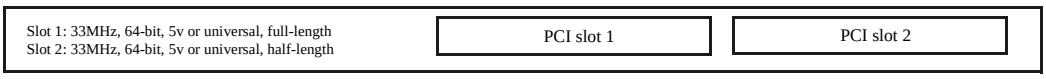
1. The xSeries 330 dual integrated EIDE controllers support a maximum of three IDE devices per machine including one CD-ROM and two IDE hard disk drives. IDE HDDs are supported only on IDE models.
2. Mixing of IDE and SCSI hard disk drives is not supported.
3. Nonhot-swap HDDs are supported only in fixed disk models.
4. Hot-swap HDDs are supported only in hot-swap models.
5. xSeries 330 does not include an external SCSI connector. To configure a SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables-Storage Units-Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
6. The EXP300 includes a single 2M Ultra2 SCSI cable and dual hot-swap 500 W redundant power supplies, each with its own standard country power cord.
7. The FAStT200 Storage Server and HA Storage Server each include two hot-swap, 350 W auto-ranging redundant power supplies each with it's own standard country power cord.
8. Can be upgraded to a FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
9. The FAStT EXP500 Storage Expansion Unit P/N 00N71xx includes dual hot-swap 350W power supplies, each with it's own standard countyr power cord.
10. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables according to the number of power supplies.
11.Where 'xx' represents a specific country code as follows: 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.
12. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
13. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
14. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/Language Line Cords/Publications are included as indicated.

xSeries 330 I/O Options

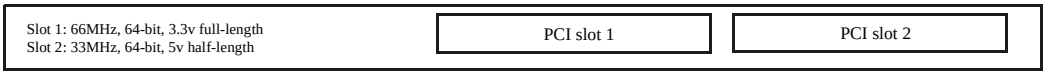
Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[1]
	SCSI Storage Controllers[2, 15]			
37L6889	ServeRAID-4H Ultra160 SCSI Controller[3]	Full	64-bit	1
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[4]	Full	64-bit	1
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[5]	Half	64-bit	1, 2
19K4646	PCI Wide Ultra160 SCSI Adapter[6]	Half	32-bit	1, 2
02K3454	PCI Fast/Wide Ultra SCSI Adapter[7]	Half	32-bit	1, 2[18]
	Fibre Storage Controller[8]			
00N6881	FAStT Host Adapter	Half	64-bit	1, 2
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1, 2[1]
	Networking[9]			
	Ethernet[10]			
09N9901	10/100 EtherLink Server Adapter by 3Com[11]	Half	32-bit	1, 2
06P3601	10/100 Ethernet Server Adapter[11]	Half	32-bit	1, 2
06P3701	Gigabit Ethernet SX Server Adapter (fibre optic cabling interface)	Half	64-bit	1, 2
22P4901	10/100 Dual Port Server Adapter[11]	Half	64-bit	1, 2
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)[11]	Half	64-bit	1, 2
22P7801	NetXtreme 1000 SX Fibre Ethernet Adapter	Half	64-bit	1, 2
	Token Ring			
34L0701	Token-Ring 16/4 PCI Adapter2 with Wake on LAN[11]	Half	64-bit	1, 2
34L5001	16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1, 2
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1, 2
	Communications[12]			
37L14xx[13]	Serial I/O SST 8 and 16 port adapters[13]	Half	32-bit	1, 2[17]
	Systems Management[14]			
09N75xx[18]	Remote Supervisor Adapter[16]	Half	32-bit	1, 2[17]

1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 66MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. xSeries 330 has an integrated single channel Ultra160 SCSI Controller.
3. ServeRAID-4H Ultra160 SCSI Controller is powered by a 266 MHz Power PC 750 processor and provides four channels, 128 MB of battery-backed ECC cache. The internal connectors are not accessible due to a cabling interference. Four external Ultra160 0.8mm VHDCI connectors are available. Not compatible with Model P/N K54MXxx.
4. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connections are 0.8mm VHDCI.
5. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI. If attached to the internal HDDs, installation is supported only in slot one.
6. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector and one external 0.8-mm VHDCI Ultra160 connector. Support for external SCSI devices only. A five-drop terminated LVD SCSI cable is included but not supported for use in this server.
7. PCI Fast/Wide Ultra SCSI Adapter P/N 02K3454 provides one external 68-pin high density connector that supports external SCSI devices such as tape enclosures.
8. See the Fibre Channel Solutions Overview section for additional configuration information.
9. xSeries 330 includes dual full-duplex, 10/100 Mbps Ethernet controllers.
10. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. The onboard Ethernet is Intel-based, which is compatible with the Intel-based optional Ethernet adapters listed here: P/Ns 06P3601, 06P3701, 22P4901, 22P6801.
11. The Wake on LAN function of this option is supported by models P/N K41xXxx, K43xXxx and K44xXxx only.
12. xSeries 330 includes two USB ports and a high speed serial/asynchronous port (NS16550A compatible).
13. Serial I/O Adapter P/N 37L1414 provides eight DB-25 RS232 serial connections using an octopus cable. Support for all ports is at 921.6 Kbps simultaneously. Adapter P/N 37L1415 provides sixteen RJ-45 RS232 serial connections in a breakout box. Support for all ports is at 115.2 Kbps simultaneously. A maximum of four Serial I/O adapters may be installed in a host system.
14. xSeries 330 has two integrated RS-485 system management interconnect ports located on the back of the system chassis. Connection of the standard integrated service processor to other servers in an interconnect network requires only a customer-supplied Cat5 Ethernet cable.
15. When storage controllers are installed in both PCI slots, the BIOS for the integrated storage controller must be disabled. i.e it cannot support either external or internal storage media. If the two storage controllers in slots one and two are both RAID adapters, the boot media must be attached to the RAID adapter in slot one.
16. When installed in an xSeries 330, the optional adapter is connected externally to the integrated service processor using the integrated RS-485 ports. The optional adapter serves only as an Ethernet and interconnect gateway. The onboard ASM processor will provide all service processor data.
17. Supported in slot two only for Model P/N K54MXxx.
18. Where 'xx' represents a specific country code as follows:- 86=Europe, 87=Denmark, 88=South Africa, 89=UK, 90=Switzerland, 91=Italy, 92=Israel, 85=USA.

Models P/N K41xXxx, K43xXxx, K44xXxx, K4N1Xxx



Model P/N K54MXxx



Rear View

Part Number	Description
	Power[1, 2, 12]
94G7448	Rack Power Cable Type C12 (3.7m)[12]
	Uninterruptible Power Supply (UPS)[3]
32P16xx[14]	APC 2U Smart-UPS 1400RMiB[6]
30RIxxx[13]	APC Smart-UPS 3000RMB[4]
37L6862	APC Smart-UPS 5000RMB[5]
	Monitors[7, 8]
06P4792	Cable Chain Technology Cable Kit[8, 9]
T3147xx[15]	E54 Color Monitor 15in (350-mm, 13.8in Viewable Image Size), stealth black[10]
T3247xx[15]	E74 Color Monitor 17in (403-mm, 15.9in Viewable Image Size), stealth black[10]
T274Axx[15]	G78 Color Monitor 17in (406.4mm, 16.0in Viewable Image Size), stealth black[10]
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)[11]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[11]

1. Most xSeries 330 models include a worldwide, voltage-sensing 200W power supply with auto restart and a standard country power cord.
2. Direct current models P/N K43AXxx and K41NXxx include a 200W, -48V to -60V direct current power supply. The line cord is customer-supplied. These models are designed for specific application in a telecommunications infrastructure.
3. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
4. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
6. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
7. The xSeries 330 uses an SVGA controller (S-3 Savage4 chipset) with 8Mb of video memory.
8. A C2T Interconnect cable chaining technology Cable Kit P/N 06P4792 (quantity one) is required for the attachment of one or multiple-chained xSeries 330s to Keyboard/ Video/Mouse either directly or via a Console Switch. If attaching directly, the Console Breakout Cable included in the Kit connects from the x330 'Out' port (or from the last x330 if multiple systems are chained together), to the K/V/M connectors. If attaching via a Console Switch, Console Cable P/N 09N4293 (2.1m/7ft) or P/N 94G7447 (3.6m/ 12ft) is required in addition to the kit and connects between the Console Breakout Cable and the Switch.
9. Each x330 ships with a Console Chaining Cable (254mm/10in), for connecting adjacent systems, thereby creating a console signal 'bus' that runs along a group of systems. The last system in the group then connects to console devices as described in the above note. Kit P/N 06P4792 also includes a longer Console Chaining Cable (2m/6.5ft) for use when the standard cable is not long enough. A maximum of 42 systems and no more than one Kit are allowed in one system chain.
10. Installation within a rack requires optional Monitor Compartment P/N94G7444.
11. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
12. Rack Power Cable P/N 94G7448 must be ordered for power connection to a high voltage UPS or PDU.
13. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe
14. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.
15. Where 'xx' represents a specific country code as follows:- DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
	Rack and NetBAY[1, 2, 10]
94G7448	Rack Power Cable Type C12 (3.7m)[10]
NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.	
	Keyboard and Mouse[3]
06P4792	Cable Chain Technology Cable Kit[4, 5]
28L36xx[11]	Space Saver II Keyboard[6, 7]
28L36xx[12]	Preferred Keyboard (stealth black)[8]
10K38xx[13]	106-key Preferred USB Keyboard with 2-port USB Hub, stealth black[8, 9]
28L3675	Sleek 2-Button Stealth Black Mouse
33L3244	Sleek USB Mouse, stealth black

1. xSeries 330 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
2. Note limitations and restrictions for adequate cooling in the Rack Cabinets and Options section. If non-IBM racks are used, assure that both the front and rear doors offer a minimum of 48% open area uniformly distributed and in line with the installed servers. A clearance of 51to 64mm (2 to 2.5in) must be maintained between the front door and the system unitÕs front bezel. The rear door must maintain the same or greater clearance.
3. xSeries 330 supports rack configurations only and ships without a keyboard or mouse.
4. A C2T Interconnect cable chaining technology Cable Kit P/N 06P4792 (quantity one) is required for the attachment of one or multiple-chained xSeries 330s to Keyboard/ Video/Mouse either directly or via a Console Switch. If attaching directly, the Console Breakout Cable included in the Kit connects from the x330 'Out' port (or from the last x330 if multiple systems are chained together), to the K/V/M connectors. If attaching via a Console Switch, Console Cable P/N 09N4293 (2.1m/7ft) or P/N 94G7447 (3.6m/ 12ft) is required in addition to the kit and connects between the Console Breakout Cable and the Switch.
5. Each x330 ships with a Console Chaining Cable (254mm/10in), for connecting adjacent systems, thereby creating a console signal 'bus' that runs along a group of systems. The last system in the group then connects to console devices as described in the above note. Kit P/N 06P4792 also includes a longer Console Chaining Cable (2m/6.5ft) for use when the standard cable is not long enough. A maximum of 42 systems and no more than one Kit are allowed in one system chain.
6. Installation within a rack requires optional keyboard tray P/N 28L4707 (stows in "ready-to-use" position).
7. Advanced TrackPoint IV features are not available on IBM xSeries systems.
8. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
9. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
10. The xSeries 330 ships with a standard country power cord. For connection to a high voltage UPS or PDU, a Rack Power Cable P/N 94G7448 must be ordered.
11. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
12. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/ Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.
13. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.

xSeries 330 Tape Options

Part Number	Description (see **General Note** below)	Bays Supported[1]	SCSI Interface (bit)	Form Factor	Termination Included	68/50-pin Converter Included?	Ext. Tape Enclosures[1]
09N4041	12/24GB DDS/3 4-mm SCSI Tape Drive	-	8	89mm (3.5in) HH or 133mm (5.25in) HH	Y	Y	03K8756
00N7991	20/40GB DDS/4 4-mm SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	89mm HH or 133mm HH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
00N7990	40/80GB DLT SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
00N8016	100/200GB LTO SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
24P2396	100/200GB LTO SCSI HH Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm HH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
24P2398	40/80GB Half-High DLTVS SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm HH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
	Tape Autoloaders						
00N79xx[9]	DLT SCSI Tape Autoloader	-	16	Desktop	Y	-	-
00N7992	120/240GB DDS/4 SCSI Tape Autoloader (see **Special Note** below)	-	16 Ultra2 LVD	133mm FH	Y (see **Special Note** below)	-	03K8756[2], (and see **Special Note** below)
09N40xx[10]	3600 Series 900GB/1.8TB LTO SCSI Tape Autoloader[3]	-	16 Ultra2 LVD	Tower or 6U Rack	Y	-	-
	External Tape Libraries[4]						
00N79xx[11]	DLT SCSI Tape Library	-	16	Rack	Y	-	-
21P99xx[12]	3600 Series 2/4TB LTO SCSI Tape Library (Rack)	-	16 Ultra2 LVD	5U Rack	Y	-	-
21P99xx[13]	3600 Series 2-Drive, 20-Cartridge Expander Module[5]	-	16 Ultra2 LVD	5U Rack	Y	-	-
09N4048	3600 Series LTO Drive Upgrade Option[6]	-	16 Ultra2 LVD	-	N	-	-
	External Tape Enclosures						
03K8756	NetMEDIA Storage Expansion Unit EL[7]	-	16	Rack	Y	N	-
10L7113	NetMEDIA Systems Management Adapter[8]	-	16 LVD	-	Y	N	03K8756
	Associated Options						
10K2340	Media Bay Tray and LVD Cable Kit[2]	-	16 LVD	Int.	Y	N	03K8756

General Note: xSeries 330 does not support internal tape drives and does not include an external SCSI connector. An external tape library or tape drive with external enclosure, supported SCSI adapter and appropriate cable must be selected. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which has an external 0.8-mm VHDCI connector. Select tape drive, enclosure and supported adapter then use Appendix D: Cables-Storage Units-Controllers to select an appropriate external cable.

Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit P/N 10K2340 to provide termination and LVD support, when attaching one of these tape drives externally in the NetMEDIA Storage Enclosure P/N 03K8756. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable. Finally, also bear in mind that it will take time for these newly equipped tape drives to work through into the supply chain. In the meantime, it may be better to order the Media Bay Kit for a small additional cost, and possibly to have too many cables (surplus to be used elsewhere), than risk ending up without the necessary cable.

1. To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section, and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
2. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **Special Note** above), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply. For support of more than two devices in a NetMEDIA Enclosure, refer to the NetMEDIA Adapter information.
3. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.
4. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.
5. Supported only with the 3600 Series LTO Tape Library (Rack) P/N 21P99xx. Allow one additional EIA space when installing either one or two (maximum) units to accommodate a filler plate for cable routing. Up to two 3600 Series LTO Drive Upgrade Options can be installed in each module or the module can operate off the LTO drives installed in the LTO tape library.
6. Install in second drive bay of 3600 Series LTO Tape Libraries or in open bays of 3600 Series 2-drive, 20-cartridge Expander Module to increase performance. Includes an LTO (Ultrium) drive and a one-meter external LVD SCSI cable.
7. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, 19" rack-mountable tape enclosure which includes two full high (FH) or four half high (HH) extended length 133 mm (5.25") bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
8. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Storage Expansion Unit to provide repeater function, LVDS interface, aggregate cable lengths up to 12 meters when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.
9. Where 'xx' represents a country specific power cord code: 70=UK, 71=Swiss, 72=Italy, 73=Israel, 33L4981=EU1, 33L4982=Denmark, 33L4983=South Africa/India.
10. Where 'xx' represents a specific country code as follows:- 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.
11. Where 'xx' represents a specific country code as follows:- *Rack versions* - 81=EU1, 82=Denmark, 83=India/South Africa, 84=UK, 85=Swiss, 86=Italy, 87=Israel.
12. Where 'xx' represents a specific country code as follows:- *Tower version* - 71=Europe, 72=Denmark, 73=South Africa, 70=UK, 74=Swiss, 75=Italy, 76=Israel: *Rack version* - 78=Europe, 79=Denmark, 80=South Africa, 77=UK, 81=Swiss, 82=Italy, 83=Israel.
13. Where 'xx' represents a specific country code as follows:- 85=Europe, 86=Denmark, 87=South Africa, 84=UK, 88=Swiss, 89=Italy, 90=Israel.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

Note: For a complete list of all IBM and non-IBM options compatibility with Network Operating Systems and IBM xSeries Servers, access the IBM ServerProven compatibility pages on the Web at URL http://www.ibm.com/pc/us/compat

xSeries 330 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Internet Server[1]

Part Number	Description	Quantity
K441Xxx	xSeries 330 1.4GHz/512KB, 256MB ECC, Open, Hot-Swap, 24X, PCI	1
06P5754	18.2GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	2[2]
06P4792	Cable Chain Technology Cable Kit[3]	1
T3147xx	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black	1
28L36xx	Space Saver II Keyboard	1
32P16xx	APC 2U Smart-UPS 1400RMiB	1

1. This example shows a 19" rackable configuration. The rack components are not included.
2. For a total of 36.4GB of internal storage.
3. A single Cable Chain Technology Cable Kit P/N 06P4792 is required for attachment of one or multiple (up to 42) chained xSeries 330s to a single monitor, mouse and keyboard.

An Internet server handles all requests from the Internet (Intranet or Extranet). Usually, this type of server has the same characteristics as a normal file server. The main difference is that an internet server talks a different language (TCP/IP vs. NETBEUI or IPX/SPX) and often needs to do an extra security check (firewall). In the case of an Internet server, the server itself talks mostly to one client, the Internet Service Provider (ISP), instead of many clients as a file server does.

With this is mind, the xSeries 330 was selected to provide an affordable price point for the growing Internet server market with two-way Pentium III processing, 256MB of system memory (expandable to 4GB), and power protection with an APC Smart-UPS.

The network configuration depends on the method that will be used to connect the server to the Internet. Usually fast Ethernet routers are used, but if other methods are used you can add the appropriate adapter.

File and Print Server[1]

Part Number	Description	Quantity
K431Xxx	xSeries 330 1.26GHz/512KB, 256MB ECC, Open, Hot-Swap, 24X, PCI	1
10K0018	128MB PC133 ECC SDRAM RDIMM	1[2]
06P5755	36.4GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	2[3]
06P4792	Cable Chain Technology Cable Kit	1[4]
T3147xx	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black	1
28L36xx	Space Saver II Keyboard	1
32P16xx	APC 2U Smart-UPS 1400RMiB	1

1. This example shows a 19" rackable configuration. The rack components are not included.
2. For a total of 384MB of system memory.
3. For a total of 72.8GB of internal storage.
4. A single Cable Chain Technology Cable Kit (P/N 06P4792) is required for attachment of one or multiple (up to 42) chained xSeries 330s to a single monitor, mouse and keyboard.

A small business or departmental server is usually required to perform all typical server functions while servicing up to 100 users in a normal workgroup computing environment, but doesn't require the high-end performance and fault-tolerance properties of larger servers.

The sample configuration above consists of an xSeries 330 with 384MB of memory and 72.8GB of hard disk space. It has enough processor power and memory to run most current network operating systems comfortably and enough hard disk drive space to store a significant amount of data with additional external storage expansion still available. Demanding network traffic is effectively handled by the standard 100Mbps Ethernet connection.

This configuration also includes a UPS to keep the system protected during power surges and outages.

Application Server[1]

Part Number	Description	Quantity
K441Xxx	xSeries 330 1.4GHz/512KB, 256MB ECC, Open, Hot-Swap, 24X	1
48P7466	1.4GHz Upgrade with 133MHz FSB and 256 KB Advanced Transfer Cache Pentium III Processor	1
10K0020	256MB PC133 ECC SDRAM RDIMM	1[2]
06P5754	18.2GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	2[3]
06P4792	Cable Chain Technology Cable Kit	1[4]
T31U2xx	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black	1
28L36xx	Space Saver II Keyboard	1
32P16xx	APC Smart-UPS 1400RMiB	1

1. This example shows a 19" rackable configuration. The rack components are not included.
2. For a total of 512MB of system memory.
3. For a total of 36.4GB of internal storage.
4. A single Cable Chain Technology Cable Kit P/N 06P4792 is required for attachment of one or multiple (up to 42) chained xSeries 330s to a single monitor, mouse and keyboard.

An application server differs from a file and print server in that it has a higher workload, in providing application serving requirements for users. With this in mind, the xSeries 330 was selected to provide an affordable price point for an application server, with two-way Pentium III processing, 512MB of system memory (expandable to 4GB), and optional availability features such as RAID-protected internal storage and power protection with an APC Smart-UPS.

IBM xSeries 342

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max) (DIMM)	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	Integrated System Management Processor	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[6]	Bays (Total/Avail)	Slots (Tot/Av)
xSeries 342 At-A-Glance																	
K92RXxx[1]	-	1.13[2]	1/2	512	256MB/4GB	Rack (3U)	1/2	P, H, F	O - Power[3] S - Fans	Y	10/100	D,U160	4/2[4]	0/220.2GB[5]	24X-10X	7/5[4]	5/5
K94RXxx[1]	-	1.26[2]	1/2	512	256MB/4GB	Rack (3U)	1/2	P, H, F	O - Power[3] S - Fans	Y	10/100	D,U160	4/2[4]	0/220.2GB[5]	24X-10X	7/5[4]	5/5
K95RXxx[1]	-	1.4[2]	1/2	512	256MB/4GB	Rack (3U)	1/2	P, H, F	O - Power[3] S - Fans	Y	10/100	D,U160	4/2[4]	0/220.2GB[5]	24X-10X	7/5[4]	5/5

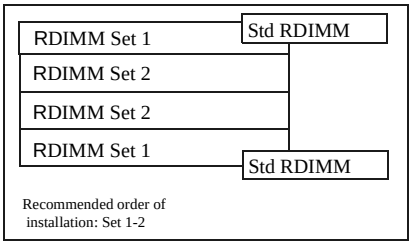
1. Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
2. Intel Pentium III processor with advanced transfer L2 cache and 133MHz FSB.
3. Power supply redundancy requires installation of optional 270W Hot-Swap Redundant Power Supply P/N 37L6879.
4. xSeries 342 includes two available removable media bays that can be converted to three slim-line (SL) hot-swap bays with the addition of optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050, thereby doubling internal hard disk drive storage capacity.
5. The optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050 is available, which converts the two available removable media bays into three slim-line (SL) hot-swap bays. This increases the Total Bays and Available Bays from 7/5 to 8/6 and the number of hot-swap disk bays from 3 to 6, thereby doubling the internal hot-swap hard disk drive capacity to 440.4GB.
6. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.

xSeries 342 Processor Upgrades

Part Number	Processor Upgrades	SMP Support[1]	Processor Speed Upgrade[2]
22P1997	xSeries 1.13GHz/133MHz, 512KB Cache Upgrade with Pentium III Processor	K92RXxx	-
22P1998	xSeries 1.26GHz/133MHz, 512KB Cache Upgrade with Pentium III Processor	K94RXxx	K92RXxx
48P7467	xSeries 1.4GHz/133MHz 512KB Cache Upgrade with Pentium III Processor	K95RXxx	K92RXxx, K94RXxx

1. One additional processor may be installed, providing a maximum of two. All processors must be identical in type, speed, and cache size.
2. Requires removal of the standard processor. A maximum of two processors may be installed. All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter machine 'Type-Model' in Quick Path. Select 'Downloadable files' then 'BIOS'.

xSeries 342 Memory Configurator



Part Number	Memory Description[1]
33L3320	IBM 128MB PC133 ECC SDRAM RDIMM
33L3322	IBM 256MB PC133 ECC SDRAM RDIMM
33L3324	IBM 512MB PC133 ECC SDRAM RDIMM
33L3326	IBM 1GB PC133 ECC SDRAM RDIMM

1. Due to two-way interleaving, memory options are required to be installed in pairs beginning with set 1.

Total Memory[1]	Quantity of RDIMMs Added			
256MB (2 x 128) Models	**128MB P/N 33L3320**	**256MB P/N 33L3322**	**512MB P/N 33L3324**	**1GB P/N 33L3326**
512MB	2	-	-	-
768MB	-	2	-	-
1GB[2]	-	4[2]	-	-
1.25GB	-	-	2	-
2.0GB[2]	-	-	4[2]	-
2.25GB	-	-	-	2
4GB (max)[2]	-	-	-	4[2]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.

2. Requires removal of standard memory.

xSeries 342 Internal SCSI Cabling

The xSeries 342 contains seven standard drive bays. The top bay on the left contains the standard 3.5in slim-line (SL) diskette drive and the bay beneath contains the standard CD-ROM drive. Three 3.5in SL hot-swap bays in the center of the server support various hot-swap drive options. Two 5.25in half-high (HH) bays on the left support either tape back-up or an optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050. The 24X-10X IDE CD-ROM is cabled directly to the IDE port.

The xSeries 342 contains a DASD backplane supporting three hot-swap, SCA-2 compliant drive bays. The backplane is connected to one of the internal connectors of the integrated dual-channel Ultra160 SCSI controller through a 16-bit LVD SCSI cable.

Additional Cabling Requirements:
xSeries 342 supports two storage alternatives in the two 5.25in HH media bays. Firstly, an optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050 can be installed to provide additional internal HDD storage capacity. Included with this option is a 16-bit LVD SCSI cable that can be attached from the 3-Pack Ultra160 Hot-Swap backplane to the second connector of the Ultra160 controller, or through the use of a repeater card that is included with the option, it can be cabled directly to the standard backplane.

Alternatively, if a tape backup device is required in one or both of the media bays, a two-drop LVD SCSI cable available in the optional Media Bay Kit P/N10K2340 will connect these devices to the Ultra160 controller. **Note**: if the Tape Option includes a terminated SCSI cable, the Media Bay Kit is not required. See the **Special Note** in the Tape Options section for more information.

In configurations where external SCSI device attachment is required, a supported SCSI adapter must be installed.

For additional information regarding internal cabling, refer to Appendix E: Internal Storage Cabling Overview.

xSeries 342 Internal Hard Disk Drive (HDD) and External Storage Configurator

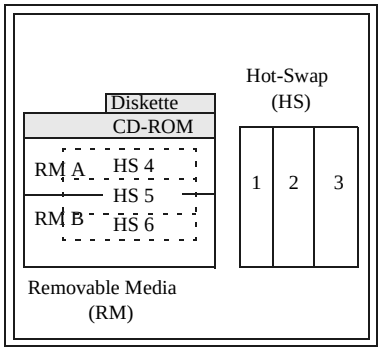
Total Int Storage[1]	10,000RPM HDDs			15,000RPM HDDs	
	18.2GB P/N 06P5754	36.4GB P/N 06P5755	73.4GB P/N 06P5756	18.2GB P/N 06P5767	36.4GB P/N 06P5768
0GB	0GB Standard on base models			0GB Standard on base models	
18.2GB	1	-	-	1	-
36.4GB	2 or	1	-	2 or	1
54.6GB	3	-	-	3	-
72.8GB[2]	4[2] or	2	-	4[2] or	2
91.0GB[2]	5[2]	-	-	5[2]	-
109.2GB[2]	6[2] or	3	-	6[2] or	3
145.6GB[2]	-	4[2]	-	-	4[2]
182.0[2]B[2]	-	5[2]	-	-	5[2]
218.4GB[2]	-	6[2]	-	-	6[2]
220.2GB	-	-	3	-	-
293.6GB[2]	-	-	4[2]	-	-
367.0GB[2]	-	-	5[2]	-	-
440.4GB[2]	-	-	6[2]	-	-

This table does not represent all possible HDD configurations.
1. Select a total storage row then identify the recommended HDDs from within an RPM range according to choice. Total Internal Storage listed is within +/- 0.2GB unless otherwise noted.
2. More than 3 disks requires 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050 to be installed.

Bay	Form Factor	Height	Front Access	Usage
-	89mm (3.5in)	-	Yes	Diskette
-	133mm (5.25in)	-	Yes	IDE CD-ROM
1 ... 3	HS	SL	Yes	Open
A, B[1]	133mm (5.25in)	HH[1]	Yes	Open
4 ... 6[2]	HS	SL	Yes	Open

1 Two half-high (HH) bays can be combined to support a single full-high (FH) device. By installing the 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050, bays A and B are transformed into three SL hot-swap bays 4 ... 6.

2. To enable bays 4 ... 6, optional 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050 is required.

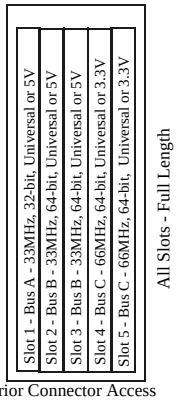


Part Number	Description	RPM	Height	Bays Supported [1]	Max Qty[1]
	Hot-Swap Ultra160 SCSI HDDs				
06P5754	18.2GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	1 ... 6	6
06P5755	36.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	1 ... 6	6
06P5756	73.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	1 ... 6	6
06P5767	18.2GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	1 ... 6	6
06P5768	36.4GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	1 ... 6	6
	Associated Options				
33L5050	IBM 3-Pack Ultra160 Hot-Swap Expansion Kit[2]	-	3 x SL	4 ... 6	-
	External Storage Expansion Units[3]	**Form Factor**			
19K11xx[9]	EXP300 Storage Expansion Unit[4, 8]	Rack (3U)			
19K11xx[10]	FAStT 200 Storage Server[5, 6, 8]	Rack (3U)			
19K11xx[11]	FAStT 200 HA Storage Server[5, 8]	Rack (3U)			
19K1121	FAStT200 Redundant RAID Controller[6]	-			
00N71xx[12]	FAStT EXP500 Storage Expansion Unit[7, 8]	Rack (3U)			
94G7448	Rack Power Cable Type C12 (3.7m)[8]	-			

1. xSeries 342 ships with Bays 1 ... 3 enabled. To enable installation of greater than three HDDs requires 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050.
2. 3-Pack Ultra160 Hot-Swap Expansion Kit P/N 33L5050 includes a hot-swap backplane and associated components for two cabling options. The backplane may be cabled directly to the second integrated SCSI channel or be supported by the same SCSI channel as the standard backplane through the use of an included repeater card.
3. To configure a SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
4. The EXP300 includes a single 2 M Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with a standard country power cord.
5. The FAStT200 Storage Server and HA Storage Server each include two hot-swap, 350 W auto-ranging redundant power supplies each with it's own standard country power cord.
6. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
7. The FAStT EXP500 Storage Expansion Unit P/N 00N71xx includes dual hot-swap 350W power supplies, each with it's own standard country power cord.
8. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables according to the number of power supplies.
9.Where 'xx' represents a specific country code as follows:- 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.
10. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/ English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
11. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/ English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
12. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/ Language Line Cords/Publications are included as indicated.

xSeries 342 I/O Options

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[1,2]
	Storage Controllers[3]			
37L6889	ServeRAID-4H Ultra160 SCSI Controller[2, 4]	Full	64-bit	2 ... 5
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[2, 5]	Full	64-bit	2 ... 5
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[6]	Half	64-bit	1 ... 5
19K4646	PCI Wide Ultra160 SCSI Adapter[7]	Half	32-bit	1 ... 5
02K3454	PCI Fast/Wide Ultra SCSI Adapter[8]	Half	32-bit	1 ... 5
	Fibre Storage Controllers and Options[9]			
00N6881	FAStT Host Adapter	Half	64-bit	1 ... 5
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1 ... 5
	Networking[10]			
	Ethernet[11]			
06P3601	10/100 Ethernet Server Adapter[12]	Half	32-bit	1 ... 5
06P3701	Gigabit Ethernet SX Server Adapter (fibre optic cabling interface)	Half	64-bit	1 ... 5
09N9901	10/100 EtherLink Server Adapter by 3Com[12]	Half	32-bit	1 ... 5
22P4901	10/100 Dual Port Ethernet Server Adapter[12]	Half	64-bit	1 ... 5
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)[12]	Half	64-bit	1 ... 5
	Token Ring			
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter[12]	Half	32-bit	1 ... 5
34L5001	16/4 Token-Ring PCI Management Adapter[12]	Half	32-bit	1 ... 5
	Communications[13]			
37L14xx[14]	Serial I/O SST 8 and 16 Port Adapters[14]	Half	32-bit	1...5[14]
	Systems Management			
09N75xx[16]	Remote Supervisor Adapter[15]	Half	32-bit	1 ... 5



1. A 64-bit adapter installed into a 32-bit slot will transfer data at 32-bit rates. Adapters rated at 66MHz will operate at 33MHz when installed in a 33MHz slot. 33MHz adapters will reduce 66MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. To avoid damage to internal cables, do not route cabling under a full-length PCI adapter.
3. xSeries 342 includes a dual-port, dual-channel Ultra160 SCSI controller for internal use only. No standard external port is available. See ÒInternal SCSI CablingÓ for cabling alternatives. Due to xSeries 342 low profile, some adapters with connectors on the top edge may not have sufficient clearance to attach a cable. Cabling interferences are identified in the footnotes.
4. ServeRAID-4H Ultra160 SCSI Controller is powered by a 266MHz PowerPC 750 processor and provides four channels, 128MB of battery-backed ECC cache. The internal connectors are not accessible due to cabling interference. Four external Ultra160 0.8mm VHDCI connectors are available.
5. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connections are 0.8mm VHDCI.
6. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI.
7. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilised.
8. PCI Fast/Wide Ultra SCSI Adapter provides one external 68-pin high density connector. The internal connectors are not accessible due to a cabling interference.
9. See Fibre Channel Solutions Overview section for additional configuration information.
10. xSeries 342 includes a full-duplex, 10/100Mbps Ethernet PCI controller.
11. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. The onboard Ethernet is Intel-based, which is compatible with the Intel-based optional Ethernet adapters listed here: P/Ns 06P3601, 06P3701, 22P4901, 22P6801.
12. This server supports Wake on LAN or Alert-on-LAN functions through the integrated Ethernet controller only. These functions are not supported for optional PCI adapters.
13. xSeries 342 includes two USB ports and two serial ports.
14 Serial I/O Adapter P/N 37L1414 provides eight DB-25 RS232 serial connections using an octopus cable. Support for all ports is at 921.6 Kbps simultaneously. Adapter P/N 37L1415 provides sixteen RJ-45 RS232 serial connections in a breakout box. Support for all ports is at 115.2 Kbps simultaneously. A maximum of four Serial I/O adapters may be installed in a host system.
15. Disables the Integrated Systems Management processor when installed in xSeries 342 and provides full system management functionality through a customer-supplied Ethernet cable or modem connection or as part of an interconnected system management bus (option includes all interconnect hardware).
16. Where ‘xx’ represents a specific country code as follows:- 86=Europe, 87=Denmark, 88=South Africa, 89=UK, 90=Switzerland, 91=Italy, 92=Israel, 85=USA.

Part Number	Description
	Power[1,9]
37L6879	270W Hot-Swap Redundant Power Supply[1, 9]
94G7448	Rack Power Cable Type C12 (3.7m)[9]
	Uninterruptible Power Supply (UPS)[2]
32P16xx[11]	APC 2U Smart-UPS 1400RMiB[5]
30RIxxx[10]	APC Smart-UPS 3000RMB[3]
37L6862	APC Smart-UPS 5000RMB[4]
	Monitors[6]
T3147xx[12]	E54 Color Monitor 15in (350mm, 13.8in Viewable Image Size), stealth black[7]
T3247xx[12]	E74 Color Monitor 17in (403mm, 15.9in Viewable Image Size), stealth black[7]
T274Axx[12]	G78 Color Monitor 17in (406.4mm, 16in Viewable Image Size), stealth black[7]
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)[8]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[8]

1. xSeries 342 systems include a single 270W, hot-swap power supply and a single standard country power cord. Power supply redundancy can be achieved with the addition of optional 270W Hot-Swap Redundant Power Supply P/N 37L6879.
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
6. xSeries 342 uses an SVGA controller (S3 Savage4 chipset) with 8MB of video memory.
7. Installation within a rack requires optional Monitor Compartment (P/N 94G7444).
8. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
9. Rack Power Cable P/N 94G7448 (one for each power supply), must be ordered for power connection to a high voltage UPS or PDU.
10. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
11. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.
12. Where 'xx' represents a specific country code as follows:- DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
	Rack and NetBAY[1, 7]
94G7448	Rack Power Cable Type C12 (3.7m)[7]
NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.	
	Keyboard and Mouse[2]
28L36xx[8]	Space Saver II Keyboard[3, 4]
28L36xx[9]	Preferred Keyboard (stealth black)[5]
10K38xx[10]	106-key Preferred USB Keyboard with 2-port USB Hub, stealth black[5, 6]
22P51xx[11]	TrackPoint USB Space Saver Keyboard, stealth black[3, 4, 6]
28L3675	Sleek 2-Button Stealth Black Mouse
33L3244	Sleek USB Mouse, stealth black

1. xSeries 342 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
2. xSeries 342 supports rack configurations only and ships without a mouse or keyboard.
3. Installation within a rack requires optional keyboard tray P/N 28L4707, which stows in ready-to-use position.
4. Advanced TrackPoint IV features are not available on IBM xSeries systems.
5. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
6. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
7. The xSeries 342 ships with a standard country power cord. For connection to a high voltage UPS or PDU, a Rack Power Cable P/N 94G7448 (one for each power supply), must be ordered.
8. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
9. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.
10. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.
11. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 68=French, 55=German, 56=Italian, 57=Spanish, 58=UK English, 59=Swedish/Finnish, 60=Belgian/English, 61=Russian, 62=Polish, 63=Portuguese, 65=Swiss, 67=US International.

xSeries 342 Tape Options

Part Number	Description (see **General Note** below)	Bays Supported	SCSI Interface (bit)	Form Factor	Termination Included	68/50-pin Converter Incl	Ext Tape Enclosures[1]
00N7991	20/40GB DDS/4 4mm Internal SCSI Tape Drive (see **Special Note** below)	A, B	16 Ultra2 LVD	89mm (3.5in) HH or 133mm (5.25in) HH	Y (see **Special Note** below)	-	10L7440[3], 03K8756[2, (and see **Special Note** below)
00N7990	40/80GB DLT Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm FH	Y (see **Special Note** below)	-	03K8756[2, (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm FH	Y (see **Special Note** below)	-	03K8756[2, (and see **Special Note** below)
00N8016	100/200GB LTO Internal SCSI Tape Drive (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm FH	Y (see **Special Note** below)	-	03K8756[2, (and see **Special Note** below)
24P2396	100/200GB LTO Internal SCSI HH Tape Drive (see **Special Note** below)	A, B	16 Ultra2 LVD	133mm HH	Y (see **Special Note** below)	-	03K8756[2, (and see **Special Note** below)
24P2398	40/80GB Half-High DLTVS Internal SCSI Tape Drive(see **Special Note** below)	A, B	16 Ultra2 LVD	133mm HH	Y (see **Special Note** below)	-	03K8756[2, (and see **Special Note** below)
	Tape Autoloaders						
00N7992	120/240GB DDS/4 Internal SCSI Tape Autoloader (see **Special Note** below)	A+B	16 Ultra2 LVD	133mm FH	Y (see **Special Note** below)	-	03K8756[2, (and see **Special Note** below)
00N79xx[11]	DLT SCSI Tape Autoloader	-	16	Desktop	Y	-	-
09N40xx[12]	3600 Series 900GB/1.8TB LTO SCSI Tape Autoloader[4]	-	16 Ultra2 LVD	Tower or 6U Rack	Y	-	-
	External Tape Libraries[5]						
00N79xx[13]	DLT SCSI Tape Library	-	16	Desktop or Rack	Y	-	-
21P99xx[14]	3600 Series 2/4TB LTO SCSI Tape Library (Rack)	-	16 Ultra2 LVD	5U Rack	Y	-	-
21P99xx[15]	3600 Series 2-Drive, 20-Cartridge Expander Module[6]	-	16 Ultra2 LVD	5U Rack	Y	-	-
09N4048	3600 Series LTO Drive Upgrade Option[7]	-	16 Ultra2 LVD	-	N	-	-
	External Tape Enclosures						
10L7440	External Half High SCSI Storage Enclosure[8]	-	8, 16	Desktop	N	N	-
03K8756	NetMEDIA Storage Expansion Unit EL[9]	-	16	Rack	Y	N	-
10L7113	NetMEDIA Systems Management Adapter[10]	-	16 LVD	-	Y	N	03K8756
	Associated Options						
10K2340	Media Bay Tray and LVD Cable Kit[2]	-	16 LVD	Int	Y	N	03K8756
00N7956	68-pin External Multimode LVD/SE SCSI Terminator	-	16 LVD/SE	Ext	Y	N	10L7440

General Note: No external SCSI port is available. External enclosures are supported by PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which has an external 0.8mm VHDCI connector.
Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit (P/N 10K2340) for the x342, to attach one of these tape drives internally to the standard SCSI controller. This cable can also be used in the NetMEDIA Storage Enclosure P/N 03K8756 to provide termination and LVD support for one of these tape drives when they are being attached externally. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable. Finally, also bear in mind that it will take time for these newly equipped tape drives to work through into the supply chain. In the meantime, it may be better to order the Media Bay Kit for a small additional cost, and possibly to have too many cables (surplus to be used elsewhere), than risk ending up without the necessary cable.
1. To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section, and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
2. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **Special Note** above), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply. For support of more than two devices in a NetMEDIA Enclosure, refer to the NetMEDIA Adapter information.
3. Requires 68-pin External Multimode LVD/SE SCSI terminator P/N 00N7956.
4. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.
5. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.
6. Supported only with the 3600 Series LTO Tape Library (Rack) (P/N 21P99xx). Allow one additional EIA space when installing either one or two (maximum) units to accommodate a filler plate for cable routing. Up to two 3600 Series LTO Drive Upgrade Options can be installed in each module or the module can operate off the LTO drives installed in the LTO tape library.
7 .Install in second drive bay of 3600 Series LTO Tape Libraries or in either of the two bays of 3600 Series 2-drive, 20-cartridge Expander Module to increase performance. Includes an LTO (Ultrium) drive and a one-meter external LVD SCSI cable.
8. Provides a black desktop 133mm (5.25in) half-high (HH) tape enclosure. Connector is configurable as 50-pin Centronix or 68-pin high density. Requires either tape drive self-termination or 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).
9. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, 19in rack mountable tape enclosure which includes two full- high (FH) or four- half high (HH) extended length 133mm (5.25in) bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
10. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Storage Expansion Unit to provide repeater function, LVDS interface, aggregate cable lengths up to 12m when attached to an LVD SCSI controller, and auto-termination when the NetMEDIA is powered off. External connector is 0.8mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.
11. Where 'xx' represents a country specific power cord code: 70=UK, 71=Swiss, 72=Italy, 73=Israel, 33L4981=EU1, 33L4982=Denmark, 33L4983=South Africa/India.
12. Where 'xx' represents a specific country code as follows:- 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.
13. Where 'xx' represents a country specific power cord code: *Tower versions* - 74=EU1, 75=Denmark, 76=India/South Africa, 77=UK, 78=Swiss, 79=Italy, 80=Israel: *Rack versions* - 81=EU1, 82=Denmark, 83=India/South Africa, 84=UK, 85=Swiss, 86=Italy, 87=Israel.
14. Where 'xx' represents a specific country code as follows:- *Rack version* - 78=Europe, 79=Denmark, 80=South Africa, 77=UK, 81=Swiss, 82=Italy, 83=Israel.
15. Where 'xx' represents a specific country code as follows:- 85=Europe, 86=Denmark, 87=South Africa, 84=UK, 88=Swiss, 89=Italy, 90=Israel.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

Note: For a complete list of all IBM and non-IBM options compatibility with Network Operating Systems and IBM xSeries Servers, access the IBM ServerProven compatibility pages on the Web at URL http://www.ibm.com/pc/us/compat

xSeries 342 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Internet Server

Part Number	Description	Quantity
K95RXxx	xSeries 342 1.4GHz/512KB Pentium III, 256MB ECC, Open, 24X (3U Rack)	1
33L3320	128MB PC133 ECC SDRAM RDIMM	2[1]
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1
06P5754	18.2GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	3[2]
24P2396	100/200GB LTO Internal SCSI HH Tape Drive	1
10K2340	Media Bay Tray and LVD Cable Kit[3]	1[3]
T3147xx	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
32P16xx	APC 2U Smart-UPS 1400RMiB	1
37L6879	270W Hot-Swap Redundant Power Supply	1
Industry Standard 19in Rack, EIA-310D, min depth of 28in (711mm)		
9306250	NetBAY25 Standard Rack Cabinet	1
28L36xx	Space Saver II Keyboard	1
94G6670	Blank Filler Panel Kit	2

1. For a total of 512MB of system memory.
2. Three HDDs are used for RAID 5 protection. Effective capacity is two HDDs or 36.4GB.
3. Contains a cable for dedicated attachment of tape to standard controller. See also the **Special Note** in the Tape Options section.

An Internet server handles all requests from the Internet (Intranet or Extranet). Usually this type of server has the same characteristics as a file server. The main difference is that an Internet server uses a different protocol (TCP/IP vs NETBEUI or IPX/SPX) and often performs an additional security check (firewall). In the case of an Internet server, the server itself communicates primarily with only one client, the Internet Service Provider (ISP), instead of many clients as applies to a file server.

With this in mind, the xSeries 342 was selected to provide an affordable price point for the growing Internet server market. The system includes two-way Pentium III processing, 512MB of system memory (expandable to 4GB), power protection with an APC Smart-UPS and availability features such as RAID-protected internal hot-swap storage.

The network configuration depends on the method that will be used to connect the server to the Internet. Usually fast Ethernet routers are used, but if other methods are preferable, you can add the appropriate adapter. The configuration includes a tape back-up unit for secure storage of critical data in the event of a system or storage media failure.

Application Server

Part Number	Description	Quantity
K92RXxx	xSeries 342 1.13GHz/512KB Pentium III, 256MB ECC, Open, 24X (3U Rack)	1
22P1997	xSeries1.13GHz/133MHz 512KB Cache Upgrade with Pentium III Processor SVR	1
33L3322	256MB PC133 ECC SDRAM RDIMM	2[1]
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1
06P5754	18.2GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	3[2]
24P2396	100/200GB LTO Internal SCSI HH Tape Drive	1
10K2340	Media Bay Tray and LVD Cable Kit[3]	1[3]
T3147xx	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
37L6879	270W Hot-Swap Redundant Power Supply	1
32P16xx	APC 2U Smart-UPS 1400RMB	1
Industry Standard 19in Rack, EIA-310D, min depth of 28in (711mm)		
9306250	NetBAY25 Standard Rack Cabinet	1
28L36xx	Space Saver II Keyboard	1
94G6670	Blank Filler Panel Kit	2

1. For a total of 768MB of system memory.
2. Three HDDs are used for RAID 5 protection. Effective capacity is two HDDs or 36.4GB.
3. Contains a cable for dedicated attachment of tape to standard controller. See also the **Special Note** in the Tape Options section.

An application server is designed to handle a high workload while providing application serving requirements for users. With this in mind, the xSeries 342 was selected to provide an affordable price point for an application server with two-way Pentium III processing, 768MB of system memory (expandable to 4GB), power protection with an APC Smart-UPS and availability features such as battery-backed cache RAID-protected internal hot-swap storage.

IBM xSeries 343

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L2 ECC Cache (KB)	Memory (Std/Max)	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	Adv System Management Processor	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[7]	Bays (Tot/Av)	Slots (Tot/Av)[8]
xSeries 343 At-A-Glance																	
882714X[1,2]	-	1.26[3]	2/2	512	2GB/6GB	Rack (2U)	2/2[4]	P	S-Power	Y	2 x 10/100	D, U160[5]	-	36.4GB/ 72.8GB[6]	24X-10X	4/1	6/6

1. This system is Network Equipment Building System (NEBS), Level 3 compliant and includes two 350w, -48V to -60V direct current (DC) power supplies requiring a direct current power source (-48v to -60v) for utilisation in a telecommunications network infrastructure.
2. Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. Requires two-post rack; not supported for installation in standard IBM racks.
3. Intel Pentium III processor with 133MHz FSB and 512KB advanced transfer cache.
4. Includes two standard 350w, -48V to -60V direct current (DC) hot-swap, redundant power supplies.
5. Includes an integrated dual-channel Ultra160 SCSI controller supporting both internal and external SCSI attachment.
6. One 36.4GB Ultra160 10,000rpm HDD ships standard with this specific NEBS configuration. Please address any questions regarding different NEBS configurations to your local IBM contact. This system does not support hot-swap HDDs.
7. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
8. Optional third-party PCI networking adapters are supported on this system. Refer to ServerProven test results for supported third-party options at www.pc.ibm.com/us/compat. Select x343 from the Fast Access pulldown menu, click Go, then select the appropriate categories on the following screen. IBM makes no representations or warranties withrespect to non-IBM products. These products are offered and warranted by third parties, not IBM.

xSeries 343 Memory Configurator

Total System Memory[1]	Quantity of RDIMMs Added[2]	
2GB (2 x 1GB) Standard	**512MB P/N 33L3324**	**1GB P/N 33L3326**
3GB	2	-
4GB	4	-
5GB	2	2
6GB	-	4

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs. RDIMMs must be added in pairs to support interleaving technology.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.

2. Add options from both columns in each row to the standard memory.

Part Number	Memory Description[1]
33L3324	512MB PC133 ECC SDRAM RDIMM
33L3326	1GB PC133 ECC SDRAM RDIMM

1. Due to two-way interleaving, installation of memory options in pairs beginning with sockets one and four is required. Add memory options in sockets two and five, then three and six.

xSeries 343 Internal SCSI Cabling

The xSeries 343 contains four drive bays. The top bay on the left contains the standard CD-ROM drive and the bay beneath contains the standard 1.44MB, 3.5in slim-line diskette drive. Two 3.5in slim-line bays are located side-by-side, one beneath the CD-ROM and FDD at the bottom of the chassis and the other directly beside it on the right side of the server.

One bay contains the standard 10,000rpm, Ultra160 SCSI nonhot-swap HDD and the other is unpopulated. The 24x-10x IDE CD-ROM is connected to the IDE port. HDDs installed in the drive bays are connected to the internal connector of the integrated Ultra160 SCSI controller through a two-drop, 16-bit LVD SCSI cable. The xSeries 343 contains an external 0.8mm VHDCI connector to attach supported external SCSI devices to the second channel of the integrated SCSI controller.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

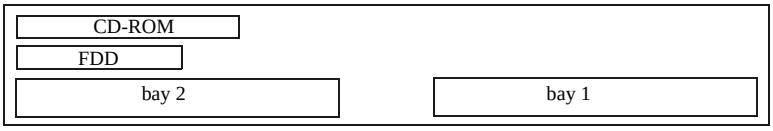
xSeries 343 Internal Hard Disk Drive (HDD) Configurator

Bay	Form Factor	Height	Front Access	Usage
-	133mm (5.25in)	-	yes	IDE CD-ROM
-	89mm (3.5in)	-	yes	Diskette
1	89mm (3.5in)	SL	No	std HDD
2	89mm (3.5in)	SL	No	open

Part Number	Description	RPM	Height	Bays Supported	Max Qty
	Ultra160 Hard Disk Drives (HDD)				
06P5751	36.4GB 10Krpm Ultra160 SCSI SL HDD	10000	SL	1, 2[1]	2

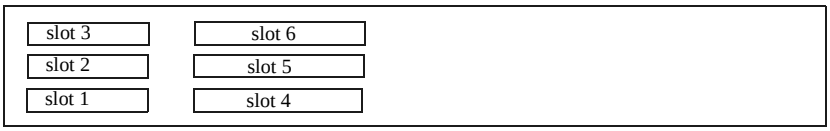
1. xSeries 343 ships with a 36.4GB 10,000rpm nonhot-swap HDD installed in bay one.

front of chassis



xSeries 343 I/O Options

rear of chassis



slot 1: bus 1, low profile, 64-bit, 66MHz, 3.3v, half-length
slot 2: bus 1, low profile, 64-bit, 66MHz, 3.3v, half-length
slot 3: bus 1, low profile, 64-bit, 66MHz, 3.3v, half-length
slot 4: bus 2, full-size, 64-bit, 33MHz, 5v, full-length
slot 5: bus 2, full-size, 64-bit, 33MHz, 5v, full-length
slot 6: bus 2, full-size, 64-bit, 33MHz, 5v, full-length

Note: Optional third-party PCI networking adapters are supported on this system. Refer to ServerProven test results for supported third-party options at www.pc.ibm.com/us/compat. Select x343 from the Fast Access pulldown menu, click Go, then select the appropriate categories on the following screen. IBM makes no representations or warranties with respect to non-IBM products. These products are offered and warranted by third parties, not IBM.

Part Number	Description
	Power[1]
	Monitors[2]
T3147xx[4]	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black[3]

1. xseries 343 systems include two 350w, -48V to -60V direct current (DC) power supplies requiring a direct current power source (-48v to -60v). Power cord is customer-supplied.
2. xSeries 343 uses an ATA Rage XL SVGA controller with 8MB of video memory.
3. Installation within a rack requires optional Monitor Compartment P/N 94G7444.
4. Where 'xx' represents a specific country code as follows: DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
	Rack and NetBAY[1]
	Keyboard and Mouse[2]
28L36xx[5]	Space Saver II Keyboard[3,4]
28L3675	Sleek 2-button Stealth Black Mouse

1. xSeries 343 is housed in a 19in rack-mountable drawer and requires a two-post rack. Not supported for installation in standard IBM racks.
2. xSeries 343 supports rack configurations only and ships without a mouse or keyboard.
3. Installation within a rack requires optional keyboard tray P/N 28L4707, which stows in ready-to-use position.
4. Advanced TrackPoint IV features are not available on IBM xSeries systems.
5. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.

IBM xSeries 360

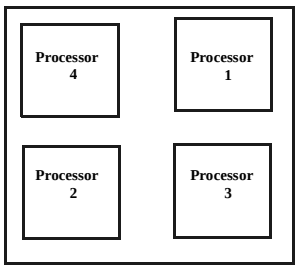
Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)	L3 ECC Cache	Memory (Std/Max)	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	Adv System Management Adapter[6]	Onboard Ethernet (Mbps)	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[8]	Bays (Total/Avail)	Slots(Tot/Av)
xSeries 360 At-A-Glance Chart																	
K61RXxx[1]	-	1.4[3]	1/4	512KB	1GB/8GB[4]	Rack (3U)	1/3	P, S, H, F	O - Power[5] S - Fans	Y	10/100	U160	-	0GB/ 220.2GB	24X-10X	5/3	6/6[9]
K62RXxx[1]	-	1.5[3]	2/4	512KB	2GB/8GB[4]	Rack (3U)	2/3	P, S, H, F	S - Power[5] S - Fans	Y	10/100	U160	-	72.8GB/ 220.2GB[7]	24X-10X	5/1	6/6[9]
K63RXxx[1]	-	1.6[3]	2/4	1MB	2GB/8GB[4]	Rack (3U)	2/3	P, S, H, F	S - Power[5] S - Fans	Y	10/100	U160	-	72.8GB/ 220.2GB[7]	24X-10X	5/1	6/6[9]
K64RXxx[1,2]	-	1.4[3]	1/4	512KB	1GB/8GB[4]	Rack (3U)	1/3	P, S, H, F	O - Power[5] S - Fans	Y	10/100	U160	-	0GB/ 220.2GB	24X-10X	5/3	6/6[9]
K65RXxx[1,2]	-	1.5[3]	2/4	512KB	2GB/8GB[4]	Rack (3U)	2/3	P, S, H, F	S - Power[5] S - Fans	Y	10/100	U160	-	0GB/ 220.2GB	24X-10X	5/3	6/6[9]
K66RXxx[1,2]	-	1.6[3]	2/4	1MB	2GB/8GB[4]	Rack (3U)	2/3	P, S, H, F	S - Power[5] S - Fans	Y	10/100	U160	-	0GB/ 220.2GB	24X-10X	5/3	6/6[9]

1. Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
2. This xSeries 360 model supports the IXA Adapter for connection to iSeries models for Microsoft Windows 2000 Server and Advanced Server. The adapter must be installed in PCI slot three only.
3. Intel Xeon MP processor with integrated full-speed ECC L3 cache and 4x100MHz (quad-pumped) access to memory and I/O buses.
4. Advanced Chipkill ECC memory corrects two-, three-, and four-bit memory errors.
5. N+1 power supply redundancy is provided standard in Models P/N K62RXxx, K63RXxx, K65RXxx and K66RXxx (optional in K61RXxx and K64RXxx). Optional 370W Hot-Swap Redundant Power Supply P/N 32P15xx is available to ensure redundancy and support for maximum configurations. See the Power Monitors, Accessories section for additional information.
6. Advanced system management is provided by a standard Remote Supervisor Adapter installed in a dedicated PCI slot, which allows six optional PCI adapters to be installed.
7. Two 36.4GB 10,000rpm hot-swap HDDs are standard in Models P/N K62RXxx and K63RXxx (installed in bays four and five). Maximum HDD storage requires replacing the two standard HDDs with 73.4GB hot-swap HDDs and adding one additional 73.4GB HDD.
8. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
9. Support for an additional 12 64-bit slots available through installation of the optional RXE-100 Remote Expansion Unit (one unit only supported by xSeries 360).

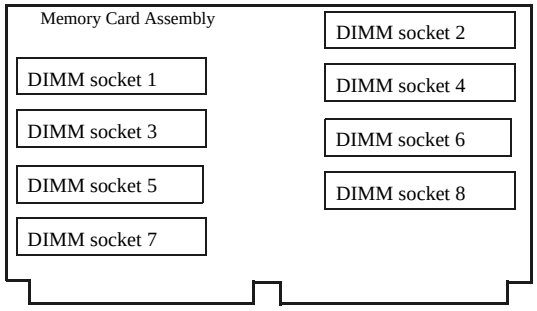
xSeries 360 Processor Upgrades

Part Number	Processor Upgrades	SMP Support	Processor Speed Upgrade[3]
19K4638	xSeries 1.4GHz/512KB L3 Cache Upgrade with Xeon Processor MP	K61RXxx, K64RXxx[1]	-
19K4639	xSeries 1.5GHz/512KB L3 Cache Upgrade with Xeon Processor MP	K62RXxx, K65RXxx[2]	K61RXxx, K64RXxx
19K4647	xSeries 1.6GHz/1MB L3 Cache Upgrade with Xeon Processor MP	K63RXxx, K66RXxx[2]	K62RXxx, K65RXxx

1. Three additional processors may be installed, providing a maximum of four. All processors must be identical in type, speed and cache size. Install processors in the order indicated in the diagram below.
2. Two additional processors may be installed, providing a maximum of four. All processors must be identical in type, speed and cache size. Install processors in the order indicated in the diagram below.
3. Requires removal of the standard processors. A maximum of four processors can be installed. All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter machine Type-Model in Quick Path. Select Downloadable files then BIOS.



xSeries 360 Memory Configurator



Part Number	Memory Description[1]
33L3281	256MB PC 1600 ECC DDR SDRAM RDIMM
33L3283	512MB PC1600 ECC DDR SDRAM RDIMM
33L3285	1GB PC1600 ECC DDR SDRAM RDIMM

1. Due to two-way interleaving, all RDIMMs must be installed in pairs in the order indicated by the diagram. Chipkill support is provided on the memory card. Only installation in pairs is supported. The order of installation in pairs is sockets one and two, three and four, five and six, and seven and eight.

Total Memory[1]		Quantity of RDIMMs Added[2]		
1GB Standard (2x512MB)	2GB Standard (4x512MB)	256MB P/N 33L3281	512MB P/N 33L3283	1GB P/N 33L3285
2GB	3GB	4	-	-
2.5GB	3.5GB	2 and	2	-
3GB	4GB	-	4	-
3.5GB	4.5GB	2 and	-	2
4GB	5GB	-	2 and	2
5GB	6GB	-	-	4
6GB	-	-	2 and	4
7GB	-	-	-	6
8GB (max)[3]	8GB (max)[3]	-	-	8[3]

This table does not represent all possible memory configurations. Memory modules may vary in price per MB. Selection of smaller RDIMMs may provide a more cost-effective alternative to using larger RDIMMs.
1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. To obtain the quantity of memory identified in the ÒTotal MemoryÓ column, select the appropriate row and order the quantity of RDIMMs identified in all columns for that row. Only installation in pairs is supported.
3. Require removal of standard RDIMMs.

xSeries 360 Internal SCSI Cabling

xSeries 360 contains five front-accessible drive bays located on the right side of the server. The top two bays contain the standard slim-line CD-ROM and 1.44MB slim-line diskette drive. Three 3.5in slim-line, hot-swap drive bays are located beneath them. The IDE CD-ROM is docked to a media interposer card that is cabled to the lightpath card before terminating at the system planar. The three SCA2-compliant hot-swap bays attach to a hot-swap backplane that connects to the integrated single-channel Ultra160 controller through an integrated bus. For RAID configurations, a cable provided with the system is connected to one of the internal connectors of the RAID controller and the other end of the cable is attached to a connector that supports the hot-swap HDD backplane, located on the planar between slot one and the memory card, beneath the memory options.

For additional information regarding internal cabling, refer to Appendix E: Internal Storage Cabling Overview.

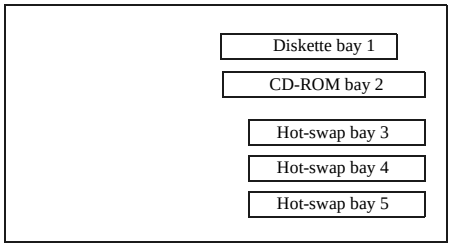
Total Int Storage[1]	10,000RPM HDDs			15,000RPM HDDs	
	18.2GB P/N 06P5754	36.4GB P/N 06P5755	73.4GB P/N 06P5756	18.2GB P/N 06P5767	36.4GB P/N 06P5768
72.8GB	2 x 36.4GB 10,000rpm hot-swap HDDs standard in Models P/N K62RXxx and K63RXxx[2]				
91GB	1 or	-	-	1	-
109.2GB	-	1	-	-	1
146.2GB	-	-	1	-	-
183.2GB[3]	-	-	2[3]	-	-
220.2GB max[3]	-	-	3[3]	-	-

This table does not represent all possible HDD configurations.
1. Select a total storage row then add the quantity of HDDs from all columns to the standard HDDs. Total Internal Storage listed is within +/- 0.2GB unless otherwise noted.
2. Standard HDDs installed in bays four and five. Model P/N K61RXxx is Open Bay. Recalculate requirements accordingly.
3. Requires replacing one or both of the standard HDDs in Models P/N K62RXxx and K63RXxx.

-

Bay	Form Factor	Height	Front Access	Usage
1	89mm (3.5in)	SL	Yes	Diskette
2	133mm (5.25in)	SL	Yes	IDE CD-ROM
3	HS	SL	Yes	Open
4, 5	HS	SL	Yes	HDD[1]

1. Two 36.4GB 10,000rpm hot-swap HDDs are standard in Models P/N K62RXxx and K63RXxx. Model P/N K61RXxx ships open bay. HDDs should be installed in open bay models beginning with the bottom bay (5-4-3)



Part Number	Description	RPM	Height	Bays Supported[1]	Max Qty
Hot-Swap Ultra160 SCSI HDDs					
06P5754	18.2GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	3 ... 5	3
06P5755	36.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	3 ... 5	3
06P5756	73.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	3 ... 5	3
06P5767	18.2GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	3 ... 5	3
06P5768	36.4GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	3 ... 5	3

External Storage Expansion Units[1]		Form Factor
19K11xx[7]	EXP300 Storage Expansion Unit[2, 6]	Rack (3U)
19K11xx[8]	FAStT200 Storage Server[3, 4, 6]	Rack (3U)
19K11xx[9]	FAStT200 HA Storage Server[3, 6]	Rack (3U)
19K1121	FAStT200 Redundant RAID Controller[4]	-
00N71xx[10]	FAStT EXP500 Storage Expansion Unit[5, 6]	Rack (3U)
94G7448	Rack Power Cable Type C12 (3.7m)[6]	-

1. To configure an external SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
2. EXP300 includes a single 2M Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with its own standard country power cord.
3. The FAStT200 Storage Server and HA Storage Server each include two hot-swap, 350W auto-ranging redundant power supplies, each with its own standard country power cord.
4. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
5. FAStT EXP500 Storage Expansion Unit includes dual hot-swap 350W power supplies, each with its own standard country power cord.
6. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables according to the number of power supplies.
7.Where 'xx' represents a specific country code as follows:- 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.
8. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/ English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
9. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/ English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
10. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/ Language Line Cords/Publications are included as indicated.

xSeries 360 I/O Options

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[1]	Hot-Plug[2]	PCI Voltage Key	MHz[3]
	Storage Controllers[4]						
37L6889	ServeRAID-4H Ultra160 SCSI Controller[5]	Full	64-bit	1 ... 6	X	Universal	33
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[6, 16]	Full	64-bit	1 ... 6[16]	X	Universal	66
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[7]	Half	64-bit	1 ... 6	X	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter[8]	Half	32-bit	1 ... 6	-	Universal	66
	Fibre Storage Controllers and Options[9]						
00N6881	Netfinity FAStT Host Adapter	Half	64-bit	1 ... 6	X	Universal	66
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1 ... 6	X	Universal	66
	Networking[10]						
	Ethernet[11]						
09N9901	10/100 EtherLink Server Adapter by 3Com[12,17]	Half	32-bit	1 ... 6	X	Universal	33
06P3601	10/100 Ethernet Server Adapter[12]	Half	32-bit	1 ... 6	X	Universal	33
06P3701	Gigabit Ethernet SX Server Adapter (fibre optic cabling interface)	Half	64-bit	1 ... 6	X	Universal	66
22P4901	10/100 Dual Port Server Adapter[12]	Half	64-bit	1 ... 6	X	Universal	66
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)[12]	Half	64-bit	1 ... 6	X	Universal	133[3]
22P7801	NetXtreme 1000 SX Fibre Ethernet Adapter[18]	Half	64-bit	1 ... 6	-	Universal	133[3]
	Token Ring						
34L5001	16/4 Token-Ring PCI Management Adapter[12]	Half	32-bit	1 ... 6	X	Universal	33
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter[12]	Half	32-bit	1 ... 6	X	Universal	33
	Systems Management[13]						
03K9309	Advanced System Management Interconnect Cable Kit[14]	-	-	-	-	-	-
	Remote I/O Expansion						
86841RX	RXE-100 Remote Expansion Enclosure[15]	-	-	-	-	-	-

Note: xSeries 360 supports the IXA Adapter for connection to iSeries models. This adapter is supported in slot three only.

1. Adapters rated at a lower frequency than the slots in which they are installed will reduce the bus to the frequency of the slowest adapter. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. All six slots are full-length hot-plug capable. For Network Operating System support, access www.pc.ibm.com/us/compat.
3. Bus two (slots one and two) supports 133MHz operation of a single 133MHz adapter installed in slot one with slot two remaining empty. If 133MHz adapters are installed in both slots one and two, the bus speed for both slots becomes 100MHz.
4. xSeries 360 includes an integrated single-channel Ultra160 SCSI controller for use internally. See “Internal SCSI Cabling“ for more information.
5. ServeRAID-4H Ultra160 SCSI Controller is powered by a 266MHz PowerPC 750 processor and provides 128MB of battery-backed ECC cache. The two internal connectors are not accessible due to a cabling interference. Four external Ultra160 0.8mm VHDCI connectors are available.
6. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connectors are 0.8mm VHDCI.
7. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI.
8. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. Only one of the two connectors may be utilised.
9. See Fibre Channel Solutions Overview section for additional configuration information.
10. xSeries 360 has an integrated10/100 PCI Ethernet controller. Wake on LAN is supported only for the integrated controller.
11. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. The onboard Ethernet is Intel-based. The optional PCI Ethernet adapters listed here are Intel-based: P/Ns 06P3601, 06P3701, 22P4901, 22P6801.
12. The Wake on LAN function of this option is not supported by this server.
13. xSeries 360 includes a Remote Supervisor Adapter installed in a dedicated PCI slot with an external connector, leaving six PCI slots available for optional adapters. Support for connection to other servers requires an optional Advanced System Management Interconnect Cable Kit P/N 03K9309. Direct connection to the RXE drawer management controller in an RXE-100 Remote Expansion Enclosure is supported through a standard Interconnect Management Cable Kit with 3.5m cable. An 8m optional cable is available.
14. Required to connect the standard Remote Supervisor Adapter to an interconnect network with other servers for system management support through a single LAN or modem connection. Up to 12 service processors or optional adapters may be interconnected with an aggregate connection length of no more than 91.4M (300ft). A customer-supplied Cat5 Ethernet cable is required for each interconnection.
15. RXE-100 Remote Expansion Enclosure supports up to 12 additional PCI-X slots. Cable required for connection included with expansion unit, which attaches to a standard external connector located on the back of the x360 chassis. An optional longer cable is available. See RXE-100 product section.
16. Not supported in slot one, if the RAID adapter is attached to the connector on the planar that controls the hot-swap backplane, as a result of a cabling interference with the standard RAID cable, which must be routed under the adapter. External RAID attachment only is supported for full-length RAID adapters installed in slot one.
17. Not supported when more than 4GB of system memory (RAM) is installed.
18. The hot-plug feature of this adapter is not supported on this system.

RSA: standard Remote Supervisor Adapter
Slot 1: Bus 2, 100MHz, 64-bit, full-length, Active PCI-X, 3.3v (Bus 2 also supports one 133MHz adapter installed in slot 1.)
Slot 2: Bus 2, 100MHz, 64-bit, full-length, Active PCI-X, 3.3v (Slot 2 must be empty if a 133MHz adapter installed in slot 1.)
Slot 3: Bus 1, 66MHz, 64-bit, full-length, Active PCI-X, 3.3v **Slot 4**: Bus 1, 66MHz, 64-bit, full-length, Active PCI-X, 3.3v
Slot 5: Bus 1, 66MHz, 64-bit, full-length, Active PCI-X, 3.3v **Slot 6**: Bus 1, 66MHz, 64-bit, full-length, Active PCI-X, 3.3v

xSeries 360 Power, Monitors, Accessories

Part Number	Description
	Power[1,10]
32P15xx[11]	370W Hot-Swap Redundant Power Supply[1, 10]
94G7448	Rack Power Cable Type C12 (3.7m)[10]
	Uninterruptible Power Supply (UPS)[2, 3]
32P16xx[13]	APC 2U Smart-UPS 1400RMiB[6]
30RIxxx[12]	APC Smart-UPS 3000RMiB[4]
37L6862	APC Smart-UPS 5000RMiB[5]
	Monitors[7]
T3147xx[14]	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black[8]
T3247xx[14]	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black[8]
T274Axx[14]	G78 Color Monitor 17in (406.4mm, 16in viewable image), stealth black[8]
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)[9]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[9]

1. xSeries 360 Models P/N K62RXxx and K63RXxx include two 370W, hot-swap power supplies, each with its own standard country power cord. N+1 power supply redundancy is standard. The addition of an optional 370W Hot-Swap Redundant Power Supply P/N 32P15xx is supported for configurations of greater than 370W with power redundancy, i.e a total of three 370W power supplies. Model P/N K61RXxx includes one standard 370W hot-swap power supply and may be upgraded to two or three power supplies according to the same rules for redundancy as the other models.

The following table is provided as a reference. The table shows an example of a maximum configuration that can be supported by two 370W power supplies with power redundancy.

Number of P/S	System configuration supported
2	**Redundant** Up to three processors Up to four PCI adapters Up to two HDDs Up to six memory RDIMMs

2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Because the x360 is not equipped with a serial port, UPS remote management requires a USB to serial adapter such as the Belkin USB to Serial Adapter P/N 10K3661. For more information visit: http://www.ibm.com - select Products & Services - click on Upgrades, Accessories and Parts - enter P/N 10K3661 in the accessories search box.
4. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
6. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
7. xSeries 360 uses an SVGA controller (S3 Savage4 LT chipset) with 8MB of video memory. Optional video adapters are not supported.
8. Installation within a rack requires optional Monitor Compartment P/N 94G7444.
9. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
10. Rack Power Cable P/N 94G7448 (one for each power supply), must be ordered for power connection to a high voltage UPS or PDU.
11. Where 'xx' represents a specific country code as follows:- 74=Europe, 75=Denmark, 76=Israel, 77=Italy, 78=South Africa, 79=Switzerland, 80=UK.
12. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
13. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.
14. Where 'xx' represents a specific country code as follows:- DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Rack and NetBAY[1, 7]		
94G7448	Rack Power Cable Type C12 (3.7m)[7]		
Part Number	**Keyboards[2]**	**Part Number**	**Mouse[2]**
28L36xx[8]	Space Saver II Keyboard[3, 4]	28L3675	Sleek 2-Button Stealth Black Mouse
28L36xx[9]	Preferred Keyboard (stealth black)[5]	33L3244	Sleek USB Mouse (stealth black)
10K38xx[10]	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black)[5, 6]		
22P51xx[11]	TrackPoint USB Space Saver Keyboard[3, 4, 6]		

1. xSeries 360 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
2. xSeries 360 supports rack configurations only and ships without a keyboard or mouse. The system includes three USB ports, SVGA video port, mouse port and keyboard port.
3. Installation within a rack requires optional keyboard tray P/N 28L4707, which stows in ready-to-use position.
4. Advanced TrackPoint IV features are not available on IBM xSeries systems.
5. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
6. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
7. The xSeries 360 ships with a standard country power cord. For connection to a high voltage UPS or PDU, a Rack Power Cable P/N 94G7448 (one for each power supply), must be ordered.
8. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
9. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.
10. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.
11. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 68=French, 55=German, 56=Italian, 57=Spanish, 58=UK English, 59=Swedish/Finnish, 60=Belgian/English, 61=Russian, 62=Polish, 63=Portuguese, 65=Swiss, 67=US International.

xSeries 360 Tape Options

Part Number	Description (see **General Note** below)	Bays Supported[1]	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures[1]
00N8016	100/200GB LTO Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	24P24xx, 03K8756[2], (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	24P24xx, 03K8756[2], (and see **Special Note** below)
24P2396	100/200GB LTO Half-High Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	03K8756[2], (and see **Special Note** below)
	Tape Autoloaders					
09N40xx[10]	3600 Series 900GB/1.8TB LTO Tape Autoloader[3]	-	16 Ultra2 LVD	Tower or 6U Rack	Y	-
	External Tape Libraries[4]					
21P99xx[11]	3600 Series 2/4TB LTO Tape Library (Rack)	-	16 Ultra2 LVD	5U Rack	Y	-
21P99xx[12]	3600 Series 2-Drive, 20-Cartridge Expander Module[5]	-	16 Ultra2 LVD	5U Rack	Y	-
09N4048	3600 Series LTO Drive Upgrade Option[6]	-	16 Ultra2 LVD	-	N	-
	External Tape Enclosures					
03K8756	NetMEDIA Storage Expansion Unit EL[7]	-	16	Rack	Y	-
10L7113	NetMEDIA Systems Management Adapter[8]	-	16 LVD	-	Y	03K8756
24P24xx[13]	Full-High SCSI Tape Enclosure[9]	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
	Associated Options					
10K2340	Media Bay Tray and LVD Cable Kit[2, 3]	-	16 LVD	Int	Y	03K8756

General Note: IBM xSeries 360 does not support internal tape drives. An external tape library or tape enclosure must be used. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which has an external 0.8mm VHDCI connector. Select tape drive, enclosure and controller then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.

Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398., 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit P/N 10K2340 to provide termination and LVD support, when attaching one of these tape drives externally in the NetMEDIA Storage Enclosure P/N 03K8756. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable. Finally, also bear in mind that it will take time for these newly equipped tape drives to work through into the supply chain. In the meantime, it may be better to order the Media Bay Kit for a small additional cost, and possibly to have too many cables (surplus to be used elsewhere), than risk ending up without the necessary cable.

1.To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section, and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.

2. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **Special Note** above), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply. For support of more than two devices in a NetMEDIA Enclosure, refer to the NetMEDIA Adapter information.

3. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.

4. Tape Library attributes and prerequisites are included in Appendix B: Tape Library Attributes.

5. Supported only with the 3600 Series LTO Tape Library (Rack) P/N 21P99xx. Allow one additional EIA space when installing either one or two (maximum) units to accommodate a filler plate for cable routing. Up to two 3600 Series LTO Drive Upgrade Options can be installed in each module or the module can operate off the LTO drives installed in the LTO tape library.

6. Install in second drive bay of 3600 LTO Tape Libraries or in either of the two bays of 3600 Series 2-Drive 20-Cartridge Expander Module to increase performance. Includes an LTO (Ultrium) drive and a one-meter external LVD SCSI cable.

7. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, 19in rack mountable tape enclosure which includes two full-high (FH) or four half-high (HH) extended length 133mm (5.25in) bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.

8. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Storage Expansion Unit to provide repeater function, LVDS interface, aggregate cable lengths up to 12m when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.

9. Black desktop or 3U rack tape enclosure supports 133mm (5.25in) full-high LVD tape devices including DLT technology. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Supports the full-high tape options P/N 00N8015 and P/N 00N8016.

10. Where 'xx' represents a specific country code as follows:- 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.

11.Where 'xx' represents a specific country code as follows:- *Rack version* - 78=Europe, 79=Denmark, 80=South Africa, 77=UK, 81=Swiss, 82=Italy, 83=Israel.

12. Where 'xx' represents a specific country code as follows:- 85=Europe, 86=Denmark, 87=South Africa, 84=UK, 88=Swiss, 89=Italy, 90=Israel.

13. Where 'xx' represents a country specific code: 35=UK, 39=Swiss, 40=Italy, 41=Israel, 36=EU, 37=Denmark, 38=South Africa.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

Note: For a complete list of all IBM and non-IBM options compatibility with Network Operating Systems and IBM xSeries Servers, access the IBM ServerProven compatibility pages on the Web at URL http://www.ibm.com/pc/us/compat

xSeries 360 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Microsoft Exchange SCSI Solution[1]

Part Number	Description	Quantity
K63RXxx	xSeries 360 Pentium III Xeon, 2x1.6GHz/4x100MHz, 1MB L3 Cache, 2GB(R) ECC, 72.8GB, 24X	1
19K4647	xSeries 1.6GHz/1MB L3 Cache Upgrade with Xeon Processor MP	2[2]
32P15xx	xSeries 370W Hot-swap Redundant Power Supply	1[3]
33L3283	512MB PC 1600 ECC DDR SDRAM RDIMM	2[4]
37L6889	ServeRAID-4H Ultra160 SCSI Controller	1[5]
06P5755	36.4GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	1[6]
06P3601	10/100 Ethernet Server Adapter	1
T3147xx	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
37L6862	APC Smart-UPS 5000RMiB	1
	External Storage	
19K11xx	EXP300 Storage Expansion Unit	2
06P5755	36.4GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	14[7]
09N40xx	3600 Series 900GB/1.8TB LTO Tape Autoloader	1
	Rack Options	
9306250	NetBAY25 Standard Rack Cabinet	1
28L36xx	Space Saver II Keyboard	1
94G6670	Blank Filler Panel Kit	1

1. This configuration supports 8,000 users.
2. Total of four processors.
3. Required to maintain N+1 power redundancy in this configuration--total of three 370W power supplies.
4. Total memory of 3GB.
5. External connectors only can be used due to internal cabling restriction.
6. Total of three 36.4GB internal HDDs (109.2GB).
7. Six HDDs are used for RAID-5E protection in each EXP300. One HDD is identified as a hot-spare. Effective capacity is five HDDs in each storage enclosure (total of 182GB).

Microsoft Exchange High-Availability Fibre Channel Solution[1]

Part Number	Description	Quantity
K63RXxx	xSeries 360 Pentium III Xeon, 2x1.6GHz/4x100MHz, 1MB L3 Cache, 2GB(R) ECC, 72.8GB, 24X	1
19K4647	xSeries 1.6GHz/1MB L3 Cache Upgrade with Xeon Processor MP	2[2]
32P15xx	xSeries 370W Hot-swap Redundant Power Supply	1[3]
33L3283	512MB PC 1600 ECC DDR SDRAM RDIMM	2[4]
06P5736	ServeRAID-4MX Ultra160 SCSI Controller	1
06P5755	36.4GB 10K-4 Ultra160 SCSI Hot-Swap SL HDD	1[5]
06P3601	10/100 Ethernet Server Adapter	1
19K1246	FAStT FC-2 Host Bus Adapter	2
86841RX	RXE-100 Remote Expansion Enclosure	1
24P09xx	FAStT700 Storage Server	1[6]
37L6862	APC Smart-UPS 5000RMiB	1
30RIxxx	APC Smart-UPS 3000RMiB	1
	External Storage	
00N71xx	FAStT EXP500 Storage Expansion Unit	3
19K0653	Netfinity 36.4GB 10K-4 FC Hot-Swap HDD	18[7]
09N40xx	3600 Series 900GB/1.8TB LTO Tape Autoloader	1
	Rack Options	
9306420	NetBAY42 Standard Rack Cabinet	1
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without Space Saver Keyboard)	1
28L36xx	Space Saver II Keyboard	1
94G6670	Blank Filler Panel Kit	1

1. This configuration supports 8,000 users.
2. Total of four processors.
3. Required to maintain N+1 power redundancy in this configuration--total of three 370W power supplies.
4. Total memory of 3GB.
5. Total of three 36.4GB internal HDDs (109.2GB).
6. Fibre Channel cable, SFP Modules and FAStT700 Mini Hubs not included.
7. Six HDDs are used for RAID-5E protection in each FAStT EXP500. One HDD is identified as a hot-spare. Effective capacity is five HDDs in each storage enclosure (total of 182GB).

IBM xSeries 380

Part Number	Withdrawal Date: ddmmyy[8]	Processor Speed[3]	Number of Proc.(Std./Max)	L3 ECC Cache	Memory (Std/Max)	Form Factor	P/S Quantity(Std./Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	Adv System Management Processor	Onboard Ethernet (Mbps)[5]	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Tot/Av)	Internal Hard Disk Drive (Std/Max	CD-ROM (IDE)[6]	Bays (Tot/Av)	Slots (Tot/Av)
xSeries 380 At-A-Glance																	
K31RXxx[1]	31/07/02	733MHz	1/4	2MB	1GB/64GB	Rack (7U)	4/4	P, S, H, F	S-Fans, S-Power	-	10/100	D, U160[7]	2/0	72.8GB/ 72.8GB[4]	24X-10X	4/0	8/8
K33RXxx[1,2]	31/05/02	733MHz	1/4	2MB	1GB/64GB	Rack (7U)	4/4	P, S, H, F	S-Fans, S-Power	-	10/100	D, U160[7]	2/0	72.8GB/ 72.8GB[4]	24X-10X	4/0	8/8
K32RXxx[1]	31/05/02	800MHz	1/4	4MB	1GB/64GB	Rack (7U)	4/4	P, S, H, F	S-Fans, S-Power	-	10/100	D, U160[7]	2/0	72.8GB/ 72.8GB[4]	24X-10X	4/0	8/8
K34RXxx[1,2]	31/05/02	800MHz	1/4	4MB	1GB/64GB	Rack (7U)	4/4	P, S, H, F	S-Fans, S-Power	-	10/100	D, U160[7]	2/0	72.8GB/ 72.8GB[4]	24X-10X	4/0	8/8

Note: This system is currently targeted at early adopters such as the scientific community and developers who are interested in porting their code from IA-32 to IA-64 to take advantage of the technological benefits of the Itanium processor. Users are advised to check with their sales representative or the Intel Web site regarding availability of operating systems and applications.

1. Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
2. This model includes the installation CD for Microsoft Windows Advanced Server Limited Edition for 64-bit systems.
3. Intel Itanium 64-bit processor with integrated full-speed ECC L3 cache and 2 X 133MHz FSB.
4. xSeries 380 supports both Fibre Channel and SCSI external storage. The system ships with two 36.4GB HDDs installed in the two internal hot-swap HDD bays. See External Storage Expansion Overview and the sections on external storage enclosures that follow this section.
5. The integrated 10/100 Ethernet adapter is Intel-based.
6. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
7. xSeries 380 includes an integrated dual-channel Ultra160 storage controller with one internal connector and one external 0.8mm VHDCI port.
8. Not available from IBM after this date. Business Partner inventory may be available.

xSeries 380 Processor Upgrades

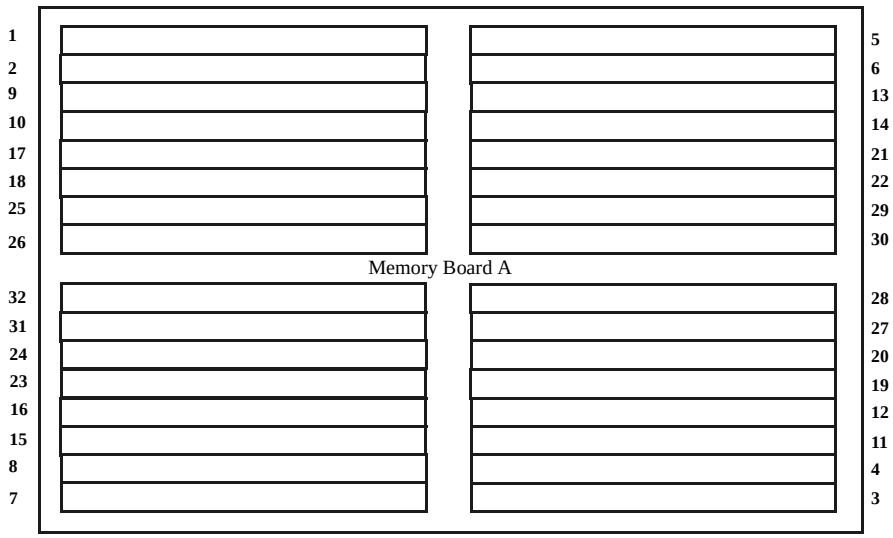
Part Number	Processor Upgrades[1]	SMP Support[1]	Processor Speed Upgrade[2]
10K3815	xSeries 380 733MHz/2MB Cache Upgrade with Itanium Processor	K31RXxx, K33RXxx	-
10K0050	xSeries 380 800MHz/4MB Cache Upgrade with Itanium Processor	K32RXxx, K34RXxx	K31RXxx, K33RXxx

1. Three additional processors may be installed, providing a maximum of four. All processors must be identical in type, speed, and cache size.
2. Requires removal of the standard processor. A maximum of four processors may be installed. All processors must be identical in type, speed, and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter machine 'Type-Model' in Quick Path. Select 'Downloadable files' and then 'BIOS'.

xSeries 380 Memory

Part Number	Memory Description[1]
33L3258	1GB (4 x 256MB) PC100 ECC SDRAM DIMM KIT
33L3260	2GB (4 x 512MB) PC100 ECC SDRAM DIMM KIT
33L3262	4GB (4 x 1GB) PC100 ECC SDRAM DIMM KIT

1. Due to four-way interleaving, all DIMMs must be installed in groups of four. All compatible memory options are available only in packs of four.



Install memory options according to the order shown for Memory Board A above. Repeat for Memory Board B.

Total Memory[1]	**Quantity of DIMMs Added[2]**		
1GB Std (4 x 256MB)	**1GB Kit (4 x 256MB) P/N 33L3258**	**2GB Kit (4 x 512MB) P/N 33L3260**	**4GB Kit (4 x 1GB) P/N 33L3262**
2GB	1	-	-
3GB	2	-	-
4GB	1 and	1	-
5GB	-	2	-
6GB	1 and	2	-
7GB	-	3	-
8GB	1 and	1 and	1
9GB	-	2 and	1
10GB	1 and	-	2
11GB	-	1 and	2
12GB	1 and	1 and	2
15GB	-	1 and	3
17GB	-	-	4
21GB	-	-	5
25GB	-	-	6
29GB	-	-	7
33GB	-	-	8
37GB	-	-	9
41GB	-	-	10
45GB	-	-	11
49GB	-	-	12
53GB	-	-	13
57GB	-	-	14
61GB	-	-	15
64GB (max)[3]	-	-	16[3]

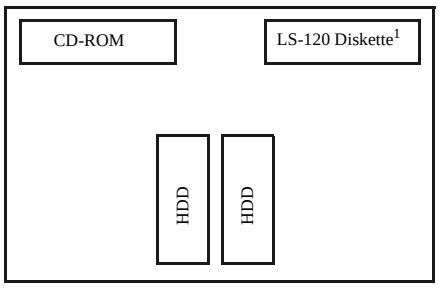
This table does not represent all possible memory configurations.
Memory options are available only in packs of four.

1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2, To obtain the quantity of memory identified in the ÒTotal MemoryÓ column, select the appropriate row and order the quantity of DIMMs identified in all columns for that row, which will be added to the standard memory noted at the top of the far left column.
3. Requires removal of standard DIMMs.

xSeries 380 HDD Storage Configurator

Bay	Form Factor	Height	Front Access	Usage
1	133mm (5.25in)	SL	yes	CD-ROM
2	89mm (3.5in)	SL	yes	Diskette
3, 4	89mm (3.5in)	HH[1]	yes	Std hot-swap HDDs

1. The hot-swap HDDs supported for installation in bays three and four and shipped as standard, are slim-line (SL). Half-high (HH) height is required to accommodate the carrier in which the HDDs are installed before insertion into the bays.



1. LS-120 slim-line diskette drive supports a diskette with capacity of 120MB.

Part Number	External Storage Expansion Units[1]	Form Factor
19K11xx[6]	FAStT200 Storage Server[2, 3, 5]	Rack (3U)
19K11xx[7]	FAStT200 HA Storage Server[2, 5]	Rack (3U)
19K1121	FAStT200 Redundant RAID Controller[3]	-
00N71xx[8]	FAStT EXP500 Storage Expansion Unit[4, 5]	Rack (3U)
94G7448	Rack Power Cable Type C12 (3.7m, 12 ft.)[5]	-

Note: xSeries 380 ships standard with a 36.4GB, 10,000RPM hot-swap Ultra160 SCSI HDD installed in each of the two internal HDD bays.

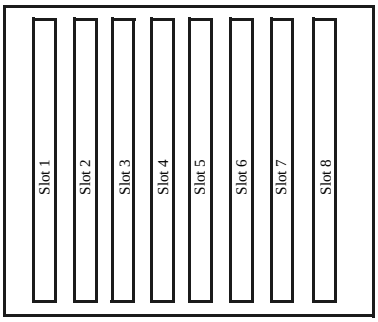
1. xSeries 380 includes an integrated dual-channel Ultra160 storage controller. For External Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
2. The FAStT200 Storage Server and HA Storage Server each include two hot-swap, 350 W auto-ranging redundant power supplies each with it's own standard country power cord.
3. Can be upgraded to a FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
4. FAStT EXP500 Storage Expansion Unit includes dual hot-swap 350W power supplies, each with its own standard country power cord.
5. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables according to the number of power supplies.
6. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
7. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
8. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/ English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/Language Line Cords/Publications are included as indicated.

.

xSeries 380 I/O Options

Part Number	Description	Adapter Length	PCI Support[4]	Slots Supported	Hot-Plug[5]	PCI Voltage Key	MHz[4]
	Storage Controllers[1, 2]						
19K4646	PCI Wide Ultra160 SCSI Adapter[3]	Half	32-bit	1 ... 8	-	Universal	66
	Fibre Storage Controller[6]						
00N6881	FAStT Host Adapter	Half	64-bit	1 ... 8	X	Universal	66
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1 ... 8	X	Universal	66
	Networking[7]						
	Ethernet[8]						
06P3601	10/100 Ethernet Server Adapter[9]	Half	32-bit	1 ... 8	X	Universal	33
06P3701	Gigabit Ethernet SX Server Adapter (fibre optic interface)	Half	64-bit	1 ... 8	X	Universal	66
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)[9]	Half	64-bit	1 ... 8	X	Universal	133

1. xSeries 380 includes an integrated dual-channel Ultra160 storage controller. External storage is supported through the external 0.8mm VHDCI connector or a supported optional PCI SCSI controller.
2. An optional RAID adapter is required to support external HDD storage. Refer to ServerProven test results for supported RAID options at www.pc.ibm.com/us/compat. Select x380 from the Fast Access pulldown menu and click Go. Select SCSI and RAID Controllers. IBM makes no representations or warrantees with respect to non-IBM products. These products are offered and warranted by third parties, not IBM.
3. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. This system supports external connection only.This system supports external connection only.
4. 33MHz adapters will reduce 66MHz buses to 33MHz. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
5. All eight slots are hot-plug capable. For Network Operating System support, access www.pc.ibm.com/us/compat.
6. See Fibre Channel Solutions Overview section for additional configuration information.
7. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. The Intel-based optional Ethernet adapters listed here: P/Ns 06P3601, 06P3701, 22P6801, provide compatible intermediate drivers for failover support.
8. xSeries 380 includes an integrated 10/100 Intel-based Ethernet adapter that supports Wake on Lan.
9. The Wake on LAN function of this option is not supported by this server.



All slots are full-length, 64-bit, 66MHz, 3.3V (5V tolerant).

xSeries 380 Power, Monitors, Accessories

Part Number	Description
	Power[1, 2]
	Uninterruptible Power Supply (UPS)[3]
30RIxxx[8]	APC Smart-UPS 3000RMB[4]
37L6862	APC Smart-UPS 5000RMB[5]
	Monitors[6]
T3247xx[9]	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black[7]

1. xSeries 380 contains four 800W, hot-swap power supplies which handle robust configurations while providing full redundancy.
2. xSeries 380 ships with two Rack power cables as standard for connection to a UPS or PDU - there are two power connections to the four power supplies.
3. For UPS attributes see UPS Appendix C:
4. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
6. xSeries 380 uses an integrated ATI-Rage XL video controller with 8MB memory.
7. Installation within a rack requires optional Monitor Compartment P/N 94G7444.
8. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
9. Where 'xx' represents a specific country code as follows:- DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
	Rack and NetBAY[1, 2]
NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.	
	Keyboard and Mouse[3]
28L36xx[7]	Space Saver II Keyboard[4, 5]
28L36xx[8]	Preferred Keyboard (stealth black)[6]
28L3675	Sleek 2-Button Stealth Black Mouse

1. xSeries 380 is housed in a 19in rack-mountable drawer. For selection of a supported rack, refer to the Rack Cabinets and Options section.
2. xSeries 380 ships with two Rack power cables as standard for connection to a UPS or PDU - there are two power connecitons to the four power supplies.
3. xSeries 380 ships without a keyboard or mouse.
4. Installation within a rack requires optional keyboard tray (P/N 28L4707), which stows in ready-to-use position.
5. Advanced TrackPoint IV features are not available on IBM xSeries systems.
6. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
7. Where 'xx' represents country specific code: 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
8. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.

IBM xSeries 440

Part Number	Withdrawal Date: ddmmyy	Processor Speed (GHz)	Number of Processors (Std/Max)[3]	L3 ECC Cache	Memory (Std/Max)[4]	Form Factor	Power Supply Quantity (Std/Max)[5]	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	Adv System Management Adapter[6]	Onboard Ethernet (Mbp	SCSI Controller (Dual, Ultra, RAID)	Removable Media Bays (Total/Avail)	Internal Hard Disk Drive (Std/Max)	CD-ROM (IDE)[7]	Bays (Tot/Av)	Slots (Tot/Av)[8]
xSeries 440 At-A-Glance																	
K71RXxx[1]	-	1.4[2]	2/8[3]	512KB	2GB/32GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	10/ 100/ 1000	D, U160	2/0	0/146.8GB	24X-10X	4/2	6/6
K72RXxx[1]	-	1.5[2]	2/8[3]	512KB	2GB/32GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	10/ 100/ 1000	D, U160	2/0	0/146.8GB	24X-10X	4/2	6/6
K73RXxx[1]	-	1.6[2]	2/8[3]	1MB	2GB/32GB	Rack (4U)	2/2	P, S, H, F	S-Fans, S-Power	Y	10/ 100/ 1000	D, U160	2/0	0/146.8GB	24X-10X	4/2	6/6

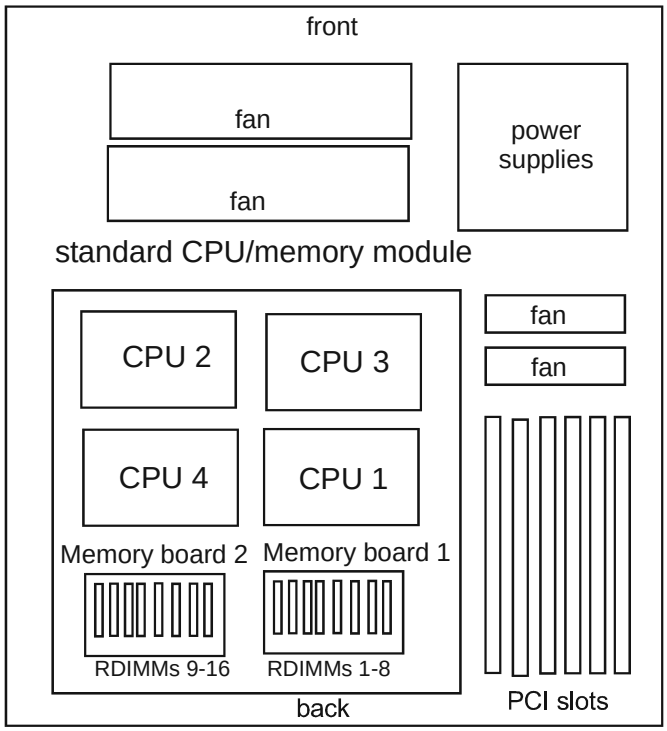
Note: xSeries 440 supports the IXA Adapter for connection to iSeries models for Microsoft Windows 2000 Server and Advanced Server. The adapter must be installed in PCI slot two only.

1. Housed in a 19in rack-mountable drawer and ships standard without a keyboard or mouse. See Rack Cabinets and Options section for supported IBM racks.
2. Intel Xeon MP processor with integrated full-speed ECC L3 cache and 4x100MHz (quad-pumped) data bus to the memory controller.
3. Either two or six additional optional processors are supported. xSeries SMP Expansion Module P/N 32P8340 is required to increase maximum support of processors from four to eight and memory options from 16 to 32. The SMP Expansion Module requires four optional processors prepopulated and a minimum of four RDIMMs to be installed, to match the memory in the standard module. A minimum of eight memory RDIMMS are required in each module to enable memory mirroring.
4. Advanced Chipkill ECC memory corrects two, three, and four-bit memory errors. Memory options are four-way interleaved. Sixteen sockets are provided in standard models, four of which are populated with 512MB RDIMMs. Additional 16 sockets are provided with the installation of xSeries SMP Expansion Module P/N 32P8340.
5. Two 1050W, voltage-sensing, hot-swap power supplies are standard, supporting N+1 redundancy on full configurations.
6. Advanced system management is provided by a standard Remote Supervisor Adapter installed in a dedicated PCI slot, which allows six optional PCI adapters to be installed.
7. Variable read rate. Actual playback speed will vary and is often less than the maximum possible.
8. Support for an additional 12 64-bit slots available through installation of the optional RXE-100 Remote Expansion Unit. Refer to x440 I/O options or the RXE-100 section for more information.

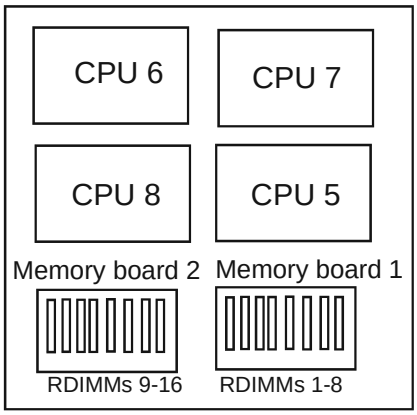
xSeries 440 Processor Upgrades

Part Number	Processor Upgrades[1]	SMP Support[2]	Processor Upgrade[3]
32P8705	xSeries 1.4GHz/512KB L3 Cache Upgrade with Xeon Processor MP	K71RXxx	-
32P8706	xSeries 1.5GHz/512KB L3 Cache Upgrade with Xeon Processor MP	K72RXxx	K71RXxx
32P8707	xSeries 1.6GHz/1MB L3 Cache Upgrade with Xeon Processor MP	K73RXxx	K71RXxx, K72RXxx
32P8340	xSeries SMP Expansion Module[4]	K71RXxx, K72RXxx, K73RXxx	-

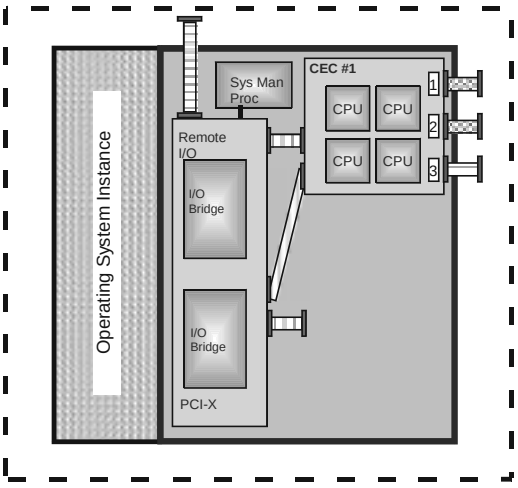
1. IBM xSeries 440 architecture optimises memory and bus performance using an XA-32 core chipset with up to two CPU/memory cards and two PCI-X host-bridge controllers. Up to eight Pentium Xeon MP processors are supported. The recommended order of processor installation is shown in the accompanying diagrams. Two processors are standard in each system with additional support for either two optional processors (total of four) or six optional processors (total of eight). Eight processors require an xSeries SMP Expansion Module with four processors prepopulated.
2. Up to six additional processors may be installed, providing a maximum of eight. All processors must be identical in type, speed and cache size. The fifth through eighth processors are required to be prepopulated on an additional xSeries SMP Expansion Module.
3. Requires removal of standard processors. A maximum of eight processors may be installed. Installation of greater than four processors requires the addition of an xSeries SMP Expansion Module. All processors must be identical in type, speed and cache size. Upgrades may require a BIOS update. To obtain the latest Flash BIOS, access www.pc.ibm.com/support and enter machine 'Type-Model' in Quick Path. Select 'Downloadable files' then 'BIOS'.
4. The fifth through eighth processors require one of these options. The option is installed directly above the standard CPU/memory board. Two 254mm (10in) scalability cables are included with this option. See the SMP Expansion Module cabling diagrams below for scalability cabling configuration. A minimum of four RDIMMs are required to be installed in the optional SMP Expansion Module (not included). Memory mirroring requires a minimum of eight RDIMMs in each SMP Expansion Module.



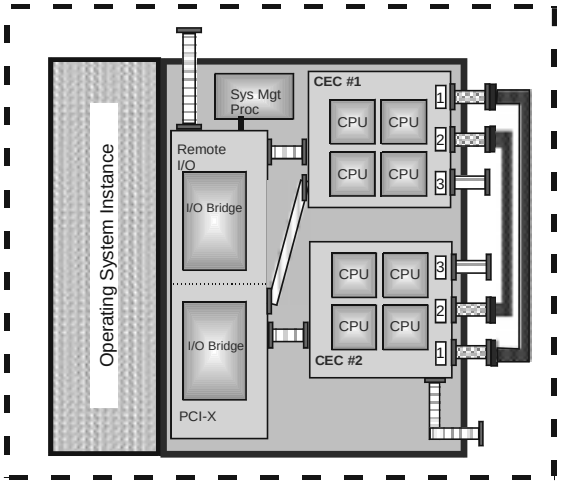
Optional SMP Expansion Module P/N 32P8340.
Installs directly above standard CPU/memory board.
Requires a minimum of four RDIMMs (not included).



Logical diagram of SMP Expansion Module cabling for single node, four-way x440 running one operating system



Logical diagram of SMP Expansion Module cabling for single node, eight-way x440 running one operating system



Key:

- Forwarding Scalability Port
- Non-forwarding Scalability Port
- Scalability Cable
- RIO Port

xSeries 440 Memory Configurator

Part Number	Memory Description[1]
33L3324	512MB PC133 ECC SDRAM RDIMM
31P8300	1GB PC133 ECC SDRAM RDIMM

1. Due to four-way interleaving, installation of memory options in banks of four is required. Banks may be populated in any order. A minimum of four RDIMMs are required for each SMP module (minimum of eight required on a module to enable memory mirroring).

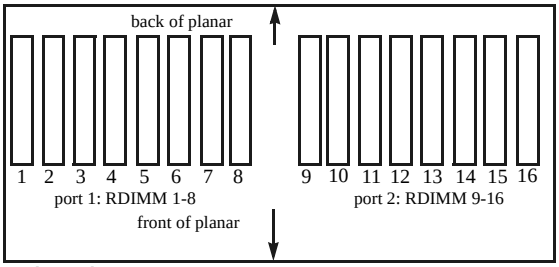
Guidance Notes (refer to RDIMM socket and bank layout and numbering in diagram below):

- Performance is optimised by balancing the amount of memory between ports (and between SMP Expansion Modules).
- In order to enable memory mirroring during BIOS set-up, the same memory configuration must be installed in each port (memory mirroring reduces the amount of memory available to the operating system by half).
- Memory mirroring is specific to each SMP Expansion Module, i.e., it is not required in both the standard and optional Expansion Modules.

Total Memory[1]	Quantity of RDIMMs Added[2]	
2GB Standard (4 x 512MB)	512MB P/N 33L3324	1GB P/N31P8300
4GB	4	-
6GB	8	-
8GB	12	-
10GB	8 and	4
12GB	4 and	8
14GB	-	12
16GB[3]	28[3]	-
18GB[3]	24 and	4[3]
20GB[3]	20 and	8[3]
22GB[3]	16 and	12[3]
24GB[3]	12 and	16[3]
26GB[3]	8 and	20[3]
28GB[3]	4 and	24[3]
30GB[3]	-	28[3]
32GB[4]	-	32[4]

This table does not represent all possible memory configurations. RDIMMs must be added in sets of four to support interleaving technology.
1. Network operating systems may limit the maximum amount of addressable memory. See operating system specifications for further information.
2. To obtain the quantity of memory identified in the Total Memory column, select the appropriate row and order the quantity of RDIMMs identified in all columns for that row, which will be added to the standard memory noted at the top of the left column.
3. Optional xSeries SMP Expansion Module P/N 32P8340 is required if total RDIMMs exceeds 16.
4. Requires removal of standard memory. Installation of greater than 16 RDIMMs requires optional xSeries SMP Expansion Module P/N 32P8340.

Numbering of RDIMM sockets on memory card



Bank 1: sockets 1, 3, 5, 7
Bank 2: sockets 9, 11, 13, 15
Bank 3: sockets 2, 4, 6, 8
Bank 4: sockets 10, 12, 14, 16

xSeries 440 Internal SCSI Cabling

xSeries 440 provides four drive bays on the lower front panel of the system chassis. At the bottom, two adjacent slim-line bays contain the standard CD-ROM and a 1.44MB diskette drive. Two 3.5in, SCA-2-compliant slim-line hot-swap hard disk drive bays are located directly above. The IDE CD-ROM is cabled directly to the IDE port on the planar, and the hot-swap backplane that supports two hot-swap bays is connected to one channel of the dual channel integrated SCSI controller through a 16-bit LVDS cable.

An optional ServeRAID controller is supported for internal and external RAID applications. An additional, longer 16-bit LVDS SCSI cable is provided standard with the system to connect the hot-swap backplane to the ServeRAID controller for internal RAID configurations. The integrated controller includes a second channel that supports external tape enclosures. A 16-bit LVDS cable connects this channel to an industry-standard, 0.8mm VHDCI connector.

For additional information regarding internal cabling, refer to Appendix F: Internal Cabling Overview.

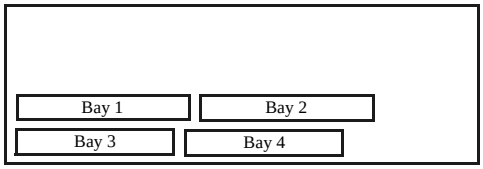
xSeries 440 Internal Hard Disk Drive (HDD) and External Storage Configurator

Total Internal Storage[1]	10,000RPM HDDs			15,000RPM HDDs	
	18.2GB P/N 06P5754	36.4GB P/N 06P5755	73.4GB P/N 06P5756	18.2GB P/N 06P5767	36.4GB P/N 06P5768
0GB	0GB Standard on base models			0GB Standard on base models	
18.2GB	1	-	-	1	-
36.4GB	2 or	1	-	2 or	1
72.8GB	-	2	-	-	2
73.4GB	-	-	1	-	-
146.8GB (max)	-	-	2	-	-

This table does not represent all possible HDD configurations.
1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice.
Total Internal Storage listed is within +/- 0.2GB unless otherwise noted.

Bay	Form Factor	Height	Front Access	Usage
1, 2	HS	SL	Yes	open
3	133mm (5.25in)	SL[1]	Yes	FDD
4	133mm (5.25in)	SL[2]	Yes	CD-ROM

1. Supports FDD, high-density FDD, CD-ROM, CD-RW or DVD-ROM. If an IDE device (optical drive) is installed, must be configured as slave.
2. Supports CD-ROM, CD-RW or DVD-ROM. Must be configured as master if bay three contains an optical drive. If only one optical drive is installed, it must be installed in bay four.



Part Number	Description	RPM	Height	Bays Supported	Max Qty
	Hot-Swap Ultra160 SCSI HDDs				
06P5754	18.2GB U160 SCSI Hot-Swap HDD	10000	SL	1, 2	2
06P5755	36.4GB U160 SCSI Hot-Swap HDD	10000	SL	1, 2	2
06P5756	73.4GB U160 SCSI Hot-Swap HDD	10000	SL	1, 2	2
06P5767	18.2GB U160 SCSI Hot-Swap HDD	15000	SL	1, 2	2
06P5768	36.4GB U160 SCSI Hot-Swap HDD	15000	SL	1, 2	2

	Removable Media	Bays Supported
08K9616	SuperDisk (LS240) Ultrabay 2000 Drive[1]	3
22P9101	Enhanced 8X/4X/24X Max CD-RW Ultrabay 2000 Drive[2]	3, 4
22P9102	Ultralight 8X DVD-ROM Ultrabay 2000 Drive[2]	3, 4

	External Storage Expansion Units[3]	Form Factor
19K11xx[9]	EXP300 Storage Expansion Unit[4, 8]	Rack (3U)
19K11xx[10]	FAStT200 Storage Server[5, 6, 8]	Rack (3U)
19K11xx[11]	FAStT200 HA Storage Server[5, 8]	Rack (3U)
19K1121	FAStT200 Redundant RAID Controller[6]	-
00N71xx[12]	FAStT EXP500 Storage Expansion Unit[7, 8]	Rack (3U)
94G7448	Rack Power Cable Type C12 (3.7m, 12 ft.)[8]	-

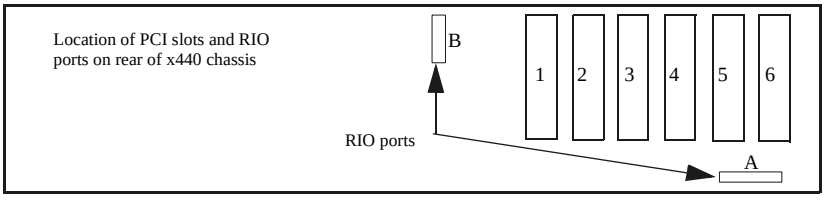
1. Install only as an option in bay three, requiring removal of standard FDD.
2. Install in either bay three or four, requiring removal of standard devices. If only one optical drive is installed, it must be installed in bay four. If a second optical drive is installed, use bay three configured as slave.
3. Not supported by the onboard external SCSI port, which supports external tape enclosures only. External SCSI HDD storage requires a RAID controller. Fibre Channel HDD storage requires a Fibre Channel controller. For HDD expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
4. The EXP300 includes a single 2M Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with its own standard country power cord.
5. The FAStT200 Storage Server and HA Storage Server each include two hot-swap, 350W auto-ranging redundant power supplies, each with its own standard country power cord.
6. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
7. The FAStT EXP500 Storage Expansion Unit includes dual hot-swap 350W power supplies, each with its own standard country power cord.
8. These units do not include Rack Power Cables P/N 94G7448 when shipped. Standard country power cords only are included. If attachment to UPS or PDU is required, order Rack Power Cables according to the number of power supplies.
9. Where 'xx' represents a specific country code as follows:- 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.
10. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
11. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
12. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/ Language Line Cords/Publications are included as indicated.

xSeries 440 I/O Options

Part Number	Description	Adapter Length	PCI Support[1]	Slots Supported[1]	Hot-Plug[2]	PCI Voltage Key	MHz
	Storage Controllers[3]						
37L6889	ServeRAID-4H Ultra160 SCSI Controller[4]	Full	64-bit	1 ... 6	X	Universal	33
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[5]	Full	64-bit	1 ... 6	X	Universal	66
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[6]	Half	64-bit	1 ... 6	X	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter[7]	Half	32-bit	1 ... 6	-	Universal	66
	Fibre Storage Controllers and Options[8]						
00N6881	FAStT Host Adapter	Half	64-bit	1 ... 6	X	Universal	66
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1 ... 6	X	Universal	66
	Networking[9]						
	Ethernet[10]						
09N9901	10/100 EtherLink Server Adapter by 3Com[11, 16]	Half	32-bit	1 ... 6	X	Universal	33
06P3601	10/100 Ethernet Server Adapter[11]	Half	32-bit	1 ... 6	X	Universal	33
06P3701	Gigabit Ethernet SX Server Adapter (fiber)	Half	64-bit	1 ... 6	X	Universal	66
22P4901	10/100 Dual Port Server Adapter[11]	Half	64-bit	1 ... 6	X	Universal	66
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)[11]	Half	64-bit	1 ... 6	X	Universal	133
22P7801	NetXtreme 1000 SX Fibre Ethernet Adapter	Half	64-bit	1 ... 6	-	Universal	133
	Token Ring						
34L5001	16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1 ... 6	X	Universal	33
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter[11]	Half	32-bit	1 ... 6	X	Universal	33
	Systems Management[12]						
03K9309	Advanced System Management Interconnect Cable Kit[13]	-	-	-	-	-	-
	Remote I/O Expansion						
86841RX	RXE-100 Remote Expansion Enclosure[14, 15]	-	-	-	-	-	-

Note: xSeries 440 supports the IXA Adapter for connection to iSeries models. The adapter must be installed in PCI slot two only.

1. Adapters rated at a lower frequency than the slots in which they are installed will reduce the bus to the frequency of the slowest adapter. 133MHz PCI-X adapters are backward compatible with 33/66MHz, 64-bit PCI-based servers.
2. All six slots are full-length hot-plug capable. For network operating system support, access www.pc.ibm.com/us/compat.
3. xSeries 440 includes an integrated dual channel Ultra160 SCSI controller with one external and one internal connector. See Internal SCSI Cabling or Internal Cabling Overview for cabling alternatives.
4. ServeRAID-4H Ultra160 SCSI Controller is powered by a 266MHz PowerPC 750 processor and provides 128MB of battery-backed ECC cache. The two internal connectors are not accessible due to a cabling interference. Four external Ultra160 0.8mm VHDCI connectors are available.
5. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections (only two connectors may be used). External connectors are 0.8mm VHDCI.
6. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector is 0.8mm VHDCI.
7. PCI Wide Ultra160 SCSI Adapter P/N 19K4646 provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. This system supports external connection only.
8. See Fibre Channel Solutions Overview section for additional configuration information.
9. xSeries 440 has an integrated10/100/1000 PCI Ethernet controller. Wake on LAN is supported only for the integrated controller.
10. In a fault-tolerant networking environment, using the fault-tolerant software delivered with the Ethernet adapters of a single manufacturer is recommended. Installing fault-tolerant solutions provided by multiple manufacturers may cause failures if the intermediate drivers provided with the adapters are not compatible. The onboard Ethernet is Broadcom-based. These four optional PCI Ethernet adapters are Intel-based P/Ns 06P3601, 06P3701, 22P4901, 22P6801, and P/N 09N9901 is 3Com-based. All five adapters are compatible with the Broadcom-based integrated Ethernet for failover.
11. The Wake on LAN function of this option is not supported by this server.
12. xSeries 440 includes a Remote Supervisor Adapter installed in a dedicated PCI slot with an external connector, leaving six PCI slots available for optional adapters. Support for connection to other servers requires an optional Advanced System Management Interconnect Cable Kit P/N 03K9309. Direct connection to the RXE drawer management controller in an RXE-100 Remote Expansion Enclosure is supported through a standard Interconnect Management Cable Kit with 3.5m cable. An 8m optional cable is available.
13. Required to connect the standard Remote Supervisor Adapter to an interconnect network with other servers for system management support through a single LAN or modem connection. Up to 24 Integrated System Management Processors or Remote Supervisor Adapters may be interconnected with an aggregate connection length of no more than 91.4m (300ft). This interconnect network of 24 devices may include a maximum of 12 Advanced System Management Processors or Advanced System Management PCI Adapters. A customer-supplied Cat5 cable is required for each interconnection.
14. RXE-100 Remote Expansion Enclosure supports up to 12 additional PCI-X slots. Cable required for connection included with expansion unit, which attaches to a standard integrated RIO port located on the back of the x440 chassis. An optional longer cable is available. Refer to RXE-100 section for diagrams and supported options.
15. xSeries 440 initially supports only one RXE-100 for two-, four- and eight-way systems. Two- and four-way systems use only RIO port A because port B is inactive unless an SMP Expansion Module is installed. Only one RIO connection to the RXE-100 is supported initially for both four- and eight-way systems.
16. Not supported when more than 4GB of system memory (RAM) is installed.



Slot 1: Bus A, 66MHz, 64-bit, full-length, 3.3v
Slot 2: Bus A, 66MHz, 64-bit, full-length, 3.3v
Slot 3: Bus B, 100MHz, 64-bit, full-length, 3.3v
Slot 4: Bus B, 100MHz, 64-bit, full-length, 3.3v
Slot 5: Bus C, 133MHz, 64-bit, full-length, 3.3v
Slot 6: Bus D, 133MHz, 64-bit, full-length, 3.3v
Optimal order of installation (highest frequency adapters first): 6-5-4-2-3-1. All slots are Active PCI-X

Part Number	Description
	Power[1]
	Uninterruptible Power Supply (UPS)[2, 3]
30RIxxx[9]	APC Smart-UPS 3000RMiB[4]
37L6862	APC Smart-UPS 5000RMiB[5]
	Monitors[6]
T3147xx[10]	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black[7]
T3247xx[10]	E74 Color Monitor 17in (406mm, 16in viewable image), stealth black[7]
T274Axx[10]	G78 Color Monitor 17in (406.4mm, 16in viewable image), stealth black[7]
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)[8]
32P1703	NetBAY 2U Flat Panel Monitor Console Kit (without keyboard)[8]

1. xSeries 440 systems include two 1050W, hot-swap power supplies with two Rack power cables and two standard country power cords. Power supply redundancy is standard for all configurations with a high voltage power source. If a low voltage source is used, power supplies operate at 550w and redundancy is supported only for configurations with two processors.
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Because the x440 is not equipped with an external serial port, UPS remote management requires a USB to serial adapter such as the Belkin USB to Serial Adapter P/N 10K3661.For more information visit: http://www.ibm.com - select Products & Services - click on Upgrades, Accessories and Parts - enter P/N 10K3661 in the accessories search box.
4. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
6. xSeries 440 uses an SVGA controller (S3 Savage4 LT chipset) with 8MB of video memory Optional video adapters are not supported.
7. Installation within a rack requires optional Monitor Compartment P/N 94G7444.
8. Includes a 15in Flat Panel Monitor. Does not include a keyboard.
9. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
10. Where 'xx' represents a specific country code as follows:- DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa/ Pakistan, CH=Switzerland, UK=UK, EU=Europe.

Part Number	Description
	Stack Option
9306110	NetBAY11 Standard Rack Cabinet
	Rack[1]
NOTE: Refer to the Rack Cabinets and Options section for details of IBM Racks and rack-supported devices.	
	Keyboard and Mouse[2]
28L36xx[7]	Space Saver II Keyboard[3, 4]
28L36xx[8]	Preferred Keyboard (stealth black)[5]
10K38xx[9]	106-key Preferred USB Keyboard with 2-port USB Hub (stealth black)[5, 6]
22P51xx[10]	TrackPoint USB Space Saver Keyboard[3, 4, 6]
28L3675	Sleek 2-Button Stealth Black Mouse
33L3244	Sleek USB Mouse (stealth black)

1. xSeries 440 is housed in a 19in rack-mountable drawer and requires one of the racks listed in the Rack Cabinets and Options section.
2. xSeries 440 supports rack configurations only and ships without a keyboard or mouse. The system includes three USB ports (one on front of chassis), SVGA video port, mouse port and keyboard port.
3. Installation within a rack requires optional keyboard tray P/N 28L4707, which stows in ready-to-use position.
4. Advanced TrackPoint IV features are not available on IBM xSeries systems.
5. Installation within a rack requires optional keyboard tray P/N 28L4707. This keyboard cannot share a keyboard tray with a flat panel display.
6. USB keyboards attach to a single USB-capable server. They are not compatible with the NetBAY console switches.
7. Where 'xx' represents a specific country code as follows:- 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
8. Where 'xx' represents a specific country code as follows:- 25=French, 26=German, 27=Italian, 28=Spanish, 29=UK English, 31=Danish, 33=Norwegian, 34=Swedish/Finnish, 35=Swiss, 36=Dutch, 37=US ISO, 21=US English, and P/N 22P7323=Icelandic, 22P7325=Belgium/UK, 22P7326=US Euro, 31P8252=Italian 141.
9. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 55=France, 56=Germany, 57=Italian, 58=Norwegian, 59=Swedish/Finnish, 10K2343=Swiss, 10K2344=UK English, 10K2345=US ISO.
10. Where 'xx' represents a specific country code as follows:- 53=Danish , 54=Dutch, 68=French, 55=German, 56=Italian, 57=Spanish, 58=UK English, 59=Swedish/Finnish, 60=Belgian/English, 61=Russian, 62=Polish, 63=Portuguese, 65=Swiss, 67=US International.

xSeries 440 Tape Options

Part Number	Description (see **General Note** below)	Bays Supported[1]	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures[1]
00N8016	100/200GB LTO Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	24P24xx, 03K8756[2] (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	24P24xx, 03K8756[2] (and see **Special Note** below)
24P2396	100/200GB LTO Half-High Tape Drive	-	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	03K8756[2] (and see **Special Note** below)
	Tape Autoloaders					
09N40xx[10]	3600 Series 900GB/1.8TB LTO Tape Autoloader[3]	-	16 Ultra2 LVD	Tower or 6U Rack	Y	-
	External Tape Libraries[4]					
21P99xx[11]	3600 Series 2/4TB LTO Tape Library (Rack)	-	16 Ultra2 LVD	5U Rack	Y	-
21P99xx[12]	3600 Series 2-Drive, 20-Cartridge Expander Module[5]	-	16 Ultra2 LVD	5U Rack	Y	-
09N4048	3600 Series LTO Drive Upgrade Option[6]	-	16 Ultra2 LVD	-	N	-
	External Tape Enclosures					
03K8756	NetMEDIA Storage Expansion Unit EL[7]	-	16	Rack	Y	-
10L7113	NetMEDIA Systems Management Adapter[8]	-	16 LVD	-	Y	03K8756
24P24xx[13]	Full-High SCSI Tape Enclosure[9]	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
	Associated Options					
10K2340	Media BayTray and LVD Cable Kit[2]	-	16 LVD	Int	Y	03K8756

General Note: xSeries 440 does not support internal tape drives. An external tape library or tape enclosure must be used. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which has an external 0.8mm VHDCI connector. Select tape drive, enclosure and controller then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.
Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit P/N 10K2340 to provide termination and LVD support, when attaching one of these tape drives externally in the NetMEDIA Storage Enclosure P/N 03K8756. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable. Finally, also bear in mind that it will take time for these newly equipped tape drives to work through into the supply chain. In the meantime, it may be better to order the Media Bay Kit for a small additional cost, and possibly to have too many cables (surplus to be used elsewhere), than risk ending up without the necessary cable.
1. To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section, and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
2. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **Special Note** above), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply. For support of more than two devices in a NetMEDIA Enclosure, refer to the NetMEDIA Adapter information.
3. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.
4. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.
5. Supported only with the 3600 Series LTO Tape Library (Rack) P/N 21P99xx. Allow one additional EIA space when installing either one or two (maximum) units to accommodate a filler plate for cable routing. Up to two 3600 Series LTO Drive Upgrade Options can be installed in each module or the module can operate off the LTO drives installed in the LTO tape library.
6. Install in second drive bay of 3600 LTO Tape Libraries or in either of the two bays of 3600 Series 2-Drive 20-Cartridge Expander Module to increase performance. Includes an LTO (Ultrium) drive and a one-meter external LVD SCSI cable.
7. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, 19in rack mountable tape enclosure which includes two full-high (FH) or four half-high (HH) extended length 133mm (5.25in) bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
8. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Storage Expansion Unit to provide repeater function, LVDS interface, aggregate cable lengths up to 12m when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.
9. Black desktop or 3U rack tape enclosure supports 133mm (5.25in) full-high LVD tape devices including DLT technology. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Supports the following full-high tape options: 00N8015, 00N8016.
10. Where 'xx' represents a specific country code as follows:- 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.
11. Where 'xx' represents a specific country code as follows:- *Rack version* - 78=Europe, 79=Denmark, 80=South Africa, 77=UK, 81=Swiss, 82=Italy, 83=Israel.
12. Where 'xx' represents a specific country code as follows:- 85=Europe, 86=Denmark, 87=South Africa, 84=UK, 88=Swiss, 89=Italy, 90=Israel.
13. Where 'xx' represents a country specific code: 35=UK, 39=Swiss, 40=Italy, 41=Israel, 36=EU, 37=Denmark, 38=South Africa.

Note: Additional tape attributes can be found in Appendix A: Tape Drive Attributes.

Note: For a complete list of all IBM and non-IBM options compatibility with Network Operating Systems and IBM xSeries Servers, access the IBM ServerProven compatibility pages on the Web at URL http://www.ibm.com/pc/us/compat

xSeries 440 Sample Configurations

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.

Basic SCSI Configuration

Part Number	Description	Quantity
K71RXxx	xSeries 440 2x1.4GHz/512KB xeon, 2GB ECC, Open, 24X (Rack 4U)	1
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	2
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1[1]
T3147xx	E54 Color Monitor 15in (350mm, 13.8in viewable image), stealth black	1
37L6862	APC Smart-UPS 5000RMiB	1
	External Storage	
19K11xx	EXP300 Storage Expansion Unit	2
06P5754	18.2GB 10Krpm Ultra160 SCSI Hot-swap SL HDD	12[2]
	Rack Options	
9306110	NetBAY11 Standard Rack Cabinet[3]	1
28L36xx	Space Saver II Keyboard	1

1. External connectors only can be used due to internal cabling restriction.
2. Six HDDs are used for RAID-5E protection in each EXP300. One HDD is identified as a hot-spare. Effective capacity is five HDDs in each storage enclosure (total of 91GB).
3. The NetBAY11 Rack Cabinet includes one Blank Filler Panel Kit as standard.

High-availability SCSI Storage Solution[1]

Part Number	Description	Quantity
K72RXxx	xSeries 440 2x1.5GHz/512KB Xeon, 2GB ECC, Open, 24X (Rack 4U)	1
32P8706	xSeries 1.5GHz/512KB L3 Cache with Xeon Processor MP	2[1]
33L3324	512MB PC133 ECC SDRAM RDIMM	12[2]
06P5767	18.2GB 15Krpm Ultra160 SCSI Hot-swap SL HDD	2
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	2
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)	2
37L6862	APC Smart-UPS 5000RMiB	1
	External Storage	
19K11xx	EXP300 Storage Expansion Unit[3]	4
06P5767	18.2GB 15Krpm Ultra160 SCSI Hot-swap SL HDD	52[4]
03K8756	NetMEDIA Storage Expansion Unit EL	1
10L7113	NetMEDIA Systems Management Adapter	1
00N8016	100/200GB LTO Tape Drive[5]	2
	Rack Options	
9306420	NetBAY42 Standard Rack Cabinet	1
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)	1
28L36xx	Space Saver II Keyboard	1
94G6670	Blank Filler Panel Kit	1

1. Total of four processors.
2. Total memory of 8GB.
3. Cables for daisy-chaining EXP300s not included in this table.
4. Thirteen HDDs are used for RAID-5E protection in each EXP300 (bay six remains empty in twintail high-availability EXP300 configurations). One HDD is identified as a hot-spare. Effective capacity is 12 HDDs in each storage enclosure (total of 946.4GB).
5. See the **Special Note** in the Tape Options section.

Microsoft Exchange High-availability Fibre Channel Solution

Part Number	Description	Quantity
K73RXxx	xSeries 440 2x1.6GHz/1MB Xeon, 2GB ECC, open, 24X (4U rack)	1
19K4647	xSeries 1.6GHz/1MB L3 Cache Upgrade with Xeon Processor MP	6[1]
32P8340	xSeries SMP Expansion Module	1
33L3324	512MB PC133 ECC SDRAM RDIMM	28[2]
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller	1
06P5767	18.2GB 15Krpm Ultra160 SCSI Hot-swap SL HDD	2[3]
22P6801	PRO/1000XT Server Adapter by Intel (with CD and manuals)	1
19K1246	FAStT FC-2 Host Bus Adapter	2
24P09xx	FAStT700 Storage Server	1[4]
37L6862	APC Smart-UPS 5000RMB	1
30RIxxx	APC Smart-UPS 3000RMB	1
	External Storage	
00N71xx	FAStT EXP500 Storage Expansion Unit	4
06P5707	18.2GB 15Krpm FC Hot-Swap HDD	40
09N40xx	3600 Series 900GB/1.8TB LTO Tape Autoloader	1
	Rack Options	
9306420	NetBAY42 Standard Rack Cabinet	1
32P1032	NetBAY 1U Flat Panel Monitor Console Kit (without keyboard)	1
28L36xx	Space Saver II Keyboard	1
94G6670	Blank Filler Panel Kit	1

1. Total of eight processors (four per SMP Expansion Module).
2. Total memory of 16GB.
3. Total of two 18.2GB internal HDDs for NOS mirroring attached to a ServeRAID adapter.
4. Fibre Channel cable, SFP Modules and FAStT700 Mini Hubs not included.

IBM RXE-100 Remote Expansion Enclosure

Part Number	Form Factor	Power Supply Quantity (Std/Max)	Hot-Swap (Power, Slots, HDD, Fans)	Redundancy (Optional, Standard)	System Management Controller	Standard Slots (Total/Avail)	Optional Slots (Total/Avail)
RXE-100 Remote Expansion Enclosure At-A-Glance Chart							
86841RX[1]	Rack (3U)	2/2	P, S, F	S - Fans S - Power[2]	Y[3]	6/6[4]	6/6[5]

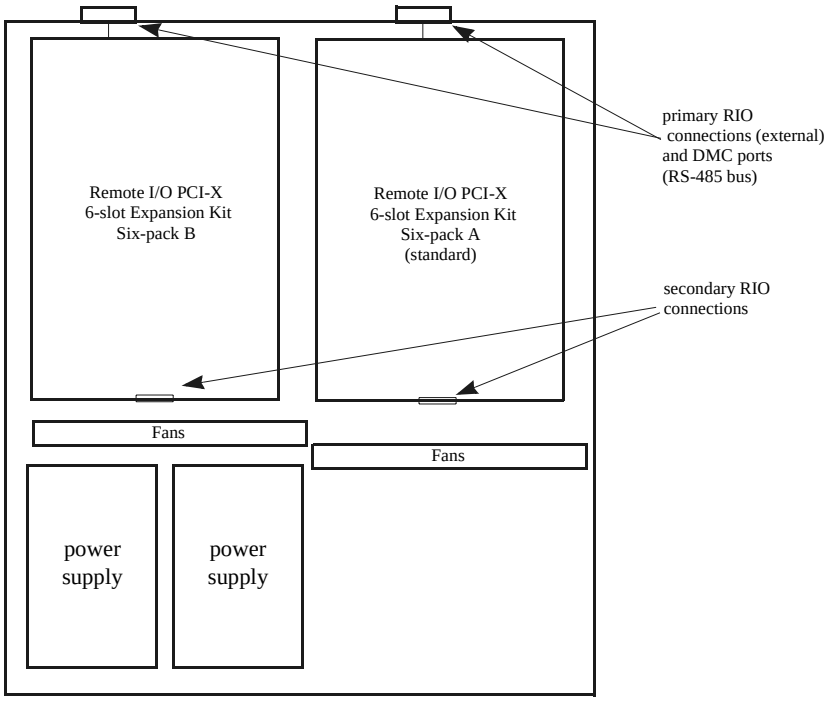
1. Housed in a 19in rack-mountable drawer. See Rack Cabinets and Options section for supported IBM racks. Ships with one 3.5m Remote I/O Cable Kit P/N 31P6102 and one 3.5m Interconnect Management Cable Kit P/N 31P6087. 8m (eight meter) cables are available as options P/N 31P6103 and P/N 31P6088.
2. N+1 power supply redundancy is provided standard.Two 370W Hot-Swap Redundant Power Supplies P/N 32P15xx are installed in the RXE-100.
3. RXE-100 management controller interfaces with the Remote Supervisor Adapter standard in xSeries 360 using an Interconnect Management Cable Kit P/N 31P6087 (3.5m) or P/N 31P6088 (8m).
4. RXE-100 ships with six full-length, 64-bit PCI-X slots supporting three 133MHz adapters or six 100MHz adapters. Adapters rated at 33 or 66MHz restrict PCI buses in which they are installed to the frequency of the slowest adapter.
5. Support for additional six 64-bit slots is available through installation of the optional Remote I/O PCI-X 6-slot Expansion Kit P/N 31P5998. Remote I/O connection is cabled internally within the RXE-100 enclosure using the secondary connector on each PCI-X 6-slot Expansion Kit, i.e., only one connection between the server and RXE-100 is required. Although the six PCI slots it contains are hot-swap, the expansion kit itself is not.

RXE-100 Remote Expansion Enclosure

P/N 86841RX

Top View

Rear



Front

o Rack-mounted 3U enclosure that fits standard IBM racks (same size case as xSeries 360).
o Contains six active PCI-X adapter slots with support for six optional slots. The 6-slot expansion kits themselves are not hot-swap although each of the slots they contain are and they support hot-swap installation of PCI adapters.
o Supports three 133MHz or six 100MHz adapters (backward compatible to 33 or 66MHz adapters).
o Interfaces directly to the xSeries 360 memory controller, supporting 2Gb/s data transfers.
o Interfaces with Remote Supervisor Adapter in the host xSeries 360.
o Hot-swap redundancy for fans and power supplies (two 370W power supplies and four cooling fans).

Part Number	External Storage Expansion Units[1]	Form Factor
19K11xx[7]	EXP300 Storage Expansion Unit[2, 6]	Rack (3U)
19K11xx[8]	FAStT200 Storage Server[3, 4, 6]	Rack (3U)
19K11xx[9]	FAStT200 HA Storage Server[3, 6]	Rack (3U)
19K1121	FAStT200 Redundant RAID Controller[4]	-
00N71xx[10]	FAStT EXP500 Storage Expansion Unit[5, 6]	Rack (3U)
94G7448	Rack Power Cable Type C12 (3.7m)[6]	-

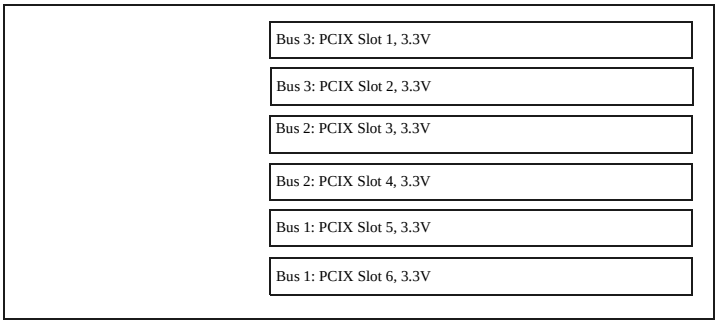
1. To configure an external SCSI storage device, select an optional SCSI controller then refer to Appendix D: Cables - Storage Units - Controllers to confirm the controller supports the desired External Storage Expansion Unit and to select a supported cable. For HDD or other expansion unit options, see the specific expansion unit section. For Fibre Channel storage devices, refer to the Fibre Channel Solutions Overview section.
2. EXP300 includes a single 2M Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with its own standard country power cord.
3. The FAStT200 Storage Server and HA Storage Server each include two hot-swap, 350W auto-ranging redundant power supplies, each with its own standard country power cord.
4. Can be upgraded to FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
5. FAStT EXP500 Storage Expansion Unit includes dual hot-swap 350W power supplies, each with its own standard country power cord.
6. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order Rack Power Cables according to the number of power supplies.
7.Where 'xx' represents a specific country code as follows:- 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/ English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.
8. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
9. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
10. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/Language Line Cords/Publications are included as indicated.

RXE-100 Remote Expansion Enclosure I/O Options

Part Number	Description	Adapter Length	PCI Support	Slots Supported[1]	Hot-Plug[2]	PCI Voltage Key	MHz[3]
	Storage Controllers						
37L6889	ServeRAID-4H Ultra160 SCSI Controller[4]	Full	64-bit	1 ... 6	X	Universal	33
06P5736	ServeRAID-4Mx Ultra160 SCSI Controller[5]	Full	64-bit	1 ... 6	X	Universal	66
06P5740	ServeRAID-4Lx Ultra160 SCSI Controller[6]	Half	64-bit	1 ... 6	X	Universal	66
19K4646	PCI Wide Ultra160 SCSI Adapter[7]	Half	32-bit	1 ... 6	-	Universal	66
	Fibre Storage Controllers and Options[8]						
00N6881	Netfinity FAStT Host Adapter	Half	64-bit	1 ... 6	X	Universal	66
19K1246	FAStT FC-2 Host Bus Adapter	Half	64-bit	1 ... 6	X	Universal	66
	Networking						
	Ethernet						
09N9901	10/100 EtherLink Server Adapter by 3Com	Half	32-bit	1 ... 6	X	Universal	33
06P3601	10/100 Ethernet Server Adapter	Half	32-bit	1 ... 6	X	Universal	33
06P3701	Gigabit Ethernet SX Server Adapter (fiber)	Half	64-bit	1 ... 6	X	Universal	66
22P4901	10/100 Dual Port Server Adapter	Half	64-bit	1 ... 6	X	Universal	66
22P6801	PRO/1000XT Server Adapter by Intel (copper) w/CD, manuals	Half	64-bit	1 ... 6	X	Universal	133[3]
	Token Ring						
34L5001	16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 6	X	Universal	33
34L5201	High-Speed 100/16/4 Token-Ring PCI Management Adapter	Half	32-bit	1 ... 6	X	Universal	33
	Associated Options						
31P5998	Remote I/O PCI-X 6-slot Expansion Kit[9]	-	-	-	-	-	-
31P6088	8m Interconnect Management Cable Kit[10]	-	-	-	-	-	-
31P6103	8m Remote I/O Cable Kit[11]	-	-	-	-	-	-
31P6087	3.5m Interconnect Management Cable Kit[12]	-	-	-	-	-	-
31P6102	3.5m Remote I/O Cable Kit[12]	-	-	-	-	-	-

1. Slots one through six are 64 bits wide configured on three buses with two slots each, supporting either one 133MHz or two 100MHz adapters in each bus. The slots are backward compatible for adapters that operate at 33 or 66MHz, which reduce the buses in which they are installed to the frequency of the slowest adapter.
2. All six slots are full-length Active PCI-X (hot-plug capable). For Network Operating System support, access www.pc.ibm.com/us/compat.
3. All slots support either 100MHz or 133MHz adapters (as well as 33MHz and 66MHz adapters). If an adapter rated at 133MHz is installed in either slot of any of the three buses, the other slot must remain vacant.
4. ServeRAID-4H Ultra160 SCSI Controller is powered by a 266MHz PowerPC 750 processor and provides 128MB of battery-backed ECC cache with two internal and four external Ultra160 connectors. External connectors only can be used. External connectors are 0.8mm VHDCI.
5. ServeRAID-4Mx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor that provides 64MB of battery-backed ECC cache and two internal and two external Ultra160 connections. External connectors only can be used. External connectors are 0.8mm VHDCI.
6. ServeRAID-4Lx Ultra160 SCSI Controller is powered by a 100MHz Intel Zion GC80303 processor and provides a single channel, 32MB of ECC cache and either one internal or one external Ultra160 connection. External connector only can be used. External connectior is 0.8mm VHDCI.
7. PCI Wide Ultra160 SCSI Adapter (P/N 19K4646) provides a single channel with one internal connector, a five-drop multi-mode terminated LVD SCSI cable and one external 0.8mm VHDCI connector. External connector only can be used.
8 See Fibre Channel Solutions Overview section for additional configuration information.
9. Installs into the RXE-100 to expand slot availability from six to 12. The expansion enclosure must be powered down to install this option. Cables internally through the secondary RIO connectors. The additional six slots are numbered one to six with the same attributes as the standard unit.
10. Allows the x360 remote management functionality to support the RXE-100. A 3.5m cable is standard for installations in the same rack. The 8m length is required when installing in a different rack.
11. Primary expansion cable connecting the expansion enclosure PCI slot capability to the system processor and memory components. A 3.5m cable is standard for installations in the same rack. The 8m length is required when installing in a different rack. Connects the RIO port on the back of the system to the primary RIO port on the back of the enclosure.
12. Ships standard with the RXE-100 Remote Expansion Enclosure.

Remote I/O PCI-X 6-Slot Expansion Kit P/N 31P5998



All slots are full-length, 64-bit, Active PCI-X.

RXE-100 Remote Expansion Enclosure Power

Part Number	Description
	Power[1]
	Uninterruptible Power Supply (UPS)[2]
32P16xx[7]	APC 2U Smart-UPS 1400RMiB[5]
30RIxxx[6]	APC Smart-UPS 3000RMiB[3]
37L6862	APC Smart-UPS 5000RMiB[4]

1. RXE-100 includes two 370W hot-swap power supplies (P/N 32P15xx - same as the x360), each with a Rack power cord. N+1 power supply redundancy is standard for full configurations. A third power supply is not supported.
2. For runtimes and UPS attributes see Appendix C: UPS Runtime Estimate.
3. Height is 3U. See Rack Cabinets and Options section for supported IBM racks.
4. Height is 5U. See Rack Cabinets and Options section for supported IBM racks.
5. Height is 2U. See Rack Cabinets and Options section for supported IBM racks.
6. Where 'xxx' represents a specific country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
7. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.

RXE-100 Remote Expansion Enclosure Tape Options

Part Number	Description (see **General Note** below)	Bays Supported[1]	SCSI Interface (bit)	Form Factor	Termination Included	Ext Tape Enclosures[1]
00N8016	100/200GB LTO Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	24P24xx, 03K8756[2], (and see **Special Note** below)
00N8015	110/220GB Super DLT Internal SCSI Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) FH	Y (see **Special Note** below)	24P24xx, 03K8756[2], (and see **Special Note** below)
24P2396	100/200GB LTO Half-High Tape Drive (see **Special Note** below)	-	16 Ultra2 LVD	133mm (5.25in) HH	Y (see **Special Note** below)	03K8756[2], (and see **Special Note** below)
	Tape Autoloaders					
09N40xx[10]	3600 Series 900GB/1.8TB LTO Tape Autoloader[3]	-	16 Ultra2 LVD	Tower or 6U Rack	Y	-
	External Tape Libraries[4]					
21P99xx[11]	3600 Series 2/4TB LTO Tape Library (Rack)	-	16 Ultra2 LVD	5U Rack	Y	-
21P99xx[12]	3600 Series 2-Drive, 20-Cartridge Expander Module[5]	-	16 Ultra2 LVD	5U Rack	Y	-
09N4048	3600 Series LTO Drive Upgrade Option[6]	-	16 Ultra2 LVD	-	N	-
	External Tape Enclosures					
03K8756	NetMEDIA Storage Expansion Unit EL[7]	-	16	Rack	Y	-
10L7113	NetMEDIA Systems Management Adapter[8]	-	16 LVD	-	Y	03K8756
24P24xx[13]	Full-High SCSI Tape Enclosure[9]	-	16 Ultra2 LVD	Desktop or 3U Rack	Y	-
	Associated Options					
10K2340	Media Bay Tray and LVD Cable Kit[2]	-	16 LVD	Int	Y	03K8756

General Note: RXE-100 does not support internal tape drives. An external tape library or tape enclosure must be used. All tape drives and enclosures are supported by PCI Wide Ultra160 SCSI Adapter P/N 19K4646 which has an external 0.8mm VHDCI connector. Select tape drive, enclosure and controller then use Appendix D: Cables - Storage Units - Controllers to select an appropriate external cable.

Special Note: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit P/N 10K2340 to provide termination and LVD support, when attaching one of these tape drives externally in the NetMEDIA Storage Enclosure P/N 03K8756. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide a two-drop terminated LVD cable. Finally, also bear in mind that it will take time for these newly equipped tape drives to work through into the supply chain. In the meantime, it may be better to order the Media Bay Kit for a small additional cost, and possibly to have too many cables (surplus to be used elsewhere), than risk ending up without the necessary cable.

1. To determine cable requirements, note the tape drive's SCSI interface, the appropriate SCSI controller from the system configurator section, and the desired enclosure, then refer to Appendix D: Cables - Storage Units - Controllers.
2. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **Special Note** above), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply. For support of more than two devices in a NetMEDIA Enclosure, refer to the NetMEDIA Adapter information.
3. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.
4. Tape library attributes and prerequisites are located in Appendix B: Tape Library Attributes.
5. Supported only with the 3600 Series LTO Tape Library (Rack) P/N 21P99xx. Allow one additional EIA space when installing either one or two (maximum) units to accommodate a filler plate for cable routing. Up to two 3600 Series LTO Drive Upgrade Options can be installed in each module or the module can operate off the LTO drives installed in the LTO tape library.
6. Install in second drive bay of 3600 LTO Tape Libraries or in either of the two bays of 3600 Series 2-Drive 20-Cartridge Expander Module to increase performance. Includes an LTO (Ultrium) drive and a one-meter external LVD SCSI cable.
7. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, 19in rack mountable tape enclosure which includes two full-high (FH) or four half-high (HH) extended length 133mm (5.25in) bays, two external 0.8mm VHDCI connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two power cords are also included.
8. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Storage Expansion Unit to provide repeater function, LVDS interface, aggregate cable lengths up to 12m when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8mm VHDCI. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.
9. Black desktop or 3U rack tape enclosure supports 133mm (5.25in) full-high LVD tape devices including DLT technology. Requires a fixed shelf if installed in a rack (allow additional 1U for fixed shelf). Supports the full-high tape options P/N 00N8015 and P/N 00N8016.
10. Where 'xx' represents a specific country code as follows:- 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.
11. Where 'xx' represents a specific country code as follows:- *Rack version* - 78=Europe, 79=Denmark, 80=South Africa, 77=UK, 81=Swiss, 82=Italy, 83=Israel.
12. Where 'xx' represents a specific country code as follows:- 85=Europe, 86=Denmark, 87=South Africa, 84=UK, 88=Swiss, 89=Italy, 90=Israel.
13. Where 'xx' represents a country specific code: 35=UK, 39=Swiss, 40=Italy, 41=Israel, 36=EU, 37=Denmark, 38=South Africa.

IBM EXP300 Storage Expansion Unit

EXP300 Hard Disk Drive (HDD) Configurator

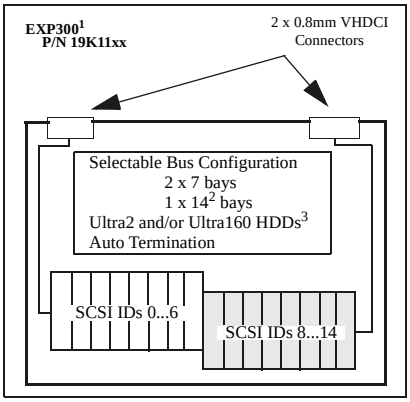
Total Int. Storage[1]	10,000RPM Ultra160 SCSI HDDs			15,000RPM Ultra160 SCSI HDDs	
	18.2GB P/N 06P5754	36.4GB P/N 06P5755	73.4GB P/N 06P5756	18.2GB P/N 06P5767	36.4GB P/N 06P5768
0GB	0GB Standard			0GB Standard	
18.2GB	1	-	-	1	-
36.4GB	2 or	1	-	2 or	1
54.6GB	3	-	-	3	-
72.8GB	4 or	2	-	4 or	2
91GB	5	-	-	5	-
109.2GB	6 or	3	-	6 or	3
127.4GB	7 or	-	-	7	-
145.6GB	8 or	4	-	8 or	4
182GB	10 or	5	-	10 or	5
218.4GB	12 or	6	-	12 or	6
254.8GB	14 or	7	-	14 or	7
291.2GB	-	8	-	-	8
364.0GB	-	10	-	-	10
436.8GB	-	12	-	-	12
509.6GB	-	14	-	-	14
587.2GB	-	-	8	-	-
734.0GB	-	-	10	-	-
880.8GB	-	-	12	-	-
1027.6GB (max.)	-	-	14	-	-

This table does not represent all possible hard disk drive (HDD) configurations.
1. Select a total storage row then select the quantity of HDDs from a column corresponding to the HDD of choice. Total Internal Storage listed is within +/- 0.2 GB unless otherwise noted.

SCSI ID	Form Factor	Height	Front Access	Usage
0...6	HS	SL	Yes	open
8...14	HS	SL	Yes	open

Part Number	Description	RPM	Height	Bays Supported[1]	Max. Qty.
	Hot-Swap Ultra 160 SCSI HDDs				
06P5754	18.2GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	1...14	14[2]
06P5755	36.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	1...14	14[2]
06P5756	73.4GB 10,000rpm Ultra160 Hot-Swap HDD	10000	SL	1...14	14[2]
06P5767	18.2GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	1...14	14[2]
06P5768	36.4GB 15,000rpm Ultra160 Hot-Swap HDD	15000	SL	1...14	14[2]
	External Storage Expansion Unit	**Form Factor**			
19K11xx[5]	EXP300 Storage Expansion Unit[3, 4]	Rack (3U)			
09N7296	EXP300 Rack-to-Tower Conversion Kit	-			
94G7448	Rack Power Cable Type C12 (3.7m)[4]	-			

1. EXP300 Storage Expansion Unit ships with 14 slim-line hot-swap bays which can be configured as a single bus, two independent buses or a twintailed single bus.
2.Twintailing reduces the maximum number of HDDs on a single bus to 13.
3. The EXP300 includes a single 2 M Ultra2 SCSI cable and dual hot-swap 500W redundant power supplies, each with it's own standard country power cord.
4. This unit does not include a Rack Power Cable P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). A standard country power cord only is included. If required, order one Rack Power Cable for each power supply.
5. Where 'xx' represents a specific country code as follows: 51=US/English, 52=European/English, 56=Danish/English, 57=Israel/English, 58=Italian/English, 59=South Africa/English, 60=Swiss/English, 63=UK/English:- Line Cords/ Publication Country Kits are included as indicated.

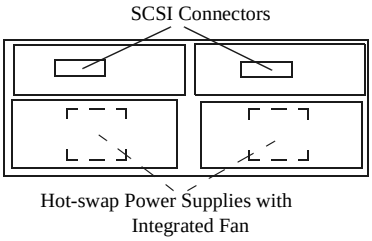


1. Housed in a 19in rack mountable drawer and ships standard with redundant 500 W hot-swap power supplies, two power cords and a single 2M Ultra2 SCSI cable capable of supporting Ultra160 speeds.
2. Twintailing reduces the maximum number of HDDs on a single bus to 13.
3. When combined with a ServeRAID-4x controller, Ultra2 and Ultra160 HDDs may be mixed on the same bus and operate at up to their maximum respective speeds.

Requires IBM NetBAY 42 Enterprise Rack or Expansion Cabinet (930842S, E), NetBAY 42 Standard Rack Cabinet or Expansion Cabinet (9306420, 1), NetBAY 25 (9306250), NetBAY 22 (9306200), NetBAY 3 (10L6912), NetBAY 3E (36L9701) or Rack-to-Tower Conversion Kit (09N7296).

External Storage Expansion Units require storage controllers and external cables. Select a supported controller from the system configurator and cables from Appendix D: Cables-Storage Units-Controllers.

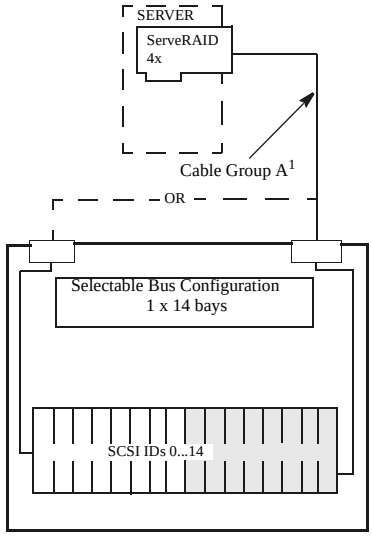
EXP300 Storage Expansion Unit P/N 19K11xx



- Fourteen slim-high drive bays.
- Supports Ultra160 SCSI data transfer speeds - up to 160MB/s.
- Single or dual SCSI bus configurations.
- Dual hot-swap 500 redundant power supplies with integrated fan assemblies.
- Height is 3U (1U=1.75in or 44.45mm).
- Tower capability through optional Rack-to-Tower Conversion Kit.
- Requires NetBAY 42 Enterprise Rack or Expansion Cabinet, NetBAY 42 Standard Rack or Expansion Cabinet, NetBAy 25, NetBAY22 or 19in EIA-D Industry-Standard Rack.
- Mounting rails are included with the unit.

Cables and Controllers:
See Appendix D: Cables - Storage Units - Controllers

EXP300 One Independent SCSI Bus

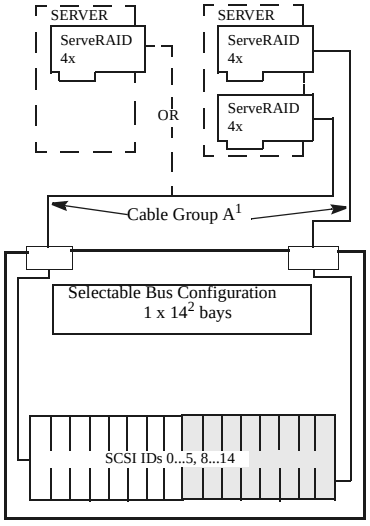


Order:
- 1 x P/N 19K11xx
- 1 x External Cable from Group A[1]
- Up to 14 Ultra2 and/or Ultra160 HDDs

1. One 2 M Ultra2 cable is included with each EXP300. If a longer cable is desired, select one from cable group A.

EXP300 One Independent Twintail SCSI Bus High Availability Configuration

To configure as one independent twintailed 13 bay SCSI bus, attach two external cables from two ServeRAID adapters, in the same or separate servers, to the two external ports of the EXP300. The EXP300 must be set for 1 x 14[2] bays.

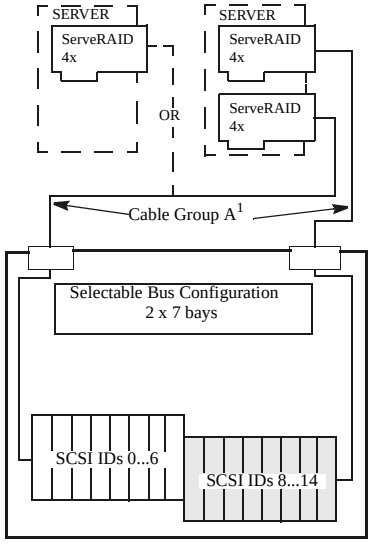


Order:
- 1 x P/N 19K11xx
- 2 x External Cables from Group A[1]
- Up to 13 Ultra2 and/or Ultra160 HDDs

1. One 2 M Ultra2 cable is included with each EXP300. If a longer cable is desired, select one from cable group A.
2. Twintailing reduces the maximum number of HDDs on a single bus to 13.

EXP300 Two Independent SCSI Buses

To configure as two independent 7 bay SCSI buses, attach two external cables from two ServeRAID adapters, in the same or separate servers, to the two external ports of the EXP300. The EXP300 must be set for 2 x 7 bays.



Order:
- 1 x P/N 19K11xx
- 2 x External Cables from Group A[1]
- Up to 14 Ultra2 and/or Ultra160 HDDs

1. One 2 M Ultra2 cable is included with each EXP300. If a longer cable is desired, select one from cable group A.

Note 1: Cable Group A - refer to Appendix D: Cables - Storage Units - Controllers for more information.

Fibre Channel Solutions Overview

Fibre Channel Solutions Overview At-A-Glance

Part Number	Description	Topology	Max Supported Storage	Host Partitions	Host Fabric Ports (std/max)	Max Redundant Host Connections	Drive Side Mini Hubs (std/max)	Redundant Drive Loops (std/max)	Form Factor
FAStT Storage Servers									
19K11xx[5]	FAStT200 Storage Server	Fibre-over-Fibre	734GB[1]	16	1/1	0	-	0	3U
19K11xx[6]	FAStT200 HA Storage Server	Fibre-over-Fibre	4.4TB[2]	16	2/2	1	-	1	3U
00N69xx[7]	FAStT500 Storage Server	Fibre-over-Fibre	16.15TB[3]	16	4/8	4	2/4	1/2	4U
24P09xx[8]	FAStT700 Fibre Channel Storage Server	Fibre-over-Fibre	16.15TB[3]	64	4/8	4	2/4	1/2	4U
Fibre Channel HDD Expansion Units									
00N71xx[9]	FAStT EXP500	Fibre-over-Fibre	734GB	-	2/2	-	-	-	3U
1Gb Fibre Channel Fabric Components									
00N6881	FAStT Host Adapter	-	-	-	-	-	-	-	-
00N6882	FAStT500 Mini Hub	-	-	-	-	-	-	-	-
00N6883	FAStT500 256MB Cache	-	-	-	-	-	-	-	-
19K1121	FAStT200 Redundant RAID Controller	-	-	-	-	-	-	-	
2108R3L	SAN Data Gateway Router UltraSCSI LVD Port	-	-	-	-	-	-	-	-
09N4047	Fibre Tape Automation Adapter	-	-	-	-	-	-	-	-
2109S08	SAN FC Switch, 8-Port	-	-	-	-	-	-	-	-
2109S16	SAN FC Switch, 16-Port	-	-	-	-	-	-	-	-
35L1647	SAN FC Managed Hub	-	-	-	-	-	-	-	-
03K9307	FC Long-Wave GBIC	-	-	-	-	-	-	-	-
03K9308	FC Short-Wave GBIC	-	-	-	-	-	-	-	-
36L9973	Fibre Channel 1M Cable	-	-	-	-	-	-	-	-
03K9306	Fibre Channel 5M Cable	-	-	-	-	-	-	-	-
03K9305	Fibre Channel 25M Cable	-	-	-	-	-	-	-	-
2Gb Fibre Channel Fabric Components									
19K1246	FAStT FC-2 Host Bus Adapter	-	-	-	-	-	-	-	-
19K1269	FAStT700 Mini Hub	-	-	-	-	-	-	-	-
3534F08	TotalStorage SAN Switch F08, 8-port	-	-	-	-	-	-	-	-
2109F16	SAN FC Switch, 16-Port (2Gb)	-	-	-	-	-	-	-	-
19K1271	Short-Wave SFP Module	--	-	-	-	-	-	-	-
19K1272	Long-Wave SFP Module	-	-	-	-	-	-	-	-
19K1247	1M LC-LC Fibre Channel Cable	-	-	-	-	-	-	-	-
19K1248	5M LC-LC Fibre Channel Cable	-	-	-	-	-	-	-	-
19K1249	25M LC-LC Fibre Channel Cable	-	-	-	-	-	-	-	-
19K1250	LC-SC Fibre Channel Adapter Cable[4]	-	-	-	-	-	-	-	-
Fibre Channel HDDs									
06P5707	18.2GB 15Krpm FC Hot-Swap HDD	-	-	-	-	-	-	-	-
19K0653	36.4GB 10K-4 FC Hot-Swap HDD	-	-	-	-	-	-	-	-
19K0654	73.4GB 10K-4 FC Hot-Swap HDD	-	-	-	-	-	-	-	-

1. Attaching expansion units to a FAStT200 Storage Server is not recommended because a single point-of-failure occurs when external storage is connected through only one RAID controller. The maximum storage value is based on 10 internal 73.4GB internal FC HDDs.
2. Based on a maximum of 60 73.4GB FC HDDs installed in the redundant storage loop that includes the FAStT200 internal HDD bays and five FAStT EXP500 expansion units.
3. Based on a maximum of 220 73.4GB FC HDDs installed in a maximum of 22 FAStT EXP500 expansion units. A maximum of 11 expansion units are supported in a redundant drive loop (cable pair). Four drive-side mini hibs are required to support two pairs of loops running in redundant mode.
4. The LC-SC Fibre Channel Adapter Cable P/N 19K1250 is designed to connect any 1Gb device or cable to any 2Gb device or cable. When 2Gb and 1Gb technology are combined in a configuration, the signal transfer automatically converts to the slower speed.
5. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated.
6. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
7. Where 'xx' represents a country specific code as follows:- 13=US/English, 14=Euro/English, 18=Denmark/English, 19=Israel/English, 20=Italy/English, 21=South Africa/English, 22=Switzerland/English, 26=UK/English. Country/Language - Line Cords/Publications are included as indicated.
8. Where 'xx' represents a specific country code as follows:- 14=Eur/English, 18=Denmark/English, 19=Israel/English, 20=Italy/English, 21=South Africa/English, 22=Switzerland/English, 25=UK/English. Country/Language Line Cords/Publications are included as indicated.
9. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/Language Line Cords/Publications are included as indicated.

FAStT EXP500 Storage Expansion Unit - Hard Disk Drive (HDD) Configurator

Total Internal Storage[1]	10,000RPM Fibre Channel HDDs		15,000RPM Fibre Channel HDD
	36.4GB (P/N 19K0653)	73.4GB (P/N 19K0654)	18.2GB (P/N 06P5707)
0GB	0GB Standard		0GB Standard
18.2GB	-	-	1
36.4GB	1	-	2
54.6GB	-	-	3
72.8GB	2	-	4
73.4GB	-	1	-
91.0GB	-	-	5
109.2GB	3	-	6
145.6GB	4	-	8
146.8GB	-	2	-
182.0GB	5	-	10
218.4GB	6	-	-
220.2GB	-	3	-
254.8GB	7	-	-
291.2GB	8	-	-
293.6GB	-	4	-
327.6GB	9	-	-
364.0GB	10	-	-
367.0GB	-	5	-
440.4GB	-	6	-
513.8GB	-	7	-
587.2GB	-	8	-
660.6GB	-	9	-
734.0GB (max)	-	10	-

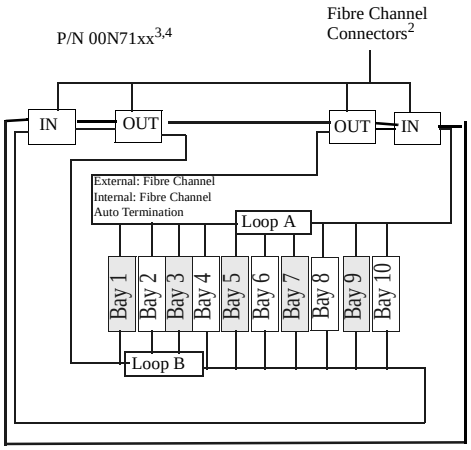
This table does not represent all valid hard disk drive (HDD) configurations.
1. Select a total storage row and then select the quantity of HDDs from a column corresponding to the HDD of choice. Total Internal Storage listed is within +- 0.2 GB unless otherwise noted.

Part Number	Description	RPM	Height	Bays Supported	Max. Qty Supported
19K0653	36.4GB 10K-4 FC Hot-Swap HDD	10000	SL	1...10	10
19K0654	73.4GB 10K-4 FC Hot-Swap HDD	10000	HH	1...10	10
06P5707	18.2GB 15,000rpm FC Hot-Swap HDD	15000	SL	1...10	10

External Storage Expansion Unit		Form Factor
00N71xx[3]	FAStT EXP500 Storage Expansion Unit[1,2]	Rack (3U)
94G7448	Rack Power Cable Type C12 (3.7m)[2]	-

1. The FAStT EXP500 Storage Expansion Unit includes two hot-swap, 350 W auto-ranging redundant power supplies each with it's own standard country power cord.
2. This unit does not include a Rack Power Cable P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cord only are included. If required, order one Rack Power Cable for each power supply.
3. Where 'xx' represents a country specific code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/Language Line Cords/Publications are included as indicated.

IBM FAStT EXP500 Storage Expansion Unit[1]



IN = primary or secondary (redundant) connection from FAStT500 Storage Server or previous FAStT EXP500 Storage Expansion Unit daisy-chained from the storage server
OUT = primary or secondary (redundant) connection to additional FAStT EXP500 expansion units

1. Housed in a 19" Rack mountable drawer and ships standard with redundant power supplies and two standard country power cables requiring separate power sources. Requires IBM industry standard 19" rack, EIA-310D, with a minimum depth of 24" (711.2 mm) or NetBAY3/3E.

Note: The FAStT EXP500 Storage Expansion Unit does not ship with a storage controller or external cables. Select these items from the Fibre Channel Device Ports Reference Chart in the Fibre Array Solutions section.

2. GBICs are not included. Either Fibre Channel Long or Short-Wave GBICs (P/N 03K9307 or 03K9308 respectively) may be used.
3. Where 'xx' represents a country specific code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/Language Line Cords/Publications are included as indicated.
4. This unit does not include a Rack Power Cable P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). A standard country power cord only is included. If required, order a Rack Power Cable.

IBM FAStT200 (HA) Storage Server

FAStT200 Storage Server - Hard Disk Drive (HDD) Configurator

Total Internal Storage[1]	10,000RPM Fibre Channel HDDs		15,000RPM Fibre Channel HDD
	36.4GB (P/N 19K0653)	73.4GB[2] (P/N 19K0654)	18.2GB (P/N 06P5707)
0GB	0GB Standard		0GB Standard
18.2GB	-	-	1
36.4GB	1	-	2
54.6GB	-	-	3
72.8GB	2	-	4
73.4GB	-	1	-
91.0GB	-	-	5
109.2GB	3	-	6
145.6GB	4	-	8
146.8GB	-	2	-
182.0GB	5	-	10
218.4GB	6	-	-
220.2GB	-	3	-
254.8GB	7	-	-
291.2GB	8	-	-
293.6GB	-	4	-
327.6GB	9	-	-
364.0GB	10	-	-
367.0GB	-	5	-
440.4GB	-	6	-
513.8GB	-	7	-
587.2GB	-	8	-
660.6GB	-	9	-
734.0GB (max)	-	10	-

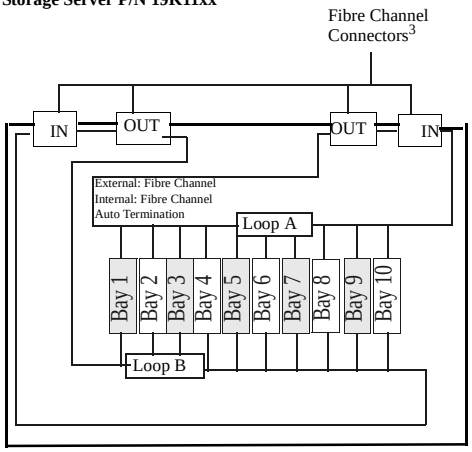
This table does not represent all valid hard disk drive (HDD) configurations.
1. Select a total storage row and then select the quantity of HDDs from a column corresponding to the HDD of choice. Total Internal Storage listed is within +- 0.2 GB unless otherwise noted.
2. When referring to hard disk drive capacity, GB equals one billion bytes. Total user accessible capacity may vary depending on operating environments.

Part Number	Description	RPM	Height	Bays Supported	Max. Qty Supported
19K0653	36.4GB 10K-4 FC Hot-Swap HDD	10000	SL	1...10	10
19K0654	73.4GB 10K-4 FC Hot-Swap HDD	10000	HH	1...10	10
06P5707	18.2GB 15,000rpm FC Hot-Swap HDD	15000	SL	1...10	10

External Storage Expansion Unit		Form Factor
19K11xx[4]	FAStT200 Storage Server[1,2,3]	Rack (3U)
19K11xx[5]	FAStT200 HA Storage Server[1,3]	Rack (3U)
19K1121	FAStT200 Redundant RAID Controller[2]	-
94G7448	Rack Power Cable Type C12 (3.7m)[3]	-

1. The FAStT200 Storage Server and HA Storage Server include two hot-swap, 350 W auto-ranging redundant power supplies each with it's own standard country power cord.
2. Can be upgraded to a FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
3. These units do not include Rack Power Cables P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). Standard country power cords only are included. If required, order one Rack Power Cable for each power supply.
4. Where 'xx' represents a country specific code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated
5. Where 'xx' represents a country specific code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.

IBM FAStT200 Storage Server P/N 19K11xx [1,2,4,6]
IBM FAStT200 HA Storage Server P/N 19K11xx [1,2,5,6]



IN = connection to host
OUT = connection to expansion units

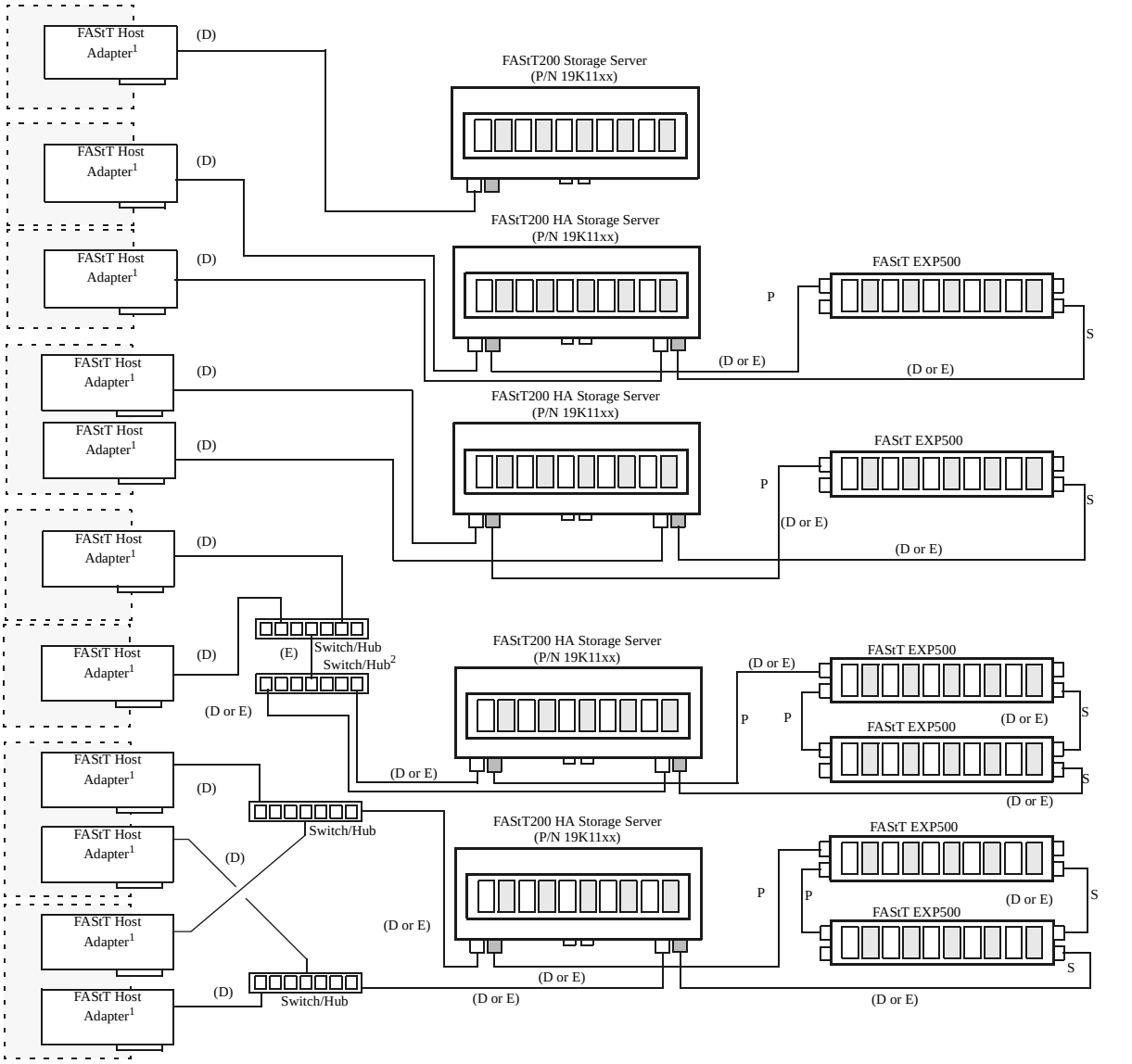
1. Housed in a 19" Rack mountable drawer and ships standard with redundant power supplies and two standard country power cables requiring separate power sources. Requires IBM industry standard 19" rack, EIA-310D, with a minimum depth of 24" (711.2 mm) or NetBAY3/3E.

Note: The FAStT200 Storage Server and HA Storage Server do not ship with a storage controller or external cables. Select these items from the Fibre Channel Device Ports Reference Chart in the Fibre Array Solutions section.

2. The FAStT200 Storage Server includes a single loop only. The second loop (shown in the diagram) is available with the addition of a FAStT200 Redundant RAID Controller P/N 19K1121. This configuration then becomes equivalent to the FAStT200 HA Storage Server.
3. GBICs are not included. Either Fibre Channel long wave GBICs P/N 03K9307 or short wave GBICs P/N 03K9308 may be used.
4. Where 'xx' represents a country specific code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated.
5. Where 'xx' represents a country specific code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
6. This unit does not include a Rack Power Cable P/N 94G7448 when shipped (for attachment to high voltage UPS or PDU). A standard country power cord only is included. If required, order one Rack Power Cable for each power supply.

Fibre / Fibre Configuration Examples (FAStT200)

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.



1. FAStT Host Adapter P/N 00N6881 supports short-wave connections only.
2. Buffering the long-wave optic cable expanse with a second switch or hub at the remote storage location is required to requalify the signal. A managed hub supports only one long-wave GBIC.

- P = primary path, S = secondary (redundant) path
- Shaded boxes represent separate hosts.
- Cable groups are represented by letters in parenthesis.
- Maximum of 60 external storage HDDs are supported for optimum performance (up to 10 in the storage server with the remainder in expansion units).
- The number of servers that can be used in configurations with managed hubs or Fibre Channel switches are dependent on partitioning restrictions of the management system or cluster software.
- An optional short- or long-wave GBIC is required for all FAStT200 storage server and FAStT EXP500 storage connections. GBICs are not depicted in these diagrams. See device drawings at the end of this section for details.
- Other Fibre Channel devices may not require optional GBICs. For specific requirements, see the Fibre Device Ports Reference.

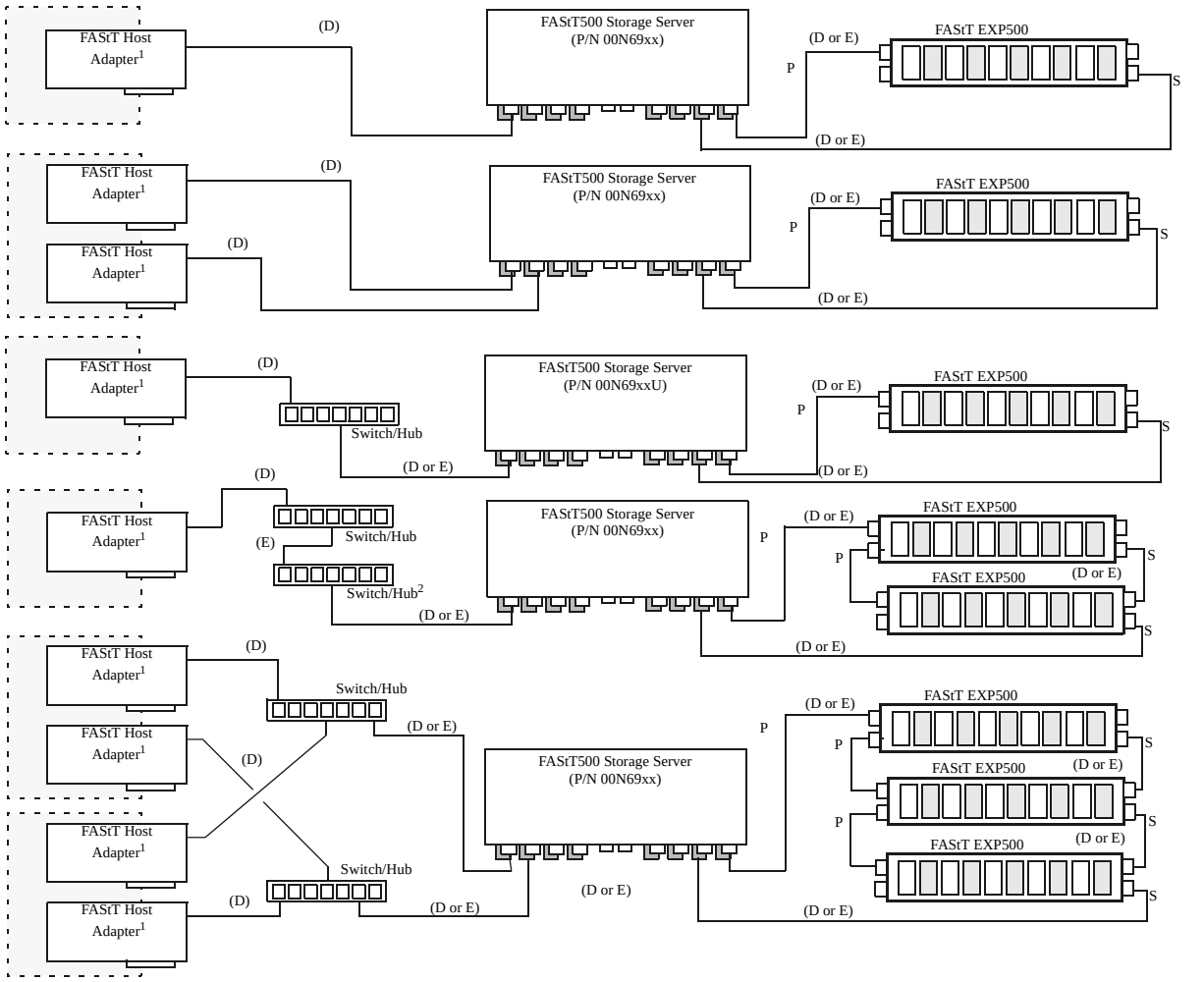
Cable Group D (short-wave Fibre Channel)
36L9973 - Netfinity Fibre Channel 1M Cable
03K9306 - Netfinity Fibre Channel 5M Cable
03K9305 - Netfinity Fibre Channel 25M Cable
Customer supplied short-wave cable of up to 500M (0.31 miles)

Cable Group E (long-wave Fibre Channel)
Customer supplied long-wave cable of up to 10KM 6.2 miles)

GBIC
03K9308 - Netfinity Fibre Channel Short-Wave GBIC
03K9307 - Netfinity Fibre Channel Long-Wave GBIC

Fibre / Fibre Configuration Examples
FAStT EXP500 with FAStT500 Storage Server

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.



1. FAStT Host Adapter P/N 00N6881 supports shortwave connections only.
2. Buffering the long-wave optic cable expanse with a second switch or hub at the remote storage location is required to requalify the signal.

- P = Primary path, S = Secondary/Redundant path
- Shaded boxes represent separate hosts.
- Cable groups are represented by letters in parenthesis.
- Maximum of 220 external storage HDDs are supported through 11 enclosures in each cable pair.
- The number of servers that can be used in configurations with managed hubs or Fibre Channel switches are dependent on partitioning restrictions of the management system or cluster software.
- An optional short- or long-wave GBIC is required for all FAStT500 storage server and FAStT EXP500 storage connections. GBICs are not depicted in these diagrams.
- Other Fibre Channel devices may not require optional GBICs. For specific requirements, see the Fibre Device Ports Reference.

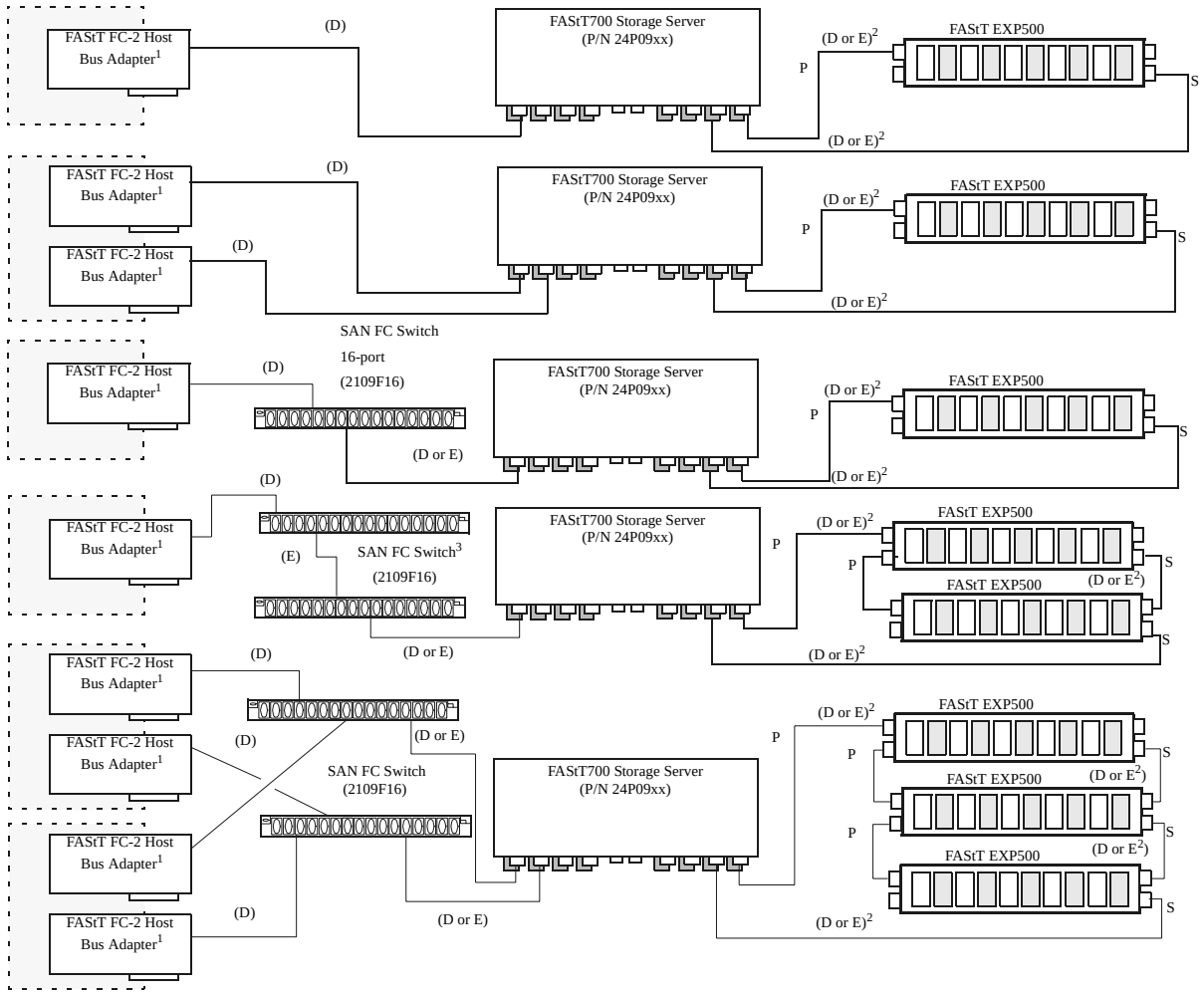
Cable Group D (Short-Wave Fibre)
36L9973 - Netfinity Fibre Channel 1M Cable
03K9306 - Netfinity Fibre Channel 5M Cable
03K9305 - Netfinity Fibre Channel 25M Cable
Customer supplied short-wave cable of up to 500M (0.31 miles)

Cable Group E (long-wave Fibre Channel)
Customer supplied long-wave cable of up to 10KM
(6.2 miles)

GBIC
03K9308 - Netfinity Fibre Channel Short-Wave GBIC
03K9307 - Netfinity Fibre Channel Long-Wave GBIC

Fibre / Fibre Configuration Examples
FAStT EXP500 with FAStT700 Fibre Channel Storage Server

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements.



1. FAStT FC-2 Host Bus Adapter P/N 19K1246 includes an integrated short-wave SFF Module, supporting short-wave connections only.
2. Fibre Channel connections to the FAStT EXP500 require GBICs. LC-LC Fibre Channel cable does not connect directly into a GBIC. LC-SC Fibre Channel Adapter Cable (P/N 19K1250) is required. Use SC Fibre Channel cable for daisy-chaining FAStT EXP500 units (see FAStT500 Storage Server configuration for a list of SC cables).
3. Buffering the long-wave optic cable expanse with a second switch or hub at the remote storage location is required to requalify the signal.

- P = Primary path, S = Secondary/Redundant path
- Shaded boxes represent separate hosts.
- Cable groups are represented by letters in parenthesis.
- Maximum of 220 external storage HDDs are supported through a maximum of 11 enclosures in each channel pair (22 enclosures total).
- The number of servers that can be used in configurations with managed hubs or Fibre Channel switches are dependent on partitioning restrictions of the management system or cluster software.
- An optional short- or long-wave GBIC is required for all FAStT500 EXP500 storage connections. FAStT700 and 2Gb FC switch connections require SFP Modules. LC-SC FC Adapter Cables are required to connect LC-LC FC cables to GBICs in FAStT EXP500 connections. GBICs, SFP Modules and adapter cables are not depicted in these diagrams.
- For specific requirements concerning connections, refer to the Fibre Device Ports Reference or Fibre Interconnection Guidelines.

Cable Group D (Short-Wave Fibre)
19K1247 - 1M LC-LC Fibre Channel Cable
19K1248 - 5M LC-LC Fibre Channel Cable
19K1249 - 25M LC-LC Fibre Channel Cable
Customer supplied short-wave cable of up to 500M (0.31 miles)

Cable Group E (long-wave Fibre Channel)
Customer supplied long-wave cable of up to 10KM (6.2 miles)

GBIC/SFP Modules
03K9308 - Netfinity Fibre Channel Short-wave GBIC
03K9307 - Netfinity Fibre Channel Long-wave GBIC
19K1271 - Short-wave SFP Module
19K1272 - Long-wave SFP Module
19K1250 - LC-SC Fibre Channel Adapter Cable

Fibre Interconnection Guidelines

Part Number	Description	00N6881 FAStT Host Adapter	00N6882 FAStT Mini Hub[1]	19K1121 FastT200 Red. Raid Controller[1]	2108R3L SAN Data Gateway Router	2109S08 SAN FC Switch, 8-Port[1]	2109S16 SAN FC Switch, 16-Port[1]	35L1647 SAN FC Managed Hub[1]	19K11xx[4] FAStT200 Storage Server[1]	19K11xx[5] FAStT200 HA Storage Server[1]	00N69xx[6] FAStT500 Storage Server[1]	00N71xx[7] FAStT EXP500[1]	09N4047 Fibre Tape Automation Adapter	3534F08 SAN Switch F08 8- port[2]	2109F16 SAN FC Switch 16- port[2]	19K1246 FAStT FC-2 Host Adapter	24P09xx[8] FAStT700 FC Storage Server[2]	19K1269 FAStT Mini Hub[2]	19K1250 LC-SC FC Adapter Cable[3]
00N6881	FAStT Host Adapter	-	S	S	-	S	S	S	S	S	S	-	-	S[4]	S[4]	-	S[4]	S[4]	H
19K1246	FAStT FC-2 Host Bus Adapter	-	S[5]	S[5]	-	S[5]	S[5]	-	S[5]	S[5]	S[5]	-	-	S	S	-	S	S	H
2108R3L	SAN Data Gateway Router UltraSCSI LVD Port	-	-	-	-	S	S	S	-	-	-	-	-	S[4]	S[4]	-	-	-	H
2109S08	SAN FC Switch, 8-Port[1]	S	E	E	S	E	E	-	E	E	E	E	S	E[4]	E[4]	E[4]	E[4]	E[4]	H
3534F08	TotalStorage SAN FC Switch 8-Port[2]	S	E[5]	E[5]	S[5]	E[5]	E[5]	-	E[5]	E[5]	E[5]	-	-	E	E	S	E	E	H
2109S16	SAN FC Switch, 16-Port[1]	S	E	E	S	E	E	-	E	E	E	E	S	E[4]	E[4]	E[4]	E[4]	E[4]	H
2109F16	SAN Fibre Channel Switch, 16-Port[2]	S	E[5]	E[5]	S[5]	E[5]	E[5]	-	E[5]	E[5]	E[5]	-	-	E	E	S	E	E	H
35L1647	SAN FC Managed Hub[1]	S	E	E	S	E	E	E	E	E	E	-	S	-	-	-	-	-	H
09N4047	Fibre Tape Automation Adapter	-	-	-	-	S	S	S	-	-	-	-	-	-	-	-	-	-	-
19K11xx[6]	FAStT200 Storage Server[1]	S	-	H	-	E	E	E	-	-	-	E	-	E	E	S[4]	-	-	H
19K11xx[7]	FAStT200 HA Storage Server[1]	S	-	-	-	E	E	E	-	-	-	E	-	E	E	S[4]	-	-	H
19K1121	FAStT200 Redundant RAID Controller[1]	S	-	-	-	E	E	E	H	-	-	E	-	-	-	S[4]	-	-	H
00N69xx[8]	FAStT500 Storage Server[1]	-	H	-	-	E	E	E	-	-	-	E	-	-	-	S[4]	-	-	H
00N6882	FAStT500 Mini Hub[1]	-	E	E	-	E	E	-	-	-	H	E	-	-	-	S[4]	-	-	H
00N71xx[9]	FAStT EXP500[1]	-	E	E	-	-	-	-	E	E	E	-	-	-	-	-	E[4]	E[4]	H
24P09xx[10]	FAStT700 Storage Server[2]	S[5]	-	-	-	E[5]	E[5]	-	-	-	-	E[5]	-	E	E	S	-	H	H
19K1269	FAStT700 Mini Hub[2]	S[5]	-	-	-	E[5]	E[5]	-	-	-	-	E[5]	-	E	E	S	H	-	H
03K9307	FC Long-Wave GBIC	-	H	H	-	H	H	H	H	H	H	H	-	-	-	-	-	-	H
03K9308	FC Short-Wave GBIC	-	H	H	-	H	H	H	H	H	H	H	-	-	-	-	-	-	H
19K1250	LC-SC Fibre Channel Adapter Cable[3]	H	H	H	H	H	H	H	H	H	H	H	-	H	H	H	H	H	-
19K1271	Short-Wave SFP Module	-	-	-	-	-	-	-	-	-	-	-	-	H	H	-	H	H	H
19K1272	Long-Wave SFP Module	-	-	-	-	-	-	-	-	-	-	-	-	H	H	-	H	H	H

S Short-wave connection only. See Fibre Device Ports Reference section for GBIC, SFP module or integrated optical port information.

E Either short-wave or long-wave connections allowed via the appropriate GBIC or SFP module. See Fibre Device Ports Reference section for GBIC, SFP module or integrated optical port information.

H Hardware connection: One of these devices installs directly into the other, e.g., the FAStT500 Mini Hub P/N 00N6882 installs directly into the FAStT500 Storage Server P/N 00N69xx[6] to provide GBIC availability.

1. This device requires the use of GBICs. Purchase of GBICs may be needed in order to make connections to this device. See the Fibre Device Ports Reference section for GBIC or integrated optical port information.
2. This device requires a long- or short-wave SFP module. See Fibre Device Ports Reference for additional information.
3. The LC-SC Fibre Channel Adapter Cable P/N 19K1250 is designed to connect any 1Gb device or cable to any 2Gb device or cable. When 2Gb and 1Gb technology are combined in a configuration, the signal transfer automatically converts to the slower speed.
4. When connected to 2Gb devices or cable, LC-SC Fibre Channel Adapter Cable P/N 19K1250 is required.
5. When connected to 1Gb devices or cable, LC-SC Fibre Channel Adapter Cable P/N 19K1250 is required.
6. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated.
7. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
8. Where 'xx' represents a country specific code as follows:- 13=US/English, 14=Euro/English, 18=Denmark/English, 19=Israel/English, 20=Italy/English, 21=South Africa/English, 22=Switzerland/English, 26=UK/English. Country/Language - Line Cords/Publications are included as indicated.
9. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/Language Line Cords/Publications are included as indicated.
10. Where 'xx' represents a specific country code as follows:- 14=Eur/English, 15=Euro/Spanish, 18=Denmark/English, 19=Israel/English, 20=Italy/English, 21=South Africa/English, 22=Switzerland/English, 25=UK/English. Country/Language Line Cords/Publications are included as indicated.

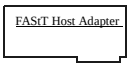
Fibre Device Ports Reference

Part Number	Description	Total Connections Possible	Integrated Ports[4]	Mini Hubs Possible	Mini Hubs Installed	GBIC or SFP Module Ports	GBICs or SFP Modules Included[4]
00N6881	FAStT Host Adapter	1	1	-	-	-	-
00N6882	FAStT500 Mini Hub[1]	2	-	-	-	2	-
03K9307	FC Long-Wave GBIC	1	-	-	-	-	-
03K9308	FC Short-Wave GBIC	1	-	-	-	-	-
09N4047	Fibre Tape Automation Adapter[2]	1	1	-	-	-	-
19K1121	FAStT200 Redundant RAID Controller	2	-	-	-	2	-
2108R3L	San Data Gateway Router UltraSCSI LVD Port[3]	1	1	-	-	-	-
2109S08	SAN FC Switch, 8-Port	8	-	-	-	8	4
3534F08	TotalStorage SAN FC Switch F08 8-port	8	-	-	-	8	4[10]
2109S16	SAN FC Switch, 16-Port	16	-	-	-	16	4
2109F16	SAN FC Switch, 16-Port	16	-	-	-	16	8[9]
35L1647	SAN FC Managed Hub	8	7	-	-	1	-
19K11xx[11]	FAStT200 Storage Server	2	-	-	-	2	-
19K11xx[12]	FAStT200 HA Storage Server	4	-	-	-	4	-
00N69xx[13]	FAStT500 Storage Server[5]	12	-	8	4	12[1]	-
00N71xx[14]	FAStT EXP500	4	-	-	-	4	-
19K1246	FAStT FC-2 Host Bus Adapter	1	1	-	-	-	-
24P09xx[15]	FAStT700 FC Storage Server[6]	12	-	8	4	12	-
19K1269	FAStT700 Mini Hub[7]	2	-	-	-	2	-
19K1250	LC-SC FC Adapter Cable[8]	1	1	-	-	-	-
19K1271	Short-Wave SFP Module	1	-	-	-	-	-
19K1272	Long-Wave SFP Module	1	-	-	-	-	-

1. Each FAStT500 Mini Hub provides two GBIC ports. The host-side mini hubs connect to one of two Fibre Channel controllers in the FAStT500 Storage Server. The drive-side mini hubs each connect to both Fibre Channel controllers. Full redundancy requires connection to two drive-side and two host-side mini hubs. Drive-side mini hubs support connection to one port only.
2. This adapter installs in a 3600 Series Tape Library and attaches to a FAStT Host Adapter or GBIC installed in a Fibre Channel Switch P/N 2109S08 or 2109S16 or a Managed Hub P/N 35L1647 via a short-wave Fibre Channel cable P/N 36L9973, 03K9306, 03K9305.
3. Provides one integrated short-wave optical port and two SCSI ports for tape storage connections (one LVD or HVD and one single-ended).
4. Standard GBICs, SFP Modules and integrated optical ports are short-wave.
5. FAStT500 Storage Server supports up to eight nonredundant or four redundant host connections and two redundant storage drive loops.
6. FAStT700 Storage Server supports up to eight nonredundant or four redundant host connections and two redundant storage drive loops.
7. Each FAStT700 Mini Hub provides two SFP Module ports. The host-side mini hubs connect to one of two Fibre Channel controllers in the FAStT700 Storage Server. The drive side mini hubs each connect to both Fibre Channel controllers. Full redundancy requires connection to two drive-side and two host-side mini hubs. Drive-side mini hubs support connection to one port only.
8. The LC-SC Fibre Channel Adapter Cable P/N 19K1250 is designed to connect any 1Gb device or cable to any 2Gb device or cable. When 2Gb and 1Gb technology are combined in a configuration, the signal transfer automatically converts to the slower speed.
9. Eight short-wave SFP modules are standard. Either short-wave or long-wave modules can populate the other eight ports.
10. Four short-wave SFP modules are standard. Either short-wave or long-wave modules can populate the other four ports.
11. Where 'xx' represents a specific country code as follows:- 23=US/English, 24=Euro/English, 25=Euro/Spanish, 27=Euro/German, 28=Denmark/English, 29=Israel/English, 30=Italy/English, 31=South Africa/English, 32=Switzerland/English, 34=Switzerland/German, 36=UK/English. Country/Language - Line Cords/Publications are included as indicated.
12. Where 'xx' represents a specific country code as follows:- 37=US/English, 38=Euro/English, 39=Euro/Spanish, 41=Euro/German, 42=Denmark/English, 43=Israel/English, 44=Italy/English, 45=South Africa/English, 46=Switzerland/English, 48=Switzerland/German, 50=UK/English. Country/Language - Line Cords/Publications are included as indicated.
13. Where 'xx' represents a country specific code as follows:- 13=US/English, 14=Euro/English, 18=Denmark/English, 19=Israel/English, 20=Italy/English, 21=South Africa/English, 22=Switzerland/English, 26=UK/English. Country/Language - Line Cords/Publications are included as indicated.
14. Where 'xx' represents a specific country code as follows:- 36=US/English, 37=Euro/English, 41=Denmark/English, 42=Israel/English, 43=Italy/English, 44=South Africa/English, 45=Switzerland/English, 49=UK/English. Country/Language Line Cords/Publications are included as indicated.
15. Where 'xx' represents a specific country code as follows:- 14=Eur/English, 15=Euro/Spanish, 18=Denmark/English, 19=Israel/English, 20=Italy/English, 21=South Africa/English, 22=Switzerland/English, 25=UK/English. Country/Language Line Cords/Publications are included as indicated.

Supported Cable Groups	
Cable Group A (0.8mm to 0.8mm)	
03K9310	2M Ultra2 SCSI Cable
03K9311	4.2M Ultra2 SCSI Cable
37L7101	20M Ultra2 SCSI Cable
Cable Group D (Short-Wave Fibre)	
36L9973	Fibre Channel 1M Cable
03K9306	Fibre Channel 5M Cable
03K9305	Fibre Channel 25M Cable
19K1247	1M LC-LC Fibre Channel Cable
19K1248	5M M LC-LC Fibre Channel Cable
19K1249	25M M LC-LC Fibre Channel Cable
Customer supplied short-wave cable of up to 500M (0.31 miles)	
Cable Group E (Long-Wave Fibre)	
Customer supplied long-wave cable of up to 10KM (6.2 miles)	
GBIC/SFP Modules	
03K9308	Fibre Channel Short-Wave GBIC
03K9307	Fibre Channel Long-Wave GBIC
19K1271	Short-wave SFP Module
19K1272	Long-wave SFP Module
19K1250	LC-SC Fibre Channel Adapter Cable

FAStT Host Adapter
P/N 00N6881

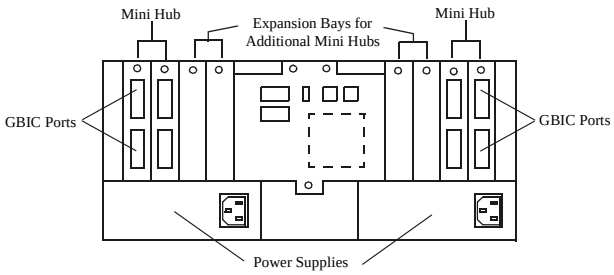


- PCI to FCAL 64/32-bit host adapter.
- Supported Attachments: FAStT500 Storage Server P/N 00N69xx. (use cable group D)
- Integrated short-wave optical port. No GBICs required.
- Full Fibre Channel fabric support.

FAStT FC-2 Host Bus Adapter
P/N 19K1246

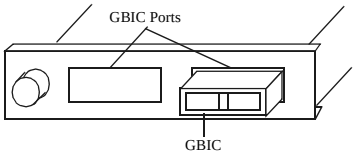
- PCI-X to FCAL 64-bit host adapter (100MHz).
- Supported Attachments:- FAStT700 Storage Server P/N 24P09xx. (use LC-LC cable in group D
- Integrated short-wave optical port. No SFP Modules required.
- Full Fibre Channel fabric support.

FAStT500 Storage Server
P/N 00N69xx



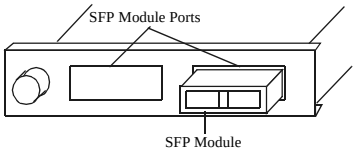
- Dual high-performance, RAID controller cards--supports up to 380MB/sec of throughput.
- Two 175W auto-ranging, hot-swap, redundant power supplies.
- Attach directly to FAStT Host Adapter(s) P/N 00N6881 with short- wave cables and GBICs or indirectly through SAN Fibre Channel Managed Hub P/N 35L1647 or either the 8-port or 16-port Fibre Channel Switch P/N 2109S08 or 2109S16, using cables from cable group D or E with corresponding GBICs.
- Height is 4U (1U = 1.75in or 44.45mm).
- For optimum performance no more than two FAStT500 Storage Servers P/N 00N69xx should be attached to a single hub P/N 35L1647.
- Includes four FAStT500 Mini Hubs P/N 00N6882, two for host and two for drive-side.
- FAStT500 256MB Cache P/N 00N6883 may be required for more complex installations.
- All connections to FAStT500 Mini Hubs require the use of GBICs. GBICs are not included.

FAStT500 Mini Hub
P/N 00N6882



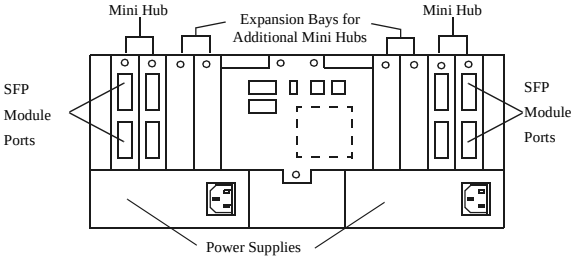
- Provides additional connections to the FAStT500 Storage Server supports complex clustering or advanced storage applications.
- All connections to FAStT500 Mini Hubs require the use of GBICs. GBICs are not included.

FAStT700 Mini Hub
P/N 19K1269



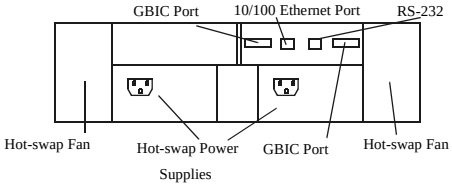
- Provides additional connections to the FAStT700 Storage Server supports complex clustering or advanced storage applications.
- All connections to FAStT700 Mini Hubs require the use of SFP Modules, which are not included.

FAStT700 Storage Server
P/N 24P09xx



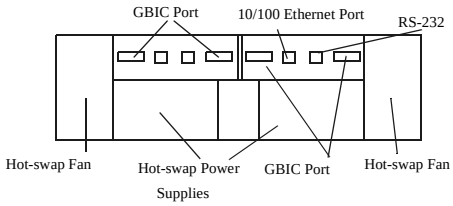
- Dual high-performance RAID controller cards--supports up to 390MB/s of throughput.
- Operates at either 1Gb or 2Gb (autosensing).
- Dual 175W auto-ranging, hot-swap, redundant power supplies.
- Attach directly to FAStT FC-2 Host Bus Adapter(s) P/N 19K1246 with short-wave cables and SFP Modules or indirectly through the SAN Fibre Channel Switch, 16-port P/N 2109F16 using LC-LC cables from cable group D or E with corresponding SFP Modules.
- Height is 4U (1U = 1.75in or 44.45mm)
- For optimum performance no more than two FAStT700 Storage Servers P/N 24P09xx should be attached to a single Fibre Channel switch.
- Includes four FAStT700 Mini Hubs P/N 19K1269, two host-side and two storage drive-side.
- Each controller is equipped with 1GB of cache (2GB total).
- All connections to FAStT700 Mini Hubs require the use of SFP Modules, which are not included.

FAStT200 Storage Server P/N 19K11xx



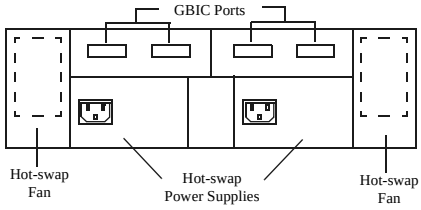
- Contains a single hot-plug, RAID controller which provides a single host Fibre Channel arbitrated loop and a single storage Fibre Channel arbitrated loop.
- Can be upgraded to a FAStT200 HA Storage Server through the addition of a FAStT200 Redundant RAID Controller P/N 19K1121.
- Integrated 10/100Mbps Ethernet connector and RS-232 service support port.
- Performance optimised for 30 HDDs - supports optional FAStT EXP500 Storage Expansion Units P/N 00N71xx.
- Two hot-swap 350W auto-ranging, redundant power supplies.
- Redundant fans: two hot-swap, dual-fan units.
- LED indicators on all critical components warn of faults, over-temperature, and other abnormalities.
- Ten drive bays--supports slim-line or half-high Fibre Channel hot-swap HDDs.
- Height is 3U (1U=1.75in or 44.45mm.
- Supports long- and short-wave connections. Requires optional GBICs for each connection. GBICs not included.

FAStT200 HA Storage Server P/N 19K11xx



- Contains two hot-plug, RAID controllers. Each controller provides a single host Fibre Channel arbitrated loop and a single storage Fibre Channel arbitrated loop.
- Integrated 10/100Mbps Ethernet connector and RS-232 service support port.
- Performance optimised for 30 HDDs-- supports optional FAStT EXP500 Storage Expansion Units P/N 00N71xx.
- Two hot-swap 350W auto-ranging, redundant power supplies.
- Redundant fans - two hot-swap, dual-fan units.
- LED indicators on all critical components warn of faults, over-temperature, and other abnormalities.
- Ten drive bays - supports slim-line or half-high Fibre Channel hot-swap HDDs.
- Height is 3U (1U=1.75in or 44.45mm).
- Supports long- and short-wave connections. Requires optional GBICs for each connection. GBICs not included.

FAStT EXP500 Storage Expansion Unit P/N 00N71xx

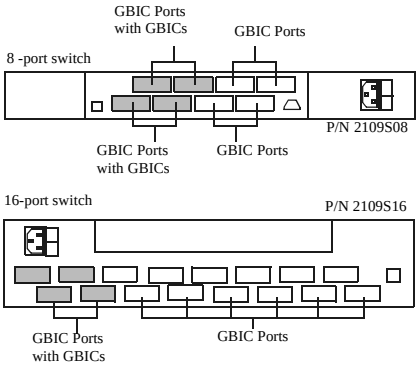


- Two hot-swap, 350W auto-ranging, redundant power supplies.
- Redundant fans - two hot-swap, dual-fan units.
- LED indicators on all critical components warn of faults, over-temperature, and other abnormalities.
- Ten drive bays - supports slim-high or half-high Fibre Channel hot-swap HDDs.
- Height is 3U (1U = 1.75in or 44.45mm).
- Requires optional GBICs for each connection. GBICs not included.

LC-SC Fibre Channel Adapter Cable P/N 19K1250

- Nine-inch adapter cable used to connect 1Gb cable or devices to 2Gb cable or devices.
- Remove the clip-on connector (B) at one end and plug into the FAStT Host Adapter integrated GBIC (or any short-wave GBIC). Use the double-female 2Gb-2Gb open connector that ships with the FAStT700 Storage Server to attach the male connector of LC-LC Fibre Channel cable to the male connector at the other end of the adapter cable (A).
- Use the 2Gb connector (A) to attach to an SFP or SFF Module, then remove the black caps from the clip-on connector and insert 1Gb cable.

SAN Fibre Channel Switch, 8 and 16 Ports P/Ns 2109S08 and 2109S16

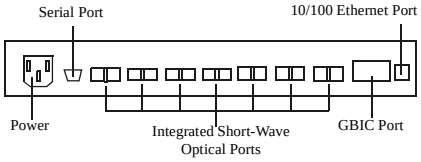


- Each port delivers up to 100MB/sec, full-duplex data transfer.
- Comes with four short-wave GBICs installed.
- Embedded Web browser configuration, management and service.
- Support for Public Fibre Channel Arbitrated Loops.
- Optional power supply P/N 09L5403 available.
- The 8-port switch is 1U (1U=1.75in or 44.45mm) and the 16-port switch is 2U.

SAN Fibre Channel Switch, 16-Port P/B 2109F16

- Provides 2Gb per second port-to-port throughput with autosensing capability for connecting to 1Gb per second host servers, storage and switches with full operability.
- Contained in a 1U mechanical requiring half the rack space of the 1Gb 16-port switch.
- Up to four Inter-Switch Links can be trucked for throughput of up to 8Gb per second.
- Includes a comprehensive set of management tools that support a Web browser interface.
- Eight short-wave SFP Modules (optical transceivers) are standard.
- Built-in redundancy with no single points of failure.
- Supports up to 384 ports in a single 42U rack (scalable to 239 switches maximum).
- Ships with one hot-swap 126W power suppy as standard. Redundant power supply P/N 18P3576 is optional.

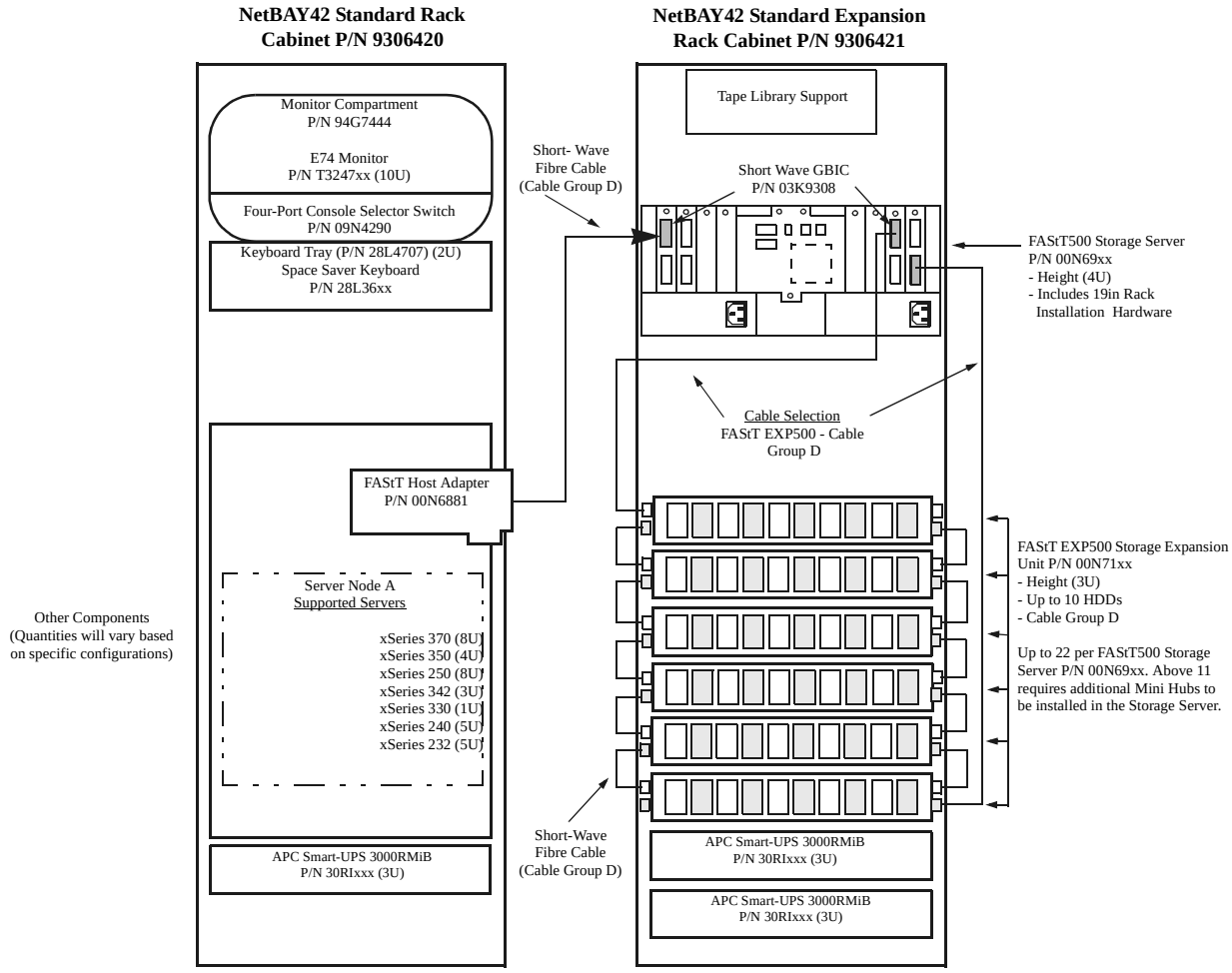
SAN Fibre Channel Managed Hub P/N 35L1647



- High-speed performance utilizing nonblocking switch-based technology.
- Simultaneous 100MB/sec full duplex data transfers across all ports.
- Eight ports total, one that is configurable with either an optional short-wave or long-wave GBIC and seven integrated short-wave optical ports.
- Support for industry standard MIBs enabling standard SNMP management.
- Height is 1U (1U=1.75in or 44.45mm).

High-speed, single-node xSeries Fibre Channel storage configuration offering performance, bandwidth & capacity

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements



Connector Types
68-pin - High Density Connector
0.8mm - Very High Density Connection Interface (VHDCI)

Cable Group A (0.8mm to 0.8mm)
03K9310 - Netfinity 2M Ultra2 SCSI Cable
03K9311 - Netfinity 4.2M Ultra2 SCSI Cable
37L7101 - Netfinity 20M Ultra2 SCSI Cable

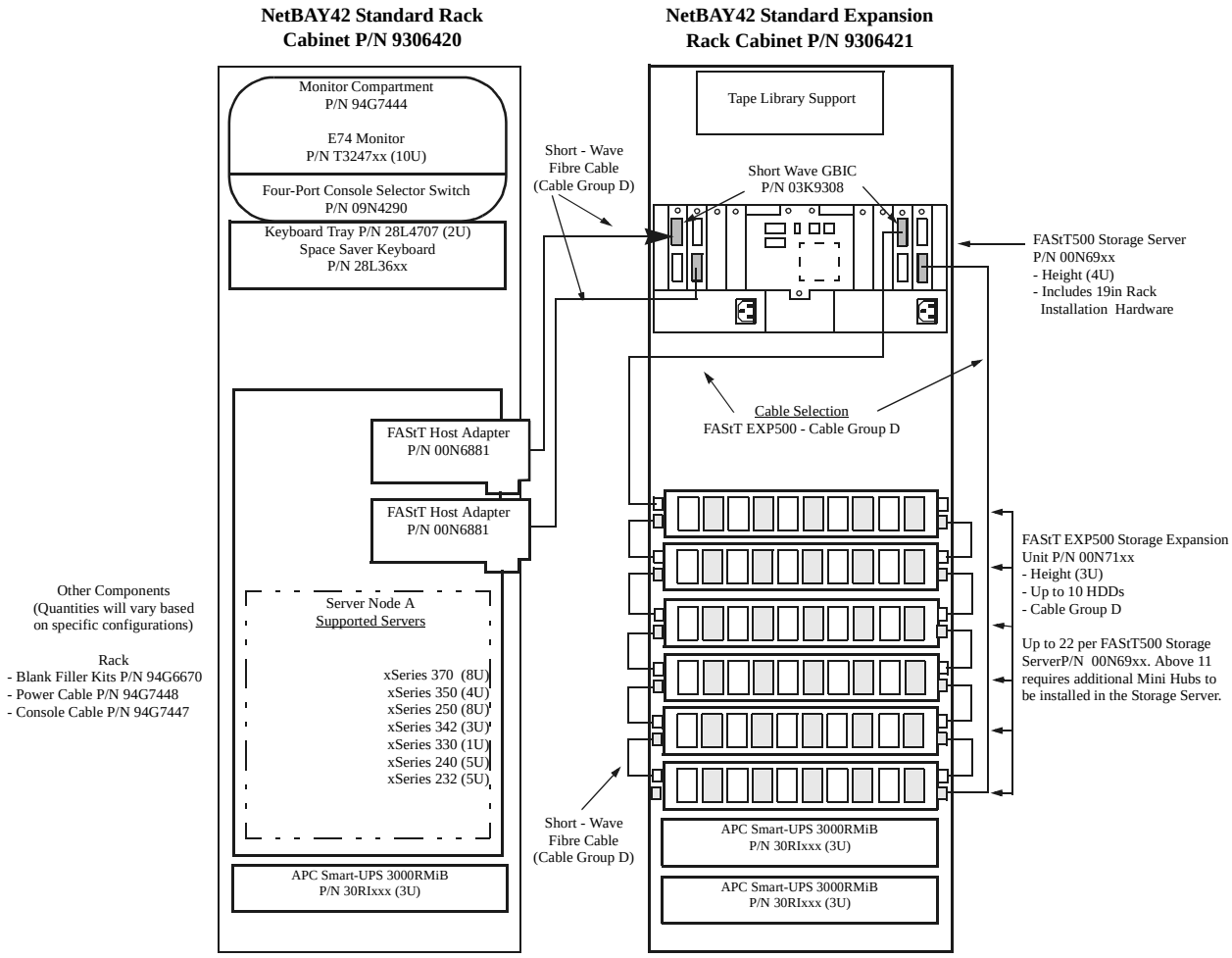
Cable Group D (Short-Wave Fibre)
36L9973 - Netfinity Fibre Channel 1M Cable
03K9306 - Netfinity Fibre Channel 5M Cable
03K9305 - Netfinity Fibre Channel 25M Cable
Customer supplied short-wave cable of up to 500m (0.31 miles)

Cable Group E (Long-Wave Fibre)
Customer supplied long-wave cable of up to 10km (6.2 miles)

GBIC
03K9308 - Netfinity Fibre Channel Short-Wave GBIC
03K9307 - Netfinity Fibre Channel Long-Wave GBIC

High-speed, single-node xSeries Fibre Channel storage configuration with Microsoft NT failover support and RAID redundancy for availability, performance and capacity

Note: The following sample configurations are for illustration only and may not be suitable for any specific customer installation. Contact your IBM Business Partner or IBM Marketing Representative for assistance with your specific configuration requirements



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03K9305 - Netfinity Fibre Channel 25M Cable
Customer supplied short-wave cable of up to 500m (0.31 miles)

Cable Group E (Long-Wave Fibre)
Customer supplied long-wave cable of up to 10km (6.2 miles)

GBIC
03K9308 - Netfinity Fibre Channel Short-Wave GBIC
03K9307 - Netfinity Fibre Channel Long-Wave GBIC

NetBAY Rack Cabinets and Options

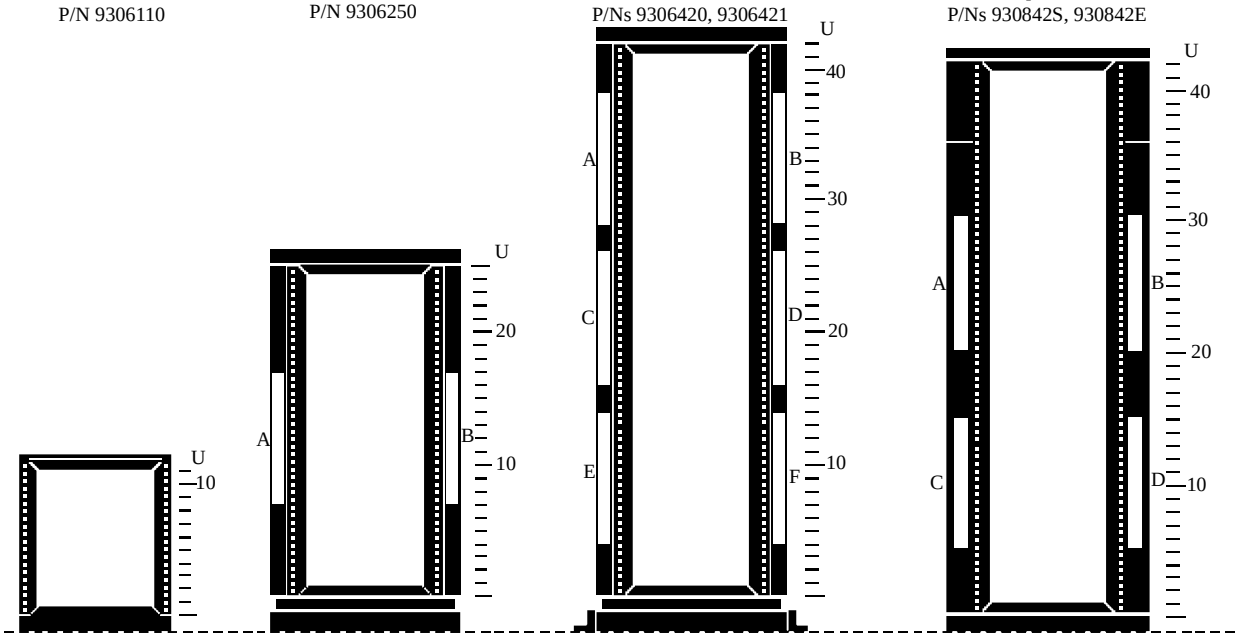
Note: For a robust rack configurator application access URL http://www.ibm.com/pc/europe/configurators

IBM NetBAY11
Standard Rack
P/N 9306110

IBM NetBAY25
Standard Rack
P/N 9306250

IBM NetBAY42
Standard Rack
P/Ns 9306420, 9306421

IBM NetBAY42
Enterprise Rack
P/Ns 930842S, 930842E



	IBM NetBAY11 Standard Rack	IBM NetBAY25 Standard Rack[3]	IBM NetBAY42 Standard Rack		IBM NetBAY42 Enterprise Rack	
Machine Type / Model	**9306110**	**9306250**	**9306420**	**9306421**	**930842S**	**930842E**
EIA Capacity[1]	11U	25U	42U	42U	42U	42U
Sidewall Compartments	0	2	6	6	4	4
Front Stabilisers	Std	Std	Std	Std	Std	Std
Side Stabilisers	NR	NR	Std	Std	NR	NR
Casters	Std	Std	Std	Std	Std	Std
Leveling Feet	NA	Std	Std	Std	Std	Std
Side Covers	Std	Std	Std	NR	Std	NR
Rack Attachment Kit[2]	NA	NA	NR	Std	NR	Std
Glass Front Door	NA	NA	NA	NA	NA	NA
Perforated Front Door	Std	Std	Std	Std	Std	Std
Height (mm/in)[4]	611 / 24.1	1360 / 53.5	2076 / 81.7	2076 / 81.7	2020 / 79.5	2020 / 79.5
Width (mm/in)	518 / 20.4	600 / 23.6	600 / 23.6	600 / 23.6	648 / 25.5	648 / 25.5
Depth (mm/in)	873 / 34.4	1000 / 39.4	1000 / 39.4	1000 / 39.4	1105 / 43.5	1105 / 43.5
Empty Weight (kg/lb)	34 / 75	80 / 177	117 / 258	92 / 202	261 / 575	234 / 516
Max Load (kg/lb)	182 / 401	385 / 849	646 / 1424	646 / 1424	667 / 1470	667 / 1470
Total Weight (kg/lb)	216 / 476	465 / 1026	763 / 1682	738 / 1626	928 / 2045	901 / 1986
Shippable Loaded[5]	Yes	Yes	No	No	Yes	Yes

NR - Not Required **N/A** - Not Available **1U**= 1.75in= 44.45mm.

1. Conforms to EIA 310 - D Standard 19in rack specification for a Type A cabinet with universal hole spacing.
2. Required to attach racks together to make a suite.
3. Display and keyboard may be placed on top of the NetBAY25.
4. Minimum clearance to the ceiling is 305mm / 12in.
5. Shippable loaded means the cabinet is capable of being transported with equipment installed. Required packaging is provided. The integrator/ assembler is responsible for assuring the stability of the shipped configuration. Rack Integration Services are available from IBM.

	Server System Rack and Stack Cabinets Cross-Reference												
	Conversion Kits					Stacks		Standard Racks[1]				Enterprise Racks[1]	
	P/N 09N4300 4Ux20D Tower-to-Rack Kit	P/N 21P9593 5Ux24D Tower-to-Rack Kit II	P/N 59P4211 5Ux24D Tower-to-Rack Kit III	P/N 32P1474 7Ux26D Tower-to-Rack Kit	P/N 37L6859 8Ux24D Tower-to-Rack Kit	P/N 10L6912 NetBAY3[3] Stackable Enclosure	P/N 36L9701 NetBAY3E[3] Stackable Enclosure	P/N 9306110 NetBAY11	P/N 9306250 NetBAY25	P/N 9306420 NetBAY42 Rack - Standard	P/N 9306421 NetBAY42 Rack - Expansion	P/N 930842S NetBAY42 Enterprise Rack - Standard	P/N 930842E NetBAY42 Enterprise Rack - Expansion
Servers[7]													
xSeries 200[2]	X							X	X	X	X	X	X
xSeries 220[2]	X							X	X	X	X	X	X
xSeries 232		X						X	X	X	X	X	X
xSeries 235			X					X	X	X	X	X	X
xSeries 250					X	X[3]		X	X	X	X	X	X
xSeries 255				X				X	X	X	X	X	X
xSeries 300[4]							X[5]	X	X	X	X	X	X
xSeries 330[4]							X[5]	X	X	X	X	X	X
xSeries 342								X	X	X	X	X	X
xSeries 350								X	X	X	X	X	X
xSeries 370[6]							X[3]	X	X	X	X	X	X
xSeries 380								X	X	X	X	X	X
xSeries 440								X	X	X	X	X	X

1. See the other charts in this section for additional information concerning IBM rack-supported devices.
2. Rack installation requires appropriate Conversion Kit.
3. A maximum of three NetBAY3 or NetBAY3E enclosures may be stacked beneath a supported system unit. NetBAY3 and NetBAY3E enclosures (now withdrawn) are shipped separately and not while attached to the server system unit. The x370 requires Rack to Tower Kit P/N 28L4705 (now withdrawn) if being used with NetBAY3E.
4. Blank filler panels supplied in Kit P/N 94G6670 should be placed on the front of any unused rack space to aid proper airflow through the x300 and x330 system units. If non-IBM racks are used, assure that both the front and rear doors offer a minimum of 48% open area uniformly distributed and in line with the installed servers. A clearance of at least 51mm (2in) must be maintained between the front door and the system unit's front bezel. The rear door must maintain the same or greater clearance.
5. Up to three xSeries 300s or 330s may be installed inside a NetBAY3E stackable enclosure, when the enclosure is installed beneath a supported server.
6. Stand-alone tower installation requires appropriate Conversion Kit. Note: xSeries 370 Rack-to-Tower Kit P/N 28L4705 was withdrawn from marketing on 31/12/01.
7. xSeries systems ship with standard country power cords. For connection of a Rack model to a high voltage UPS or PDU, or if a Tower model is being converted for rack installation and is to be connected to a UPS or PDU, a Rack Power Cable P/N 94G7448 (one for each power supply), must be ordered. Refer to the appropriate product seciton for more information about server power configuration.

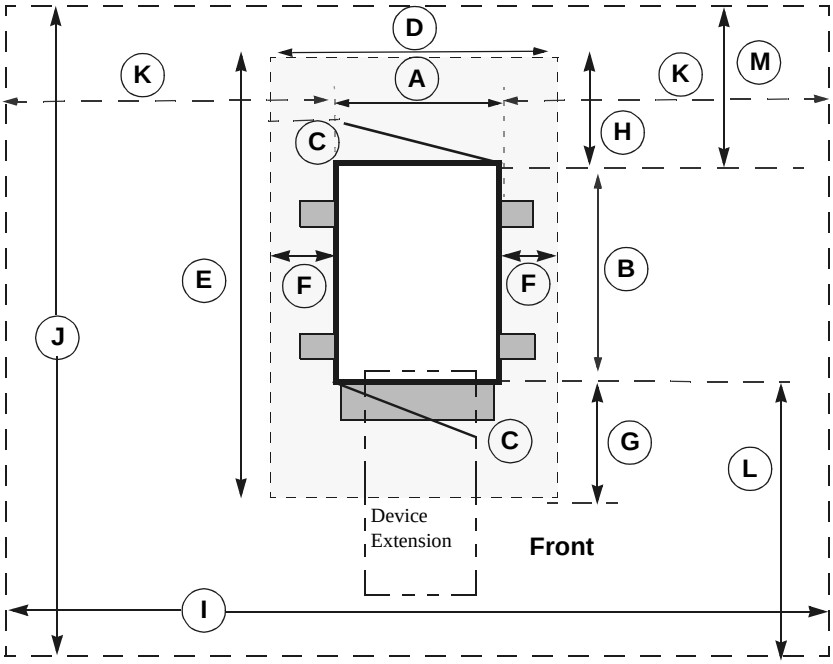
IBM Rack Mountable Units						
Description	**Part Number (if applicable)**	**Size (U)[6]**	**Depth (mm)**	**Approx Weight (Kg)**	**Power (Watts) Typical /Max (All cords to same source)**	**Number of Power Supplies and Line Cords[7] Typical/Max**
Server System Units						
x200[1]	-	4	508	19	245/350	1/1
x220[1]	-	4	508	19	245/350	1/1
x232	-	5	635	35	385/550	1/1[2]
x232 with Power Conversion[2]	-	5	635	36	420/600	2/3[2]
x235[3]	-	5	610	38	560/800	1/2
x250	-	8	610	56	350/475	2/4
x255[4]	-	7	635	54	530/1000	2/2
x300[5]	-	1	635	13	140/200	1/1
x330[5]	-	1	635	13	140/200	1/1
x342	-	3	660	28	262/375	1/2
x350	-	4	711	34	365/525	1/3
x360 (K72RXxx, K73RXxx)	-	3	711	28	520/740	2/3
x360 (K71RXxx)	-	3	711	26	260/740	1/3
x370	-	8	711	73	1015/1450	3/3
x380	-	7	737	68	1400/2000	2/2
x440[8]	-	4	711	54	800/950	2/2
I/O Units						
RXE-100	86841RX	3	660	25	260/370	2/2
Storage Units						
EXP300	P/N 19K11xx	3	534	41	285/360	2/2
FAStT200	P/N 19K11xx	3	559	25	275/390	2/2
FAStT200HA	P/N 19K11xx	3	559	25	275/390	2/2
FAStT500 Storage Server	P/N 00N69xx	4	610	34	140/200	2/2
FAStT700 Storage Server	P/N 24P09xx	4	610	38	140/200	2/2
FAStT EXP500 Storage Expansion Unit	P/N 00N71xx	3	559	27	245/350	2/2
SAN FC Switch 8-port	P/N 2109S08	1	432	8	-/200	1/2
SAN FC Switch 16-port	P/N 2109S16	2	432	13	-/200	1/2
SAN FC Switch 16-port	P/N 2109F16	1	635	13	-/200	1/2
Tape Unit/Enclosure						
NetMEDIA	P/N 03K8756	3	482	17	130/185	2/2
DLT Tape Library	P/N 00N79xx	4	508	32	-/135	1/1
3600 Series LTO Tape Library	P/N 21P99xx	5	686	38	500/700	1/1
3600 Series Expander Module	P/N 21P99xx	5	686	34	599/700	1/1
Other Options						
NetBAY 1 x 4 Console Switch	P/N 09N4290	1	203	2	-/100	1/1
NetBAY 2 x 8 Console Switch	P/N 09N4291	1	203	3	-/100	1/1
1U Flat Panel Console Kit w/o Keyboard	P/N 32P1032	1	610	12	-/100	1/1
2U Flat Panel Console Kit w/o Keyboard	P/N 32P1703	2	686	14	-/100	1/1

1. Requires 4Ux20D Tower-to-Rack Kit P/N 09N4300 to mount server unit into an EIA rack cabinet.
2. One 385W power supply standard on models P/N P811Xxx, P81RXxx, P821Xxx, P82Rxxx, P841Xxx, P84Rxxx. Two 250W power supplies on redundant models P/N P822Xxx, P82SXxx, P842Xxx, P84SXxx, P824Xxx, P82TXxx, P844Xxx, P84TXxx, K854Xxx, K85TXxx. The xSeries Hot-Swap Power Conversion Kit P/N 24P3513 supports up to three hot-swap power supplies. If converting a 385W model, remove the standard power supply and add the conversion kit with 250W power supplies. Models shipped redundant as standard do not require the conversion kit.
3. Require 5Ux24D Tower to Rack Kit P/N 59P4211 to mount the server into an EIA Rack Cabinet. Models are available with both a single 560W non hot-swap power supply and two 560W hot-swap power supplies.
4. Tower models require 7Ux26D Tower to Rack Kit P/N 32P1474 to mount server into an EIA Rack Cabinet.
5. To provide adequate cooling, blank filler panel kit P/N 94G6670 should be placed on the front of any unused rack space. If non-IBM racks are to be used, assure that both front and rear doors offer a minimum of 48% open area uniformly distributed and in line with installed servers. A clearance of 51 to 64mm (2 to 2.5in) must be maintained between the front of the door and the system units front bezel. The rear door must maintain the same or greater clearance. Non-rack installations are not supported.
6. 1U= 1.75in= 44.45mm.
7. Standard Country Line Cords only are supplied standard with all units except the x380 which is shipped with 2 Rack power cords only. Rack Power Cord P/N 94G7448 (one for each power supply) must be ordered optionally for the other models if connecting to a high voltage UPS or PDU. **Note**: the x440 is shipped with Rack power cords and standard country power cords.
8. Internal power supply logic limits low voltage (100-127VAC) to 550w per power supply. Thus, configurations requiring more power are not redundant for low voltage installations, e.g., configurations with more than two processors.

General rack placement rules and other information:
- Locate heaviest components at the bottom of the rack (i.e. UPS, then servers or storage, etc.)
- Do not extend more than one component on side rails at a time.
- Maximum of three UPS (including no more than two APC 5000 UPS) per rack.
- Utilise side compartments for mounting PDUÕs and console switches prior to using EIA space.
- When mounting components in a rack, consider user and service requirements.
- When selecting length of power, console and storage cables, consider extension of cable management arms and overall cable routing.
- BTUs = Watts x 3.41

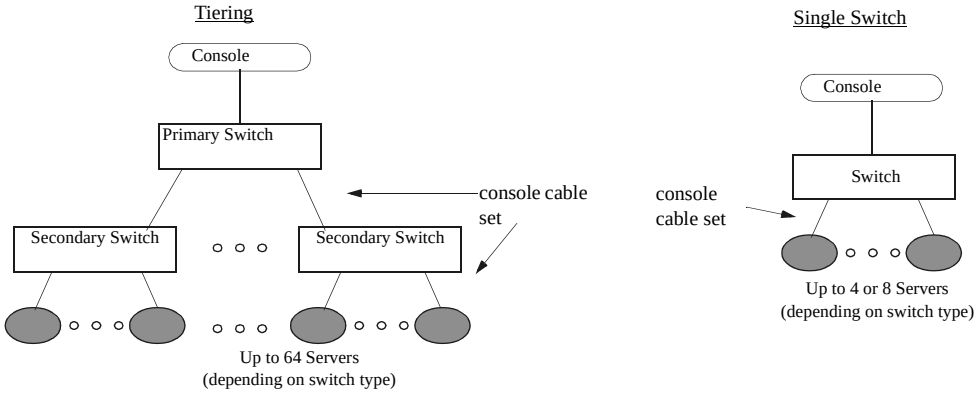
Rack-Mountable Options		
Part Number	**Description**	**Information**
28L4707	Rack Keyboard Tray	Supports Keyboards in racks, also used with Flat Panel Monitor Rack Mount Kit II
28L36xx[1]	Space Saver II Keyboard	1U, includes TrackPoint IV, requires Rack Keyboard Tray P/N 28L4707
94G7444	Monitor Compartment	
T3147xx[2]	E54 Color Monitor	9U, requires Monitor Compartment P/N 94G7444
T3247xx[2]	E74 Color Monitor	10U, requires Monitor Compartment P/N 94G7444
T274Axx[2]	G78 Color Monitor	10U, requires Monitor Compartment P/N 94G7444
37L6888	Flat Panel Monitor Rack Mount Kit II	Requires Rack Keyboard Tray P/N 28L4707
32P1032	NetBAY 1U Flat Panel Monitor Console Kit w/o Keyboard	1U, built-in 15inch Flat Panel Monitor (15in viewable image), space for Space Saver Keyboard.
32P1703	NetBAY 2U Flat Panel Monitor Console Kit w/o keyboard	2U, built-in 15inch Flat Panel Monitor (15in viewable image), space for SpaceSaver Keyboard
09N4290	NetBAY 1 x 4 Console Switch	1U, mounts in sidewall compartments, EIA space, or Monitor Compartment; supports one to four servers, one console
09N4291	NetBAY 2 x 8 Console Switch	1U, mounts in sidewall compartments, EIA space, or Monitor Compartment; supports one to eight servers, two consoles (only one console when installed in the Monitor Compartment
09N4293	NetBAY Console Cable Set - 2.1m (7ft)	Connects servers to console switch
94G7447	NetBAY Console Cable Set - 3.7m (12ft)	Connects servers to console switch
37L68xx[4]	NetBAY Rack PDU (EMEA)	1U, 100-240V, 15A, mounts in sidewall compartment or EIA space, 7 IEC 320-C13 outlets
37L6866	NetBAY Rack PDU (US)	1U, 100-240V, 15A, mounts in sidewall compartment or EIA space, 7 IEC 320-C13 outlets, requires one NEMA L5-20R or L6-20R wall receptacle
37L68xx[5]	NetBAY Server Dual-cord PDU (EMEA)	1U, 100-240V, 15/10A, mounts in sidewall compartment or EIA space, 4 IEC 320-C13 outlets
37L6865	NetBAY Server Dual-cord PDU (US)	1U, 100-240V, 15/10A, mounts in sidewall compartment or EIA space, 4 IEC 320-C13 outlets, requires two NEMA L5-20R or L6-20R wall receptacles
37L6885	NetBAY 200-240V Single-phase Front-end PDU	1U, 200-240V, shared 20A, mounts in sidewall compartment, 3 IEC 320-C19 outlets
37L6883	NetBAY 100-127V Single-phase Front-end PDU	1U, 100-127V, shared 30A, mounts in sidewall compartment, 3 IEC 320-C19 outlets, requires one NEMA L5-30R wall receptacle
37L6887	NetBAY 3-phase Front-end PDU	1U, 200-415V, shared 30A, mounts in sidewall compartment, 3 IEC 320-C19 outlets
32P16xx[6]	APC 2U Smart-UPS 1400RMiB	2U, 220-240V, four - 10 Amp, IEC 320-C13 outlets
30RIxxx[3]	APC Smart-UPS 3000RMiB	3U, 220-240V, eight - 10 Amp IEC 320-C13 and one -16 Amp IEC 320-C19 outlets
37L6862	APC Smart-UPS 5000RMiB	5U, 220-240V, eight - 10 Amp IEC 320-C13 and two -16 Amp IEC 320-C19 outlets
94G6670	Blank Filler Panel Kit	Consists of one 5U, one 3U, and two 1U blank filler panels
94G7442	Fixed Shelf	Supports equipment weighing up to a total of 45Kg
94G7448	Rack Power Cord -Type C12	IEC 320-C13 to IEC 320-C14 3.7m (12ft)

1. Where ‘xx’ represents country specific code: 46=Danish , 47=France, 48=Germany, 49=Italian, 50=Spanish, 51=UK English, 44=US English, and P/N 19K3831=Switzerland, 19K3832=Sweden/Finland, 19K3833=Portugal, 19K3834=Belgium, 19K3836=Russia, 19K3837=Poland.
2. Where ‘xx’ represents a specific country code: DK=Denmark, IS=Israel, IT=Italy, SD=Saudi Arabia, SA=South Africa, CH=Switzerland, UK=UK, EU=Europe.
3. Where ‘xxx’ represents the appropriate country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
4. Where ‘xx’ represents the appropriate country code as follows:- 66=US/Saudi Arabia, 68=EU, 70=Denmark/Switzerland, 72=Israel, 74=Italy, 76=South africa, P/N 06P6028=UK.
5. Where ‘xx’ represents the appropriate country code as follows:- 65=US/Saudi Arabia, 67=EU, 69=Denmark/Switzerland, 71=Israel, 73=Italy, 75=South africa, P/N 06P6027=UK.
6. Where ‘xx’ represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.



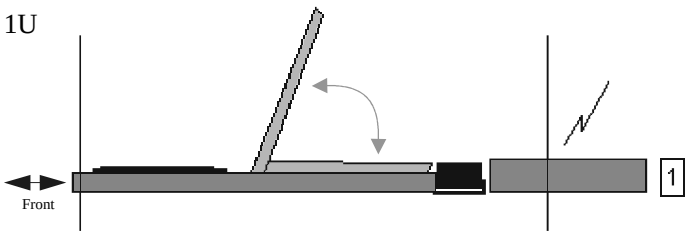
	Rack Cabinets P/Ns 9306110 millimetres(inches)	Rack Cabinets P/Ns 9306xxx millimetres(inches)	Rack Cabinets P/N 9308xxx millimetres(inches)	Description
Box Footprint				
Dimension A	518(20.4)	597(23.5)	648(25.5)	Width of rack
B	874(34.4)	1001(39.4)	1105(43.5)	Depth of rack (not including front stabilizer)
C	533(21)	610(24)	660(26)	Front and rear door clearance
Operational Clearance				
Dimension D	620(24.4)	699(27.5)	749(29.5)	Width of Operational Clearance area
E	1890(74.4)	2372(93.4)	2794(110)	Depth of Operational Clearance area
F	51(2)	51(2)	51(2)	Left/Right sides of rack to Operational Clearance area
G	762(30)	762(30)	914(36)	Front of rack to Operational Clearance area
H	254(10)	610(24)	660(26)	Rear of rack to Operational Clearance area
Service Clearance				
Dimension I	660(26)	2426(95.5)	2477(97.5)	Width of Service Clearance area
J	1989(78.3)	3287(129.4)	3391(133.5)	Depth of Service Clearance area
K	71(2.8)	914(36)	914(36)	Left/Right sides of rack to Service Clearance area
L	914(36)	1524(60)	1524(60)	Front of rack to Service Clearance area
M	762(30)	762(30)	762(30)	Rear of rack to Service Clearance area

Console Switch Arrangements



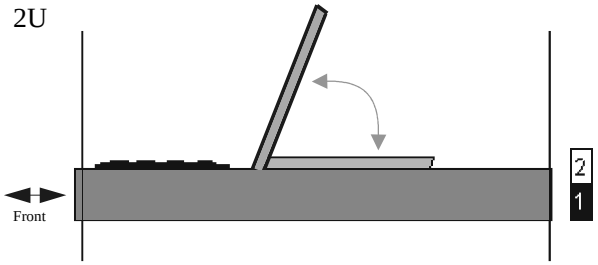
Flat Panel Monitor Console Kits
(slide out and flip up)

1U



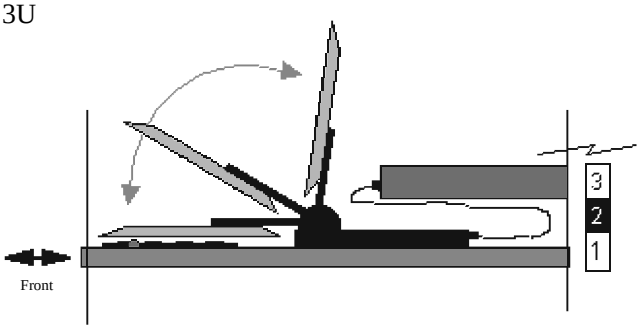
Console switch
- o Mounts to rear flanges
- o Shares 1U space with console switch

2U



Console switch
- o Not mounted in same space as Console Kit
- o Mounted in sidewall compartment

3U



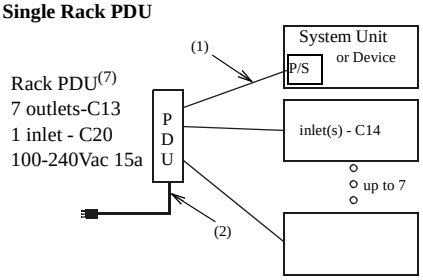
Console switch
- o Mounts to rear flanges
- o Shares 3U space with display, keyboard and tray

Keyboard tray components
- o P/N 28L4707 Netfinity Rack Keyboard Tray
- o P/N 37L6888 Netfinity Flat Panel Monitor Rack Mount Kit II
- o P/N 28L36xx Space Saver Keyboard
- o P/N T11AGxx T540 TFT Color Monitor

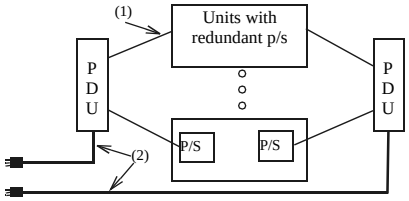
NetBAY Rack Power Configuration Examples

Possible Power Configurations:

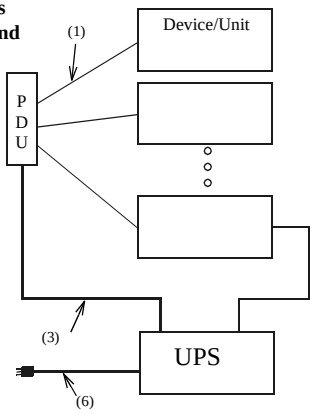
Single Rack PDU



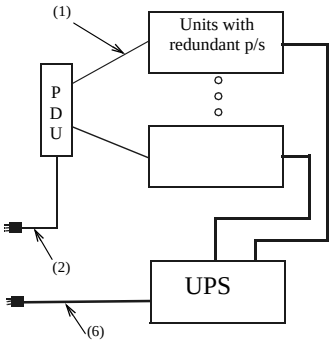
Redundant Power Distribution



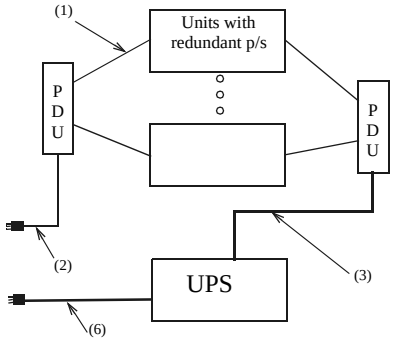
PDU used as UPS back-end



Redundant Power Distribution with PDU and UPS

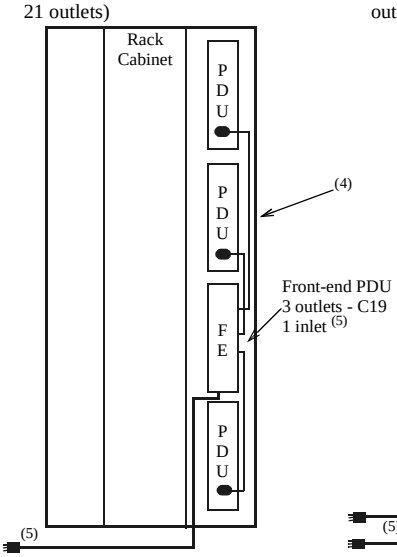


Redundant Power Distribution with PDU and UPS with PDU

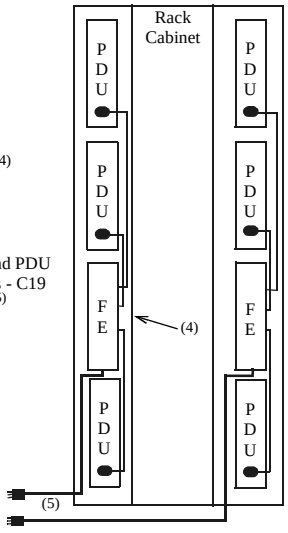


Typical Rack Power Configurations:

Simple -- three Rack PDUs and one Front-end PDU (single circuit, 21 outlets)



Redundant -- six Rack PDUs and two Front-end PDUs (dual circuit, 42 outlets)



Key:

inlet/outlet = direction of power supply flow in relation to subject device.

C13/C19 = Female Connectors
C14/C20 = Male Connectors

Rack Rules:

Total PDUs (LV PDUs, HV PDUs, Rack PDUs, Server PDUs, FE PDUs) = 8
Total Server PDUs = 3
Total Front-end PDUs = 2

Outlets:	**C19**	**C13**
Rack PDU	0	7
Server PDU	0	4
Front-end PDU	3	0
APC 1400RMiB UPS	0	4
APC 3000RMiB UPS	1	8
APC 5000RMiB UPS	2	8

NOTES:

1. RackPower Cables P/N 94G7448 (14ft) need to be ordered for each system unit or external enclosure etc. (one for each power supply). Refer to the appropriate product section for more details. This cable has a C13 connecror one end and a C14 connector on the other end.
2. Each PDU comes with a country-specific power cord.
3. Internal rack power cable provided with APC SmartUPS 5000 UPS.
4. Internal rack power cable provided with Front-end PDU.
5. A power plug is provided with each Front-end PDU for connection (PDU end) to a customer-supplied (inlet) power cable.
6. UPS comes with a country-specific (inlet) power cord or provides a terminal block for connection of a customer-supplied power cable.
7. The NetBAY Server Dual-Cord PDU has two C20 inlet connectors and four C13 outlets. It is designed to provide switchover of the four attached devices to the alternate supply circuit in case of degradation of the primary.

Note: the Customer is required to provide a dedicated power supply circuit for each line cord protected with an appropriate circuit breaker.

Country-Specific Considerations: Europe, Middle East and Africa

Power Cables:

(1). Device to PDU or UPS Rack Power Cable
Option P/N 94G7448 3.7m (12ft)
Connectors = IEC C13 and C14
Rating: 10/15a

(2). Rack and Server PDU to wall line cords
Connectors = IEC C19 and country-specific
Rating: 16/20a, 4.3m (14ft)

(3). Rack PDU to UPS power cable x2
Connectors/Rating = IEC C19 and C20, 16/20a
provided with APC 5000RMiB UPS P/N 37L6862

(4). Rack PDU to Front-end PDU power cables x3
Connectors/Rating = IEC C19 and C20, 16/20a
provided with the Front-end PDU

(5). Front-end PDU to wall line cord
special to country-specific connector,
30/32a, 8.2ft (2.5m)

Rack and Server PDUs - Line Cords Included

PDU Part Number	Country	Inlet Line Cord Plug Type	Source Circuit (single phase 50/60Hz)	PDU Output (single phase 50/60Hz)
37L6866	USA/ Saudi Arabia	NEMA L5-20P	100-127Vac, 20a	seven 100-127Vac, shared 15a
		NEMA L6-20P	200-240Vac, 20a	seven 200-240Vac, shared 15a
37L6868	European	CEE7-VII	220-240Vac, 16a	
37L6870	Denmark/Switz.	IEC 309-2P+Gnd	220-240Vac, 16a	
37L6872	Israel	SII 32	220-240Vac, 16a	
37L6874	Italy	CEI 23-16	220-240Vac, 16a	
37L6876	South Africa	SABS 164	220-240Vac, 16a	
06P6028	UK	BS 1363/A	220-240Vac, 13a	

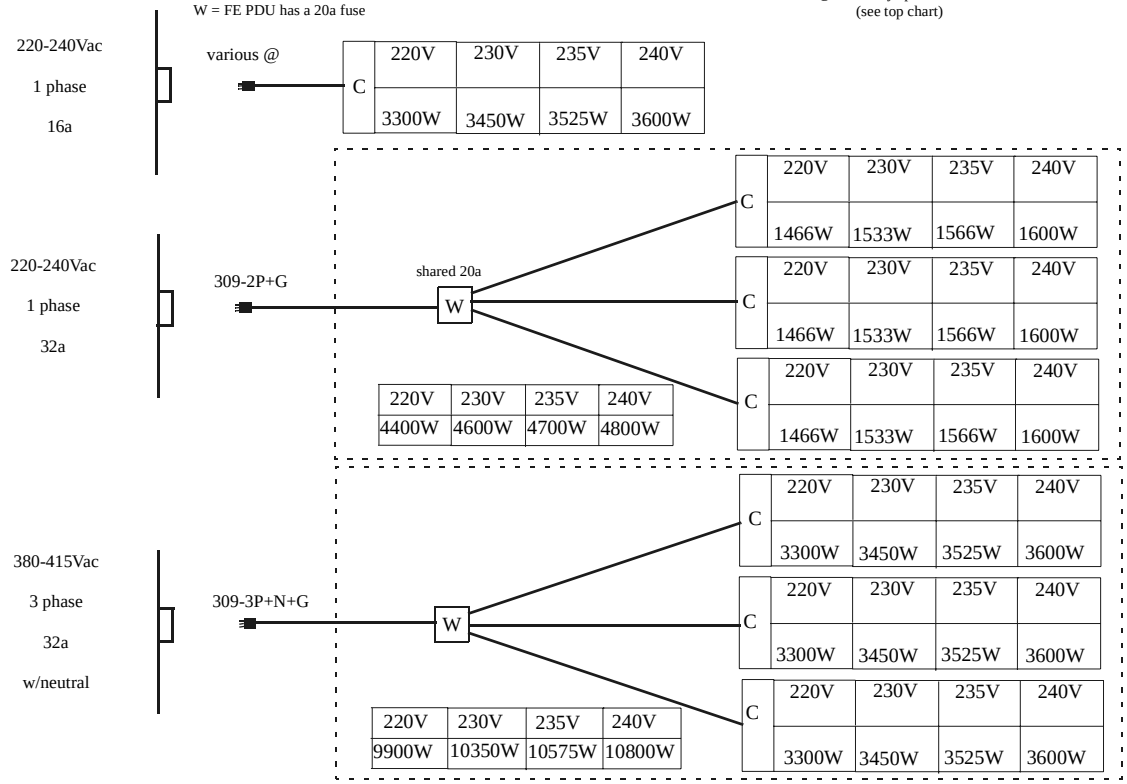
Front-end PDUs - Line Cord or Connector Plug provided

Part Number	Region	Type	Source Circuit (50/60Hz)	PDU Output (single phase 50/60Hz)
37L6883	Low Voltage (example: USA)	Plug: NEMA L5-30P Cable Provided	100-127Vac, 30a, single-phase	three 100-127Vac, 20a each, shared 30a
37L6884	High Voltage (example: USA)	Plug: NEMA L6-30P Cable Provided	200-240Vac, 30a, single phase line-to-line with ground	three 200-240Vac, shared 20a
37L6886	(example: USA)	Plug: NEMA L21-30P Cable Provided	200-250Vac, 30a, three-phase Y-connection with neutral	three 100-127Vac (115-145), 20a each
37L6885	(ex: Europe, M/ East, Africa)	IEC 309-2P+Gnd (inlet plug provided)	220-240Vac, 32a, single-phase	three 220-240Vac, 16a each, shared 32a
37L6887	(ex: Europe, M/ East, Africa)	IEC 309-3P+N+Gnd (inlet plug provided)	380-415Vac, 32a, three-phase Y-connection with neutral	three 220-240Vac, 16a each

Max. Power Load Capacity -- xSeries Rack Systems

NOTE:
C = Rack PDU has a 15a circuit breaker
W = FE PDU has a 20a fuse

@ = country specific:
(see top chart)



Appendix A: Tape Drive Attributes

Form Factor
LEGEND
HH: Half High - approx. height of 1.6”
SL: Slim Line - approx. height of 1”
FH: Full High

Part Number	Withdrawn ddmmyy[17]	Description	SCSI Interface (bit)	Form Factor	Max GB-Native/Compr.[2]	MB/sec - Native/compr.[2]	Termination Incl.	68/50-pin Converter Incl.	Internal Cables	Data/Clean. Ctridgs Std	Ext. Tape Enclosures[1]
Tape Drives											
20L0549	-	10/20GB TR5 Internal IDE Tape Drive	-	89mm (3.5in) SL or 133mm (5.25in) HH	10/20	1/2	-	-	-	1/0	-
48P7042	-	20/40GB TR7 Internal IDE Tape Drive	-	89mm (3.5in) SL or 133mm (5.25in) HH	20/40	2/4	-	-	-	1/1	-
09N4041	-	12/24GB DDS/3 4mm Internal Tape Drive	8	89 mm (3.5in) HH or 133 mm (5.25in)HH	12/24	1.1/2.2	Y	Y	-	1/1	10L7440 03K8756
00N7991	-	20/40 GB DDS/4 4-mm Internal Tape Drive	16 Ultra2 LVD	89 mm (3.5in) HH or 133 mm (5.25in)HH	20/40	2.75/5.5	Y[15]	-	-	1/1	10L7440[4], 03K8756[3]
09N4042	25/06/02	10/20GB NS Internal SCSI Tape Drive	8	89 mm (3.5in) SL or 133 mm (5.25in)HH	10/20	1/2	Y	Y	-	1/0	10L7440, 03K8756
09N4040	30/04/02	20/40GB DLT Internal SCSI Tape Drive[16]	8	133 mm (5.25in)FH	20/40	1.5/3	N[16]	Y	-	1/1	03K8756[16]
00N7990	-	40/80 GB DLT Internal SCSI Tape Drive	16 Ultra2 LVD	133 mm (5.25in)FH	40/80	6/10	Y[15]	-	-	1/1	24P24xx[14], 03K8756[3]
00N8016	-	100/200 GB LTO Tape Drive	16 Ultra2 LVD	133 mm (5.25in)FH	100/200	15/30	Y[15]	-	-	1/1	24P24xx[14], 03K8756[3]
24P2396	-	100/200GB LTO Half-High Tape Drive	16 Ultra2 LVD	133mm (5.25in) HH	100/200	8/16	Y[15]	-	-	1/1	03K8756[3]
00N8015	-	110/220GB Super DLT Internal SCSI Tape Drive	16 Ultra2 LVD	133mm (5.25in) FH	110/220	11/22	Y[15]	-	-	1/1	24P24xx[14], 03K8756[3]
24P2398	-	40/80GB Half-High DLTVS Internal SCSI Tape Drive	16 Ultra2 LVD	133mm (5.25in) HH	40/80	3/6	Y[15]	-	-	1/1	03K8756[3]
Associated Options											
00N7956	-	68-pin External Multimode LVD/SE SCSI Terminator	16 LVD/SE	Ext.	-	-	Y	N	-	-	10L7440
10K2340	-	Media Bay Tray and LVD Cable Kit[5, 15, 16]	16 LVD	Int.	-	-	Y	N	16-bit 2-drop	-	03K8756
Tape Autoloaders											
00N79xx[12]	-	DLT Tape Autoloader	16	Desktop	280/560	5/10	Y	-	-	1/1	-
00N7992	-	120/240 GB DDS/4 Tape Autoloader	16 Ultra2 LVD	133 mm (5.25”)FH	120/240	3/6	Y[15]	-	-	5/1	24P24xx[14], 03K8756
09N40xx[13]	-	3600 Series 900GB/1.8TB LTO Tape Autoloader[6]	16 Ultra2 LVD	Tower or 6U Rack	900GB/ 1.8TB	15/30	Y	-	-	1/1	-
49P32xx[18]	-	3607 Series 1760GB/1.8TB SDLT Tape Autoloader	16 Ultra2 LVD	2U Rack	1760GB/ 3.53TB	11/22	Y	-	-	1/1	-

Form Factor
LEGEND
HH: Half High - approx. height of 1.6”
SL: Slim Line - approx. height of 1”
FH: Full High

Part Number	Withdrawn ddmmyy[17]	Description	SCSI Interface (bit)	Form Factor	Max GB-Native/Compr.[2]	MB/sec - Native/compr.[2]	Termination Incl.	68/50-pin Converter Incl.	Internal Cables	Data/Clean. Ctridgs Std	Ext. Tape Enclosures[1]
External Tape Enclosures											
10L7440	-	External Half High SCSI Storage Enclosure[7]	8/16	Desktop	-	-	N	N	8-bit or 16-bit	-	-
03K8756	-	NetMEDIA Storage Expansion Unit EL[8]	16	Rack	-	-	Y	N	16-bit, 4-drop	-	-
10L7113	-	NetMEDIA Systems Management Adapter[9]	16	-	-	-	N	N	N	-	03K8756
24P24xx[14]	-	IBM Full-High SCSI Tape Enclosure[10]	16 Ultra2 LVD	Desktop or 3U Rack	-	-	Y	N	16-bit	-	-

1. To determine cable requirements, note the tape drive’s SCSI interface, the appropriate SCSI controller from the system configurator section and the desired enclosure then refer to Appendix D: Cables-Storage Units-Controllers. For installation of an internal tape drive into a server, see the appropriate system section.
2. Data compression typically provides a 2X improvenent in capacity and transfer rate, bur since data compression is affected by many factors, actual improvements may be more or less than 2X.
3. LVD support for LVD devices installed in a NetMEDIA Storage Expansion Unit P/N 03K8756, requires replacement of the standard single-ended internal cable with either the cable shipped with the tape option (see **note 15**), or the two-drop, terminated LVD cable provided by Media Bay Tray and LVD Cable Kit P/N 10K2340. If the standard cables are used for attachment to LVD devices, single-ended SCSI rules and bus speeds apply.
4. Requires 68-pin External Multimode LVD/SE SCSI Terminator P/N 00N7956.
5. Media Bay Tray and LVD Cable Kit P/N 10K2340 includes an internal two-drop multi-mode terminated LVD SCSI cable.
6. If installed in a rack, a fixed shelf is required.
7. Provides a black desktop 5.25” half-high (HH) tape enclosure. Connector is configurable as 50-pin Centronix or 68-pin high density. Requires either tape drive self termination or 68-pin External Multimode LVD/SE SCSI Terminator (P/N 00N7956).
8. NetMEDIA Storage Expansion Unit EL P/N 03K8756 is a black 3U, 19” rack or NetBAY3/3E mountable tape enclosure which includes two full high (FH) or four half-high (HH) extended length 5.25” bays, two external 68-pin high density connectors and two internal four-drop single-ended terminated 16-bit SCSI cables for device attachment. Two power supplies and two standard country power cords are also included. Use of the two standard 4-drop single-ended cables shipped with the NetMEDIA Enclosure is supported, to provide one or two LVD buses, when this option is installed.
9. NetMEDIA Systems Management Adapter P/N 10L7113 may be installed in a NetMEDIA Storage Expansion Unit to provide repeater function, LVDS interface, aggregate cable lengths up to 12 meters when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8-mm VHDCI.
10. Black desktop or 3U rack tape enclosure supports 133mm (5.25in) full-high LVD tape devices including DLT technology. Requires a fixed shelf if installed in a rack. Will replaces Tape Enclosure P/N 03K8705.
11. A combination data/cleaning cartridge cleans the drive each time the data cartridge is used.
12. Where ‘xx’ represents a country specific code: 70=UK, 71=Swiss, 72=Italy, 73=Israel, 33L4981=EU1, 33L4982=Denmark, 33L4983=South Africa/India.
13. Where ‘xx’ represents a country specific code: 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.
14. Where ‘xx’ represents a country specific code: 35=UK, 39=Swiss, 40=Italy, 41=Israel, 36=EU, 37=Denmark, 38=South Africa.
15. **Special Note**: The following Tape Drives are now shipping with a single-drop terminated LVD SCSI Cable (864mm/34inches in length):- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2398, 24P2396. The inclusion of this cable removes the need to order the Media Bay Kit (P/N 10K2340), to provide LVD support for many models when attaching one of these tape drives internally to the standard SCSI controller. This cable can also be used in the NetMEDIA Storage Enclosure P/N 03K8756 to provide termination and LVD support for one of these tape drives when they are being attached externally. Bear in mind that this is a single-drop cable. If two tape drives are being installed in the external enclosure, the Media Bay Kit P/N 10K2340 will be required to provide the two-drop terminated LVD cable.
16. When Tape Drive P/N 09N4040 is installed internally, it requires the use of a terminated cable such as the two-drop LVD SCSI cable included with the Media Bay Tray and LVD Cable Kit P/N 10K2340. External attachment for tape P/N 09N4040 requires either the two-drop cable included with the Media Bay Tray and LVD Cable Kit P/N 10K2340 or the NetMEDIA Adapter P/N 10L7113 to be installed in the NetMEDIA Storage Enclosure, to provide termination for the drive.
17. Not available from IBM after this date. Business Partner inventory may be available.
18. Where ‘xx’ represents a country specific code: 40=UK, 41=Eur, 42=Denmark, 43=South Africa, 44=Switzerland, 45=Italy, 46=Israel.

Note: Tape support varies by system depending on internal bay availability, SCSI cabling type, number of cable drops, existence of a RAID controller and availability of a suitable external enclosure. The following general rules should be followed.
a) Tapes are not supported for attachment to RAID controllers.
b) Single-ended (non-LVD) devices may be attached to internal multi-mode terminated cables. The entire SCSI bus will be limited to single-ended operation with a maximum bus speed of Ultra-SCSI.
c) LVD devices attached to single-ended terminated cables will operate in single-ended mode with a maximum bus speed of Ultra-SCSI.

Internal SCSI Cables and Optional SCSI Adapters
Most systems support the following SCSI adapters for use with tape. Consult the I/O Options table in the system sections for specific system support. Where tapes are supported internal to the system, the cables which ship with the adapters are supported for tape attachment. Some restrictions may apply based on cable and tape type which are explaned in the note above.

Part Number	Description	Cable Description	External Connector
02K3454	PCI Fast/Wide Ultra SCSI Adapter	Four-drop, single-ended terminated, 16-bit	68-pin high density
19K4646	PCI Wide Ultra160 SCSI Adapter	Five-drop, multi-mode terminated	0.8mm VHDCI
10K2340	Media Bay Tray and LVD Cable Kit	Two-drop, multi-mode terminated	-

Appendix B: Tape Library Attributes

SCSI Interface & Cable Legend
M: Male - External
68: 16-bit, 68-pin High Density connector
0.8: 16-bit, 68-pin Very High Density Connection Interface (VHDCI) 0.8 mm connector
SE: Single-ended SCSI
HVD: High Voltage Differential SCSI
LVD: Low Voltage Differential SCSI

Part Number	Withdrawn: ddmmyy[13]		SCSI Interface	Form Factor	Terminator Included	External Cables Incl	SCSI Controllers Incl	Data Cartridges: std/max	Cleaning Cartridges std.	Cartridge Mags std/max	Qty. of drives: std./max	Max Storage: Native/ Compressed	MB/sec[1]: Native/compr.
DLT Tape Libraries													
00N79xx[9]	-	DLT Tape Library - Tower	SE	Desktop	Y	M68-M68 (3m)	Y	1/14	1	2/2	1/3	490GB/ 980GB	5/10
00N79xx[9]	-	DLT Tape Library - Rack[2]	SE	4U Rack	Y	M68-M68 (3m)	Y	1/14	1	2/2	1/3	490GB/ 980GB	5/10
33L4979	-	DLT Library Drive Upgrade[3]	SE	-	N	Jumper	N	-	-	-	-	-	5/10
3600 Series Tape Libraries													
21P99xx[10]	31/01/02	3600 Series 2/4TB LTO Tape Library (Tower)	LVD	Tower	Y	M68-M0.8 (2m)	N	1/20	1	4/4	1/2	2TB/4TB	15/30
21P99xx[11]	-	3600 Series 2/4TB LTO Tape Library (Rack)	LVD	5U Rack	Y	M68-M0.8 (2m)	N	1/20	1	4/4	1/2	2TB/4TB[8]	15/30
21P99xx[11]	-	3600 Series 2-Drive, 20-Cartridge Expander Module[4]	LVD	5U Rack	Y	M68-M0.8 (2m)	N	0/20	1	4/4	0/2	2TB/4TB	15/30
09N40xx[12]	-	3600 Series 900GB/1.8TB LTO Tape Autoloader[5]	LVD	Tower or 6U Rack	Y	M68-M0.8 (2m)	N	1/9	1	1/1	1/1	900/1.8TB	15/30
09N4048	-	3600 Series LTO Drive Upgrade Option[6]	LVD	-	N	Jumper (1m)	N	-	-	-	-	-	15/30
09N4047	-	Fibre Tape Automation Adapter[7]	LVD	-	-	M68-M08 (2 x 18in)	-	-	-	-	-	-	-

1. Transfer rates are for single SCSI Channel configurations. Tape Libraries utilising split library or dual host configurations may obtain higher rates. Data compression typically provides a 2X improvement in capacity and transfer rate, bur since data compression is affected by many factors , actual improvements may be more or less than 2X.
2. Includes Fixed Shelf P/N 94G7442 for installation in an IBM Rack or NetBAY22.
3. Upgrade 33L4979 is an additional drive for DLT Tape Libraries. Up to two tape drives may be installed for a maximum of three drives per DLT Tape Library
4. NOTE: The 3600 Series 2-Drive, 20-Cartridge Expander Module is designated as IBM Install and must be installed by IBM service. This installation service is included without additional charge. Supported only with the 3600 Series LTO Tape Library (Rack) P/N 21P99xx. One additional EIA space has to be allowed when installing either one or two (maximum) units - to accommodate a filler plate for cable routing. Up to two 3600 Series LTO Drive Upgrade Options can be installed in each module or the module can operate off the LTO drives installed in the LTO tape library.
5. If installed in a rack, a fixed shelf is required. Allow an additional 1U for the fixed shelf. One unit only per shelf is supported.
6. Install in second drive bay of 3600 Series LTO Tape Libraries or in either of the two bays of the 3600 Series 2-drive, 20-Cartridge Expander Module to increase performance. Includes an LTO (Ultrium) drive and a one-meter external LVD SCSI cable.
7. This adapter installs in a 3600 Series Tape Library or Expander Module. It includes a Fibre Channel-to-SCSI bridge that serves as a router to provide direct attachment to a Fibre Channel Host Adapter or GBIC installed in a Fibre Channel Switch P/N 2109S08 or 2109S16 or Managed Hub P/N 35L1647 via a short-wave Fibre Channel cable P/N 36L9973, 03K9306, 03K9305. Two 18in LVD cables with a 68-pin male connector on one end and a male 0.8mm VHDCI connector on the other end are included with the option. The 68-pin connector attaches to either the standard or optional LTO tape drive in the Tape Library or Expander Module and the 0.8mm VHDCI connector attaches to one of two connectors on the adapter. Each adapter supports up to two LTO drives in a single 3600 layer P/N 21P99xx[10] (Tape Library - Rack) or P/N 21P99xx[11] (Expander Module), using one SCSI connector and cable for each drive.
8. Maximum configuration includes two 3600 Series 2-Drive, 20-Cartridge Expander Modules (P/N 3600LXU), which combine with a 3600 Series Tape Library to provide a total of 6TB of native storage capacity and 12TB compressed.
9. Where 'xx' represents a specific country code as follows:- *Tower version* - 74=EU1, 75=Denmark, 76=India/South Africa, 77=UK, 78=Swiss, 79=Italy, 80=Israel: *Rack version* - 81=EU1, 82=Denmark, 83=India/South Africa, 84=UK, 85=Swiss, 86=Italy, 87=Israel.
10. Where 'xx' represents a specific country code as follows:- *Tower version* - 71=Europe, 72=Denmark, 73=South Africa, 70=UK, 74=Swiss, 75=Italy, 76=Israel: *Rack version* - 78=Europe, 79=Denmark, 80=South Africa, 77=UK, 81=Swiss, 82=Italy, 83=Israel.
11. Where 'xx' represents a specific country code as follows:- 85=Europe, 86=Denmark, 87=South Africa, 84=UK, 88=Swiss, 89=Italy, 90=Israel.
12. Where 'xx' represents a specific country code as follows:- 49=UK, 50=Europe, 51=Denmark, 52=South Africa, 53=Switzerland, 54=Italy, 55=Israel.
13. Not available from IBM after this date. Business Partner inventory may be available.

Appendix C: UPS Runtime Estimate (minutes)

Servers	# Pwr. Cords Std/Max	Watts Load Max./Typ.[1]
xSeries 200[2]	1/1	350/245
xSeries 220[2]	1/1	350/245
xSeries 232 (one 385W power supply)[2]	1/1	400/280
xSeries 232 (two 250W power supplies)[2]	2/3	450/315
xSeries 250[2]	2/4	475/350
xSeries 300[2]	1/1	200/140
xSeries 330[2]	1/1	200/140
xSeries 342[2]	1/2	390/270
xSeries 350[2]	1/3	525/395
xSeries 360 (P/Ns K62RXxx and K63RXxx)[2]	2/3	740/520
xSeries 360 (P/N K61RXxx)[2]	1/3	740/260
xSeries 370[2]	3/3	1450/1015
xSeries 380[2]	2/2	2000/1400
xSeries 440[2]	2/2	950/800
Other Devices		
FAStT500 Storage Server (P/N 00N69xx)[2]	2/2	200/140
FAStT EXP500 Storage Expansion Unit (P/N 00N71xx)[2]	2/2	350/245
FAStT200 Storage Server (P/N 19K11xx)[2]	2/2	390/275
FAStT200 HA Storage Server (P/N 19K11xx)[2]	2/2	390/275
FAStT700 Storage Server (P/N 24P09xx)[2]	2/2	390/275
EXP300 Storage Expansion Unit (P/N 19K11xx)[2]	2/2	360/285
SAN Fibre Channel Switch 8-port (P/N 2109S08)	1/2	200/n/a
SAN Fibre Channel Switch 16-port (P/N 2109S16)	1/2	200/n/a
SAN Fibre Channel Switch 16-port (P/N 2109F16)	1/2	200/n/a
SAN Data Gateway Router (LVD) (P/N 2108R3L)	1/1	90/n/a
DLT Tape Autoloader and Library (P/N 00N79xx)	1/1	135/n/a
NetMEDIA Storage Expansion Unit EL (P/N 03K8756)	2/2	185/130
3600 Series Tape Autoloader and Library (P/Ns 09N40xx and 21P99xx)	1/1	700/500

1. This table represents general guidelines for selecting the appropriate UPS based on minimum and typical runtime estimates. A 'maximum configuration' load will result in 'minimum' UPS runtime. 'Typical' loads are based on a production system running at approximately 70% of maximum capacity. The 'typical' loads represent a more likely configuration and, therefore, a more likely estimate of runtime. Customer environments are unique and are unlikely to be precisely represented by any of the specific entries in the table.
2. Power-Factor Corrected (PFC) power supply.

	Tower					Rack Mounted			
	EMEA P/N	SU-700iNET P/N SUP072Y	SU-1000iNET P/N SUP102Y	SU-1400iNET P/N SUP142Y	SU-2200iNET P/N 06P60xx[6]	2U SU-1400RMiB P/N 32P16xx[8]	SU-1400RMiB P/N 14RIxxx[7]	SU-3000RMiB P/N 30RIxxx[7]	SU-5000RMiB P/N 37L6862
	US P/N	SU-700NET 94G3134	SU-1000NET 94G3135	SU-1400NET 94G3136	Not Available	2U SU-1400RMB 32P1020	SU-1400RMB 94G6674	SU-3000RMB 94G6676	SU-5000RMB 37L6861
UPS Attributes[1]									
Comms Links to Servers		1	1	1	1	1	1	3	3
Color		black	black	black	beige	black	black	black	black
EIA Height		-	-	-	-	2U	3U	3U	5U
EMEA Models									
50/60Hz, single phase, VAC[2, 3]:		220-240 (208)[2]	220-240 (208)[2]	220-240 (208)[2]	220-240 (208)[2]	220-240 (208)[2]	220-240 (208)[2]	220-240 (208)[2]	220-240 (208)[2]
10Amp, IEC 320-C13 Device Sckts		4	4	4	8	4	4	8	8
16 Amp, IEC 320-C19 PDU Sckts		-	-	-	1	-	-	1	2
Line Cord Socket (IEC 320)		C14	C14	C20	C20	C14	C14	C20	TB[5]
US Models									
50 or 60 Hz, single phase, VAC:		120 (120)[2]	120 (120)[2]	120 (120)[2]	-	120 (120)[2]	120 (120)[2]	120 (120)[2]	200-220 (208)[2]
Receptacles (NEMA 5-15R)		4	6	6	-	6	6	8	-
10 Amp, IEC 320-C13 (Device) receptacles		-	-	-	-	-	-	-	8
16 Amp, IEC 320-C19 (PDU 94G7450) receptacles		-	-	-	-	-	-	-	2[4]
Line Cord Length, NEMA Plug		6 ft., 5-15P	6 ft., 5-15P	6 ft., 5-15P	-	6 ft., L5-15P	6 ft., L5-15P	6 ft., L5-30P	8 ft., L5-30P

1. Data provided by APC.
2. Example for 220-240(208): Input VAC is 220- 240 as is the UPS output when electric service is active. When electric service is interrupted and the UPS is in battery mode, the UPS output is 208 VAC.
3. Battery output may be set to 220, 225, 230, or 240 VAC.
4. Two PDU jumper cables ship with the UPS for attachment from the IEC 320-C19 receptacles to Power Distribution Units (PDU) (P/N 2PDUxxx).
5. SU-5000RMiB (P/N 37L6862) contains a Terminal Block (TB) for direct attachment to an electrical source by qualified personnel.
6.Where 'xx' represents the appropriate country code as follows:- 14=UK, 15=Denmark/Switzerland, 16=EUR, 17=Israel, 18=Italy, 19=South Africa.
7. Where 'xxx' represents the appropriate country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
8. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.

	Total Configuration Runtime Estimation (Time in minutes)[1]							
	Tower				Rack Mount			
EMEA Part Number	SU-700iNET P/N SUP072Y	SU-1000iNET P/N SUP102Y	SU-1400iNET P/N SUP144Y	SU-2200iNET P/N 06P60xx[5]	2U SU-400RMiB P/N 32P16xx[7]	SU-1400RMiB P/N 14RIxxx[6]	SU-3000RMiB P/N 30RIxxx[6]	SU-5000RMiB P/N 37L6862
US Part Number	SU-700NET 94G3134	SU-1000NET 94G3135	SU-1400NET 94G3136	Not Available	2U SU-1400RMB 32P1020	SU-1400RMB 94G6674	SU-3000RMB 94G6676	SU-5000RMB 37L6861
Total Load (Watts)	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes	Runtime Minutes
200	22	38	62	130	45	45	104	240
250	17	28	43	104	34	34	84	200
300	12	22	34	85	25	25	70	166
350	9	18	29	71	22	22	58	145
400	7	14	23	65	18	18	52	125
450	5	12	20	52	15	15	45	110
500	-	11	18	43	13	13	38	97
550	-	9	16	38	11	11	35	87
600	-	8	13	34	10	10	31	76
650	-	7	12	31	9	9	29	68
700	-	6	11	28	8	8	26	63
750	-	-	10	25	8	8	24	59
800	-	-	9	23	7	7	22	55
850	-	-	8	21	7	7	20	51
900	-	-	7	19	6	6	18	47
950	-	-	6	18	5	5	17	43
1000	-	-	-	17	-	-	16	39
1100	-	-	-	15	-	-	14	34
1200	-	-	-	13	-	-	12	31
1300	-	-	-	11	-	-	10	28
1400	-	-	-	9	-	-	9	25
1500	-	-	-	9	-	-	8	22
1600	-	-	-	8	-	-	8	20
1700	-	-	-	-	-	-	7	18
1800	-	-	-	-	-	-	-	17
1900	-	-	-	-	-	-	-	14
2000	-	-	-	-	-	-	-	12
2100	-	-	-	-	-	-	-	11
2200	-	-	-	-	-	-		11
2300	-	-	-	-	-	-	-	10
2400	-	-	-	-	-	-		10
2500	-	-	-	-	-	-	-	9
2600	-	-	-	-	-	-		9
2700	-	-	-	-	-	-	-	8
2800	-	-	-	-	-	-	-	8

1. Data provided by APC.

Steps:
1. Identify the devices contained in the configuration.
2. Sum the load (watts) of all devices in the configuration. Use either Maximum Load for minimum runtime, or Typical Load for typical runtime.
3. Find the Total Configuration Load in the table above.
4. Select the most appropriate UPS model to achieve the desired runtime.
5. Where 'xx' represents the appropriate country code as follows:- 14=UK, 15=Denmark/Switzerland, 16=EUR, 17=Israel, 18=Italy, 19=South Africa.
6. Where 'xxx' represents the appropriate country code as follows:- DEN=Denmark, ISR=Israel, ITA=Italy, SDI=Saudi Arabia, SAF=South Africa, SWS=Switzerland, UKM=United Kingdom, EUR=Europe.
7. Where 'xx' represents a specific country code as follows:- 12=Europe, 13=UK, 14=Italy, 15=Switzerland, 16=Denmark, 17=South Africa, 18=Israel.

NOTE: If the Total Configuration Load is greater than the entries above, split the load across two or more UPS units.

Appendix D: External SCSI Cabling, Storage Units and Controllers

F: Female - External
M: Male - External
I: Internal
68: 16-bit, 68-pin High Density connector
50: 8-bit, 50-pin Centronix Connector
0.8: 16-bit, 68-pin Very HighDensity Connection Interface (VHDCI) 0.8 mm connector
16: 16-bit, 68-pin connector
8: 8-bit, 50-pin connector

Instructions: Identify Desired Controller Row and Storage Unit Column. The intersection of row and column contains the cable group letter which supports the connection. Go to the cable group under the corresponding storage unit for specific support. Read all Notes for row, column, and any cable group footnotes.

					Storage Enclosure Unit	**EXP300 19K11xx**	**External HH SCSI 10L7440**	**Full-High SCSI Enclosure 24P24xx**	**NetMEDIA 03K8756**	**NetMEDIA Adapter 10L7113**	**3600 Libraries 21P99xx**
					Max.MB/sec.)[1]	160	-	-	-	-	30
					LVDS	X	-	X	-	-	X
					Connector Type	F0.8	F68 or F50	F68	F0.8	F0.8	F68
Description	**Part Number**	**Max./ Channel (MB/sec)[1]**	**LVDS**	**Connector Type/ Max**	**Note #**	2, 3	4, 6	4	2, 4	2, 4, 7	2, 3, 5
RAID Storage Controllers											
ServeRAID-4H Ultra160 SCSI Controller	37L6889	160	X	F0.8/4	9	A	-	-	-	-	-
ServeRAID-4Mx Ultra160 SCSI Controller	06P5736	160	X	F0.8/2	9	A	-	-	-	-	-
ServeRAID-4Lx Ultra160 SCSI Controller	06P5740	160	X	F0.8/1	9	A	-	-	-	-	-
Ultra320 SCSI Controllers											
xSeries 235	Onboard[14]	320	X	F0.8/1	-	A[15]	A, B	B	A	A	B
Ultra160 SCSI Controllers											
PCI Wide Ultra160 SCSI Adapter	19K4646	160	X	F0.8/1	-	-	A, B	B	A	A	B[5]
xSeries 255	Onboard[14]	160	X	F0.8/1	-	-	-	B	A	A	B[5]
xSeries 350	Onboard	160	X	F0.8/1	-	-	-	B	A	A	B[5]
xSeries 380	Onboard	160	X	F0.8/1	-	-	-	-	-	-	-
xSeries 440	Onboard	160	X	F0.8/1	-	-	-	B	A	A	B
Ultra2 SCSI Controllers											
xSeries 250	Onboard	80	X	F0.8/1	-	-	A, B	B	A	A	B[5]
xSeries 370	Onboard	80	X	F0.8/1	-	-	A, B	B	A	A	B[5]
Ultra SCSI Controllers											
PCI Fast/Wide Ultra SCSI Adapter	02K3454	40	-	F68/1	8	-	B, C	-	B	B	-
No Onboard External Port[12]											
xSeries 200	Onboard	-	-	N/A	-	-	-	-	-	-	-
xSeries 220	Onboard	-	-	N/A	-	-	-	-	-	-	-
xSeries 232	Onboard	-	-	N/A	-	-	-	-	-	-	-
xSeries 300	Onboard	-	-	N/A	-	-	-	-	-	-	-
xSeries 330	Onboard	-	-	N/A	-	-	-	-	-	-	-
xSeries 342	Onboard	-	-	N/A	-	-	-	-	-	-	-
xSeries 360	Onboard	-	-	N/A	-	-	-	-	-	-	-
Cable Group A (M0.8-M0.8)											
2M Ultra2 SCSI Cable	03K9310	-	X	M0.8-M0.8	10	X[11]	X	-	X	X	-
4.2M Ultra2 SCSI Cable	03K9311	-	X	M0.8-M0.8	10	X	X	-	X	X	-
20 M Ultra2 SCSI Cable	37L7101	-	X	M0.8-M0.8	8	X	X	-	-	-	-
Cable Group B (M68-M0.8)											
IBM 2M External .8mm SCSI Cable	01K8027	-	-	M68-M0.8	-	-	X	X	X	X	X[5]
Cable Group C (M68-M68)											
PC Server F/W to F/W External SCSI Cable-1m	SS2C02Y	-	-	M68-M68	13	-	X	-	-	-	-
Cable Group G (Other)											
68-pin External Multimode LVD/SE SCSI Terminator	00N7956	-	-	M68	-	-	X	-	-	-	-

1. Maximum supported speeds may be limited by installation of lower speed devices, controllers or cable lengths greater than 2m.
2. Rack installation cable management requires devices to have a minimum cable length of 2 meters. Cable length requirements will vary based on placement within a single or multiple rack suite.
3. Maximum speeds may be limited by the installed devices or SCSI controller.
4. Daisy chaining tape enclosures is not supported at this time.
5. The 3600 Series Tape Libraries (rack or tower) support up to two Expander Modules P/N 21P99xx. 3600 Series Tape Libraries are shipped with a 2m M68-M0.8 external SCSI Cable P/N 01K8027, with a 68-pin high density connector at one end and an 0.8mm VHDCI connector at the other end.
6. Requires 68-pin External Multimode LVD/SE SCSI Terminator P/N 00N7956.
7. NetMEDIA Systems Management Adapter (P/N 10L7113) may be installed in a NetMEDIA Storage Expansion Unit to provide repeater function, LVDS interface, aggregate cable lengths up to 12 meters when attached to an LVD SCSI controller, and auto-termination when the Expansion Unit is powered off. External connector is 0.8-mm VHDCI.
8. Cable lengths exceeding 4.3m are NOT supported for attachment to non-LVD controllers.
9. Maximum speeds may be limited by the enclosure or installed devices.
10. Supports attachment to Ultra-2 or single-ended SCSI controllers with operational speeds of up to Ultra-2. Controller, storage unit, cable length or storage device limitations may apply (see Max. MB/sec row and column above).
11. EXP300 P/N 19K11xx include a single 2m Ultra2 SCSI cable similar to the 2m Ultra2 SCSI Cable P/N 03K9310.
12. No external SCSI port is available on these systems. A supported optional controller must be installed. See the systems section to determine which controllers and external storage units are supported then refer back to this table for cable requirements using the controller row.
13. Not supported for use in a rack. Rack installations require a minimum cable length of two meters.
14. Requires External SCSI Interface Kit P/N 32P8164 to enable the external 0.8mm VHDCI port.
15. Support for EXP300 connected to the external SCSI port requires installation of ServeRAID-5i P/N 25P3492 and availability of channel B of the integrated Ultra320 controller.

Appendix E: Internal Storage Cabling Overview

System	IDE Connections				SCSI Connections										Media	Int RAID
xSeries server	IDE connector #[1]	connects to (as shipped)	std cable (IDE)	additional connectivity	# standard SCSI controllers	standard SCSI controller type	onboard?	# channels	channel reference	internal (I) or external (E) connector?	type of connector	intended or standard connection	standard SCSI cable (16-bit LVD)	terminated?	optional connectivity	media bay cable (supplying P/N)[9]	Use std SCSI cable to connect RAID?
x200 IDE	1	CD-ROM	2-drop[2]	1 optical, IDE tape or IDE HDD	-	-	-	-	-	-	-	-	-	-	-	19K4646[10]	-
	2	IDE HDD	2-drop	1 HDD	-	-	-	-	-	-	-	-	-	-	-	-	-
x200 SCSI	1	CD-ROM	2-drop	1 optical or IDE tape	1	U160	N	1	A	I	68-pin	1 fixed SCSI HDD	5-drop	Y	3 fixed HDDs, 1 HH tape[11]	10K2340[14] or 19K4646[11]	Y[14]
x220 fixed	1	CD-ROM	2-drop	1 optical	1	U160	Y	1	A	I	68-pin	1 fixed SCSI HDD or open bay	5-drop	Y	3 fixed HDDs, 1 HH tape[11]	10K2340[14] or 19K4646[11]	Y[14]
x220 H/S	1	CD-ROM	2-drop	1 optical	1	U160	Y	1	A	I	68-pin	H/S backplane	2-drop	N[7]	-	10K2340[15] or 19K4646[12]	Y[15]
x232	1	CD-ROM	2-drop	1 optical	1	U160	Y	2	A	I	68-pin	H/S backplane	1 drop	N[7]	-	-	Y[15]
	-	-	-	-	-	-	-	-	B	I	68-pin	media bays[6, 13]	-	-	2 HH or 1 FH tape	10K2340[13]	-
x235	1	CD-ROM	2-drop	1 optical	1	U320	Y	2	A	I	68-pin	H/S backplane	1 drop	N[7]	-	-	N[26]
	-	-	-	-	-	-	-	-	B	I	68-pin	media bays[24]	1 drop	Y[25]	HH or FH tape or U320 3-pack Kit	std w/ option	Y[27]
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device[24]	-	-	-	-	-
x250	1	CD-ROM	2-drop	-	1	U2	Y	2	B	I	68-pin	H/S backplane[5]	1-drop	N[7]	-	standard or 19K4646[16]	Y[15]
	-	-	-	-	-	-	-	-	A	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-
x255	1	CD-ROM	2-drop	1 optical	1	U160	Y	2	A	I	68-pin	H/S backplane	1-drop	N[7]	HH or FH tape, 6-pack kit[28]	std w/option	Y[29]
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-
x300 IDE	1	CD-ROM	1-drop[3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	IDE HDD	2-drop	1 IDE HDD	-	-	-	-	-	-	-	-	-	-	-	-	-
x300 SCSI	1	CD-ROM	1-drop[3]	-	1	U160	N	1	A	I	68-pin	1 fixed SCSI HDD	2-drop	Y	1 fixed HDD	-	Y[14]
x330 IDE	1	CD-ROM	1-drop[3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	IDE HDD	2-drop	1 IDE HDD	-	-	-	-	-	-	-	-	-	-	-	-	-

System	IDE Connections				SCSI Connections											Media	Int RAID
x330 fixed SCSI	1	CD-ROM	1-drop[3]	-	1	U160	Y	1	A	I	68-pin	1 fixed SCSI HDD	2-drop	Y	1 fixed HDD	-	Y[14]
x330 H/S SCSI	1	CD-ROM	1-drop[3]	-	1	U160	Y	1	A	I	68-pin	H/S backplane	1-drop	N[7]	-	-	Y
x342	1	CD-ROM	1-drop[4]	-	1	U160	Y	2	A	I	68-pin	H/S backplane	1-drop	N[7]	-	-	Y[15]
	-	-	-	-	-	-	-	-	B	I	68-pin	media bays[6, 13]	see media column	-	2 HH or 1 FH tape	10K2340[13]	-
x343 (NEBS)	1	CD-ROM	1-drop	-	1	U160	Y	2	A	I	68-pin	1 NH/S SCSI HDD	2-drop	Y	-	-	-
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-
x350	1	CD-ROM	2-drop	-	1	U160	Y	2	A	I	68-pin	H/S backplane[6]	1-drop	N[7]	-	-	Y
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device[17]	1-drop	-	optional b/plane or ext device[17]	-	-
x360	1	CD-ROM	1-drop[19]	-	1	U160	Y	1	A	I	Integrated	H/S backplane[20]	-	-	-	-	Y[21]
x370	1	CD-ROM	2-drop	-	1	U2	Y	2	A	I	68-pin	H/S backplane	1-drop	N[7]	-	-	Y
	-	-	-	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-
x380	1	CD-ROM	1-drop	-	1	U160	Y	2	A	I	68-pin	H/S backplane	1-drop	N[7]	-	-	Y[18]
	2	LS-120	1-drop	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-
x440	1	CD-ROM	N/A[22]	-	1	U160	Y	2	A	I	68-pin	H/S backplane	1-drop	N[7]	-	-	Y[23]
	2	FDD	N/A[22]	-	-	-	-	-	B	E	0.8mm VHDCI	ext SCSI device	-	-	-	-	-

1. IDE controllers generally have two channels, with one connector per channel. On most systems the second connector is not supported for use (except where shown on this chart). Standard IDE cables include two drops. Some IDE devices, such as a slim-line CD-ROM, use a single-drop ribbon cable, which is soldered to a backplane at the device end of the cable, instead of using a connector.
2.The term drop refers to a device connector on a cable. The connector that attaches to the controller is not counted as a drop.
3.The cable is connected to one of the channels (connectors) of the IDE controller, and at the device end it is soldered to a dedicated backplane.
4.This single-device cable is soldered to the CD-ROM backplane. In order to install one or two optional optical devices in vacant media bays, the two-drop cable included with the optional devices is connected to one connector of the IDE controller and one of the two drops connects to an optional device. The standard CD-ROM cannot be used when an optional device is installed in one or both media bays. A single optional device is configured as primary, and when two optional devices are installed, one must be configured as primary and the other as secondary (master and slave).
5. xSeries 250 includes a split backplane with five HDD bays each. Refer to Internal SCSI Cabling in the x250 COG section for additional information.
6. The 3-Pack Ultra160 Hot-swap Expansion Kit P/N 33L5050 is available, allowing conversion of the two media bays into three hot-swap bays in x232, or x342 and adding three hot-swap bays in the x350. Through the use of a repeater card provided with the option, the expansion backplane can be cabled as an extension of the standard backplane and supported by it's controller, or the expansion backplane can be cabled on an independent bus attached to either a separate channel of the integrated storage controller, or to a different (optional) controller.
7. Termination is provided by the hot-swap backplane.
9. An additional cable may be required, to connect SCSI devices installable in internal removable media bays, to the standard SCSI storage controller when the standard SCSI cable is used to connect an optional RAID adapter. Some systems ship with an extra cable coiled inside the system case, or the necessary cable is provided in one of the options specified in this column. Some Tape Drives ship with a single-drop terminated LVD SCSI cable - see the Tape Options section for the appropriate server model for more information.
10. If installing an IDE tape drive, the standard IDE cable is used. NOTE: the total number of IDE optical drives or HDDs supported and connectable across both IDE connectors is four. If installing an internal SCSI device in Bay 2, a supported SCSI storage controller is required. The single-channel Ultra160 SCSI adapter P/N 19K4646 includes a 16-bit five-drop terminated multimode SCSI cable and a 0.8mm VHDCI external connector. The PCI Fast/Wde Ultra SCSI Adapter P/N 02K3454 is also single-channel and includes a 16-bit four-drop terminated single-ended SCSI cable and a 68-pin external connector. Refer to the x200 Tape Options section for more information.
11. To install an IDE tape drive in the available x200 media bay, the second connector of the standard IDE cable can be used. If installing a SCSI tape drive in x200 or 220 fixed SCSI disk models, one connector of the five-drop SCSI cable can be used, but this is not recommended, as it may adversely affect performance of the SCSI bus. For example, if the SCSI tape drive is an 8-bit device, the entire SCSI bus is limited to the speed of the tape drive. The recommended solution, is to add SCSI Adapter P/N 19K4646, to support the tape drive on a separate bus. The adapter comes with a supported cable.
12. In a non-RAID hot-swap drive system, a SCSI Tape drive installed in the media bay (bay 2) or a fixed HDD installed in bay 4, are not supported on the same SCSI bus as the hot-swap backplane. The recommended solution, is to add SCSI Adapter P/N 19K4646, to support either of these on a separate bus. The adapter comes with a supported cable. Connecting a tape drive on the same bus as a HDD is not recommended, as the tape drive can affect the performance of the entire bus. See note (16) for internal RAID configuration.
13. Media bay attachment requires a supported cable such as the two-drop terminated LVD cable provided in the Media Bay Tray and LVD Cable Kit (P/N 102340). See also the **Special Note** in the Tape Options section, relating to the xSeries model being configured..
14. In fixed disk models, an optional SCSI RAID adapter can be connected to the standard two-drop (x300, x330) or five-drop (x200, x220) SCSI cable. When the standard cable is used to attach to the RAID adapter, media bay connection to the standard controller for SCSI devices in the x200 and x220, requires the two-drop terminated LVD cable provided in the Media Bay Tray and LVD Cable Kit P/N 10K2340. Attachment of tape or optical drives to RAID adapters is not supported. See also the **Special Note** in the Tape Options section, relating to the xSeries model being configured.
15. An optional SCSI RAID adapter can be connected to the hot-swap backplane using the existing cable that normally connects to the standard controller. In this situation, attachment of a tape drive in a media bay to the available standard controller, requires another supported cable, such as the two-drop terminated LVD cable provided in the Media Bay Tray and LVD Cable Kit P/N 10K2340. Some systems already include an additional cable, but this may be either non-terminated or non-LVD (or both) and therefore unsuitable for supporting the latest technology tape drives. If a fixed HDD is installed in bay 4, it is not supported for connection to the same SCSI bus as the hot-swap backplane. Refer to the media bay cable column, or to the appropriate Product/Tape Options section of the COG for more information. See also the **Special Note** in the Tape Options section, relating to the xSeries model being configured.
16. Attachment of SCSI devices in either of the two available media bays requires optional SCSI storage controller P/N 19K4646 in a non-RAID system. This adapter comes with a supported cable. Two half-high or one full-high device may be installed. A two-drop SCSI cable is included with the x250 as standard, which can be used to attach one or two internal tape options to the integrated controller when a RAID adapter is used to support the hot-swap backplane.
17. Channel B of the integrated controller, can be cabled to the external connector, by using a single-drop cable included with the system. Alternatively, this channel can be used to connect to the optional hot-swap backplane included with the 3-Pack Ultra160 Hot-swap Expansion Kit P/N 33L5050 thereby enabling the three additional internal hot-swap HDD bays.
18. An optional RAID adapter is required to support external HDD storage. Refer to ServerProven test results for supported RAID options at www.pc.ibm.com/us/compat. Select x380 from the Fast Access pulldown menu and click Go. Select SCSI and RAID Controllers. IBM makes no representations or warrantees with respect to non-IBM products. These products are offered and warranted by third parties, not IBM.
19. The standard slim-line CD-ROM docks directly into a media interposer card that is routed through the lightpath card before terminating at the planar.
20. The hot-swap backplane is connected to the integrated controller through a SCSI bus integrated into the system planar.
21. Internal RAID configurations are supported by connecting an internal connector on the RAID controller to a connector on the planar located between slot one and the memory card using a dedicated RAID cable provided with the system. (Route cable underneath PCI adapters).
22. xSeries 440 ships with a slim-line UltraBay 2000 CD-ROM installed in bay 4 (lower right of four bays) and an UltraBay 2000 floppy disk drive (FDD) installed in bay three. An optional UltraBay 2000 CD-RW and high-density FDD are available. FDDs can be installed in bay three only, but optical devices can be installed in either bay. If only one optical device is installed, it must be located in bay four. If two are installed, the standard FDD is removed and the second device is installed in bay three configured as slave.
23. If a RAID adapter is attached to the hot-swap backplane, the standard SCSI cable is removed and a longer cable shipped with the system is connected to one of the internal connectors of the RAID adapter and to the hot-swap backplane connector.
24. This channel may be connected to either a supported tape drive or the Ultra320 3-pack Kit P/N 33P2751 installed in the media bays. If no internal connection is established, the 0.8mm VHDCI external SCSI port can be enabled by installing External SCSI Interface Kit P/N 32P8164.
25. Termination is provided by the one-drop cable included with the tape option or by the optional hot-swap backplane when the Ultra320 3-pack Kit is installed, which includes a nonterminated cable.
26. Optional Internal SCSI Interface Kit P/N 33P3168 is required to connect the hot-swap backplane to ServeRAID-4H, -4Mx or -4Lx. ServeRAID-5i does not require a cable.
27. If the optional Ultra320 3-pack Kit P/N 33P2751 is installed in the media bays, the cable that ships with the option is used to connect to ServeRAID-4H, -4Mx or -4Lx or to the integrated controller if ServeRAID 5i is installed.
28. An optional 6-pack Ultra320 Hot-swap Expansion Kit P/N 32P8163 can be installed above the standard six hot-swap HDD bays and a full-high or half-high tape drive can be installed in the available media bays.
29. SCSI RAID adapters are generally connected to the hot-swap backplane using the standard cable that connects the integrated storage controller. When the standard cable is used for RAID attachment, media bay attachment requires another supported cable, e.g., the two-drop terminated LVD cable provided in the Media Bay Tray and LVD Cable Kit P/N 10K2340 unless one of the following tape drives is the media device being connected:- P/Ns 00N7990, 00N7991, 00N7992, 00N8015, 00N8016, 24P2396, 24P2398, in which case a 34in single-drop terminated LVD SCSI cableis shipped with the tape drive. Optional 6-pack Ultra320 Hot-swap Expansion Kit P/N 32P8163 connects to a RAID adapter if required, using the cable that ships with the Kit.

For additional information, refer to the Internal SCSI Cabling and Tape Options sections for each system or to Appendix D: SCSI Cables - Storage Units - Controllers.

Appendix F: System Management Overview

IBM system management solutions allow you to run your business-critical applications using innovative hardware technology that helps to reduce failures and recover rapidly if any downtime should occur. This technology makes xSeries simpler to service and easier to manage.

This section shows the available range of standard and optional system management processors and describes the features and configuration process for each. This section further demonstrates how these service processors can be interconnected to form a communication network for alerting and monitoring a wide range of system functions and hardware conditions.

Key to abbreviations	
ASMP	Integrated Advanced System Management Processor
ISMP	Integrated System Management Processor
ASMA	Advanced System Management PCI Adapter (P/N 36L96xx)
RSA	Remote Supervisor Adapter (P/N 09N75xx)
ASMIC	Advanced System Management Interconnect Cable Kit (P/N 03K9309)

General Notes:

All descriptions of features and compatibility of ISMP described here require the use of firmware version 1.02 or newer. As of Jan 1st 2002, all ISMPs ship standard with firmware version 1.02. Firmware updates may be found on the IBM Web site at the URL:- www.pc.ibm.com/qtechinfo/MIGR-4WEP53.html.

An advanced system management interconnect network is configured with at least one focal point (generally an ASMA or RSA in a server) that provides Ethernet LAN and serial connections for management and alerting, which are shared between all the members of an interconnect network.

Up to 24 ISMPs and/or RSAs may be interconnected in a single ASM interconnect network (including standard and optional processors).

Up to 12 ASMPs and/or ASMAs may be interconnected in a single ASM interconnect network (including standard and optional processors). Up to 12 additional ISMPs and/or RSAs may be added to an ASM interconnect network containing 12 or less ASMPs and/or ASMAs.

An ASM interconnect network may contain an aggregate connection length of no more than 91.4m (300ft).

A customer-supplied Cat5 Ethernet cable is required for each interconnection.

Connecting servers that do not have two external RS-485 ports in an ASM interconnect network, requires Advanced System Management Interconnect Cable Kit (P/N 03K9309). RSA and ASMA do not include this option when shipped standard with a system.

System Management support by server

	Onboard		PCI Adapter		Cabling
xSeries server model	**ASMP[11]**	**ISMP[11]**	**ASMA[13, 14, 20]**	**RSA[15, 16, 20]**	**ASMIC[18]**
x200[26]	-	-		-	-
x220	-	-		optional[4]	-
x230	standard[8, 10]	-	optional[9, 10]	-	optional[17]
x232	-	standard[1, 12]	-	optional[5, 21]	-
x240	standard[8, 10]	-	optional[9, 10]	-	optional[17]
x250	standard[1, 12]	-	optional[6, 22]	-	-
x300[26]	-	-		-	-
x330	standard[1, 12]	-	optional[6, 22, 23]	optional[7, 24, 25]	-
x340	standard[8, 10]	-	optional[9, 10]	-	optional[17]
x342	-	standard[1, 12]	-	optional[5, 21]	-
x350	standard[1, 12]	-	optional[6, 22]	-	-
x360	-	-	-	standard[3]	optional[19]
x370	-	-	standard[2]	-	optional[19]
x440	-	-	-	standard[3]	optional[19]

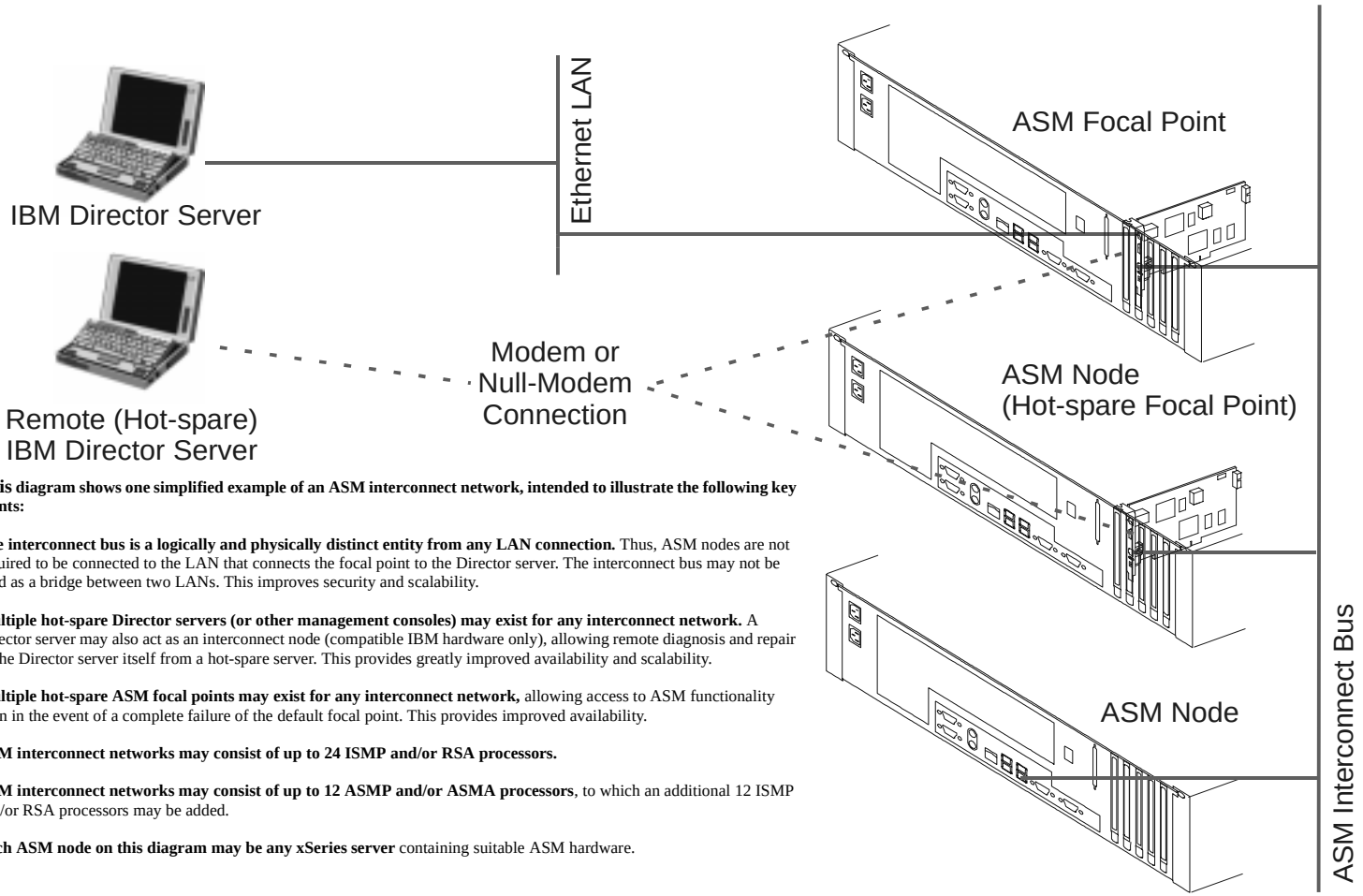
1. This configuration is shown in interconnect scenario 1, appearing later in this section.
2. This configuration is shown in interconnect scenario 2, appearing later in this section.
3. This configuration is shown in interconnect scenario 3, appearing later in this section.
4. This configuration is shown in interconnect scenario 4, appearing later in this section.
5. This configuration is shown in interconnect scenario 5, appearing later in this section.
6. This configuration is shown in interconnect scenario 6, appearing later in this section.
7. This configuration is shown in interconnect scenario 7, appearing later in this section.
8. This configuration is shown in interconnect scenario 8, appearing later in this section.
9. This configuration is shown in interconnect scenario 9, appearing later in this section.
10. Connecting xSeries 230, 240 or 340 servers in an ASM interconnect network requires Advanced System Management Interconnect Cable Kit (P/N 03K9309).
11. This service processor is integrated into the system planar (onboard).
12. The system includes two external integrated RS-485 ports located on the rear of the chassis, which precludes the requirement for the ASMIC kit option.
13. This adapter cannot be the remote management focal point in an interconnect network containing an RSA. The ASMA PCI adapter is only used as the focal point when an RSA is not present (or not functioning) in the network. This is because the RSA is backwards-compatible with the ASMA, but the ASMA is not forwards-compatible with the RSA. The focal point must be the latest generation of service processor connected within the network.
14. Advanced System Management PCI Adapter (P/N36L96xx) includes the following: adapter card, dual serial cable, ASM interconnect dual pigtail cable, ASM interconnect single pigtail cable, internal ASM interconnect knockout cable, AC adapter and power cord, power cable with C13 connector for UPS attachment, and 1ft Cat5 cable. When ASMA is supplied standard (e.g., with xSeries 370), the optional ASM Interconnect Cable Kit (P/N 03K9309) is required in order to enable ASM interconnect.
15. RSA provides ASM Web interface using HTTP protocol; SNMP, DNS, PPP and DHCP network support; E-mail alerting; full remote graphical console redirection; Òblue screenÓ error information capture for Windows NT and 2000; and network flashing of host firmware for system BIOS and Advanced System Management firmware.
16. Remote Supervisor Adapter (P/N 09N75xx) includes the following: adapter card, 20-pin ribbon power cable, AC power adapter, power cable, power cable for UPS attachment, single pigtail cable, RS-485 terminator and 1ft Cat5 cable. When RSA is shipped standard (e.g., with xSeries 360), optional ASM Interconnect Cable Kit (P/N 03K9309) is required to enable ASM interconnect.
17. Advanced System Management Interconnect Cable Kit is not required for servers with built-in RS-485 interconnect ports or for servers with optional Advanced Systems Management PCI Adapter (P/N 36L96xx) or Remote Supervisor Adapter (P/N 09N75xx).
18. Advanced Systems Management Interconnect Cable Kit (P/N 03K9309) includes an internal ASM interconnect knockout cable, an ASM interconnect single pigtail cable and RS-485 terminator.
19. Required to connect the standard adapter to other servers in an interconnect network.
20. Adds alternate Ethernet LAN and serial connections for support when the operating system is not available.
21. When RSA is installed in an xSeries 232 or 342, the onboard service processor is disabled.
22. When ASMA is installed in this system, the optional adapter serves only as an Ethernet and interconnect gateway. The onboard ASM processor will provide all service processor data.
23. Supported only in the 8654 models of x330 systems.
24. When installing in xSeries 330 machine type 8654 models, do not use the 20-pin cable provided with the option. Connect to the external AC power supply that is provided with the option. When installing in xSeries 330 machine type 8674 models, install the 20-pin cable to provide the adapter with power. The AC power supply then becomes optional and provides redundant power to the adapter.
25. When RSA is installed in this system, the optional adapter serves only as an Ethernet and interconnect gateway. The onboard ASM processor will provide all service processor data.
26. These xSeries servers support system management via IBM Director only, without ASM interconnect support.

System Management Functional Comparison

	Onboard		PCI Adapter	
Feature/Function	**ASMP**	**ISMP[1]**	**ASMA[2]**	**RSA[2, 3, 4]**
Monitoring & Alerting				
Automatic server shutdown/restart	yes	yes	yes	yes
Environmental monitors (temperature, voltage)	yes	yes	yes	yes
Interface with Light Path Diagnostics	yes	yes	yes	yes[5]
PFA on system components (fans, power supplies, memory, etc.)	yes	yes[6]	yes	yes
Post, loader, OS timeouts	yes	yes	yes	yes
Alert Mechanisms				
Pager (numeric/alphanumeric)[7]	yes	no	yes	yes
Director via LAN	yes	yes[9]	yes	yes
Director via serial[8]	yes	no	yes	yes
E-mail	no	no	no	yes
Generate SNMP traps	yes[9]	yes[9]	yes	yes
Management				
Remote BIOS and SP firmware update[10]	yes	no	yes	yes[11]
Remote GUI-mode control	no	no	no	yes[5, 12]
Remote text-mode control	yes	no	no	yes
Remote POST and diagnostics[10]	yes	no	yes	yes[13, 14]
View status logs	yes	no	yes	yes
View vital product data	yes	no	yes	yes
Capture Windows blue screens	no	no	no	yes[12]
View SP configuration	no	no	yes	yes
Set SP configuration	no	no	no	yes[11]
Save and restore SP configuration	no	no	no	yes[12]
Restart SP	no	no	yes	yes
Connectivity & Cabling				
IBM Director[15]	yes	yes	yes	yes
ANSI terminal[8]	yes	no	yes	yes
Telnet	yes[16]	no	yes	yes
Web interface	yes[16]	no	yes	yes
10/100 Ethernet	yes[17]	no	yes	yes
DHCP	no	no	no	yes
DNS	no	no	no	yes
PPP[7]	no	no	no	yes
Dedicated serial port	yes	no	dual[18]	yes
Shared serial port	yes	no	dual[18]	no
Redundant external power	no	no	yes	yes

1. This table is correct only for ISMP firmware v1.02 or newer, Systems shipped after 01/01/02 include v1.02 firmware. Firmware updates are available on the Web at the URL www.pc.ibm.com/qtechinfo/MIGR-4WEP53.html.
2. When either RSA or ASMA are integrated as a standard adapter in an xSeries server (e.g., x360 or x370), the two interconnect cables, external power supply and power cords provided with the optional packages are not included.
3. When an optional RSA (P/N 09N75xx) is installed in a system with standard ISMP, the optional adapter disables the onboard service processor and assumes all system management functionality.
4. When an optional RSA (P/N 09N75xx) is installed in a system with standard ASMP, the optional adapter serves only as an Ethernet and interconnect gateway. The onboard ASMP provides all service processor data.
5. Not available when RSA is added as an option to systems with standard ASMP (e.g., x330).
6. Performs monitoring capability only. Automatic alerting available through IBM Director only.
7. Requires customer-supplied external modem.
8. Requires customer-supplied external modem or null-modem cable.
9. The specified alerting mechanisms may be configured, but sending such alerts to their destination requires connection through an RSA or ASMA either within the local machine or via the interconnect network.
10. Requires an out-of-band connection such as serial, Ethernet or ASM interconnect network (out-of-band connections bypass the NOS and are established even when the NOS is not functioning).
11. Only available through the Web interface, over an Ethernet or through a PPP connection.
12. Only available through the Web interface, Telnet or an Ethernet connection.
13. Not available via interconnect network.
14. Not available on systems in which an optional RSA is the only installed adapter (e.g., x220).
15. Connection to IBM Director allows use of all management and alerting functionality (except Òsave and restore configuration fileÓ) via an active in-band, out-of-band or interconnect network connection.
16. Connection using Telnet, Web interface or Ethernet is available via an RSA or ASMA through the interconnect network.
17. Requires interconnection of onboard processor to optional ASMA or RSA using an ASM Interconnect Cable Kit (P/N 03K9309).
18. Requires the use of the included serial port splitter cable.

Sample ASM Interconnect Network Schematic



This diagram shows one simplified example of an ASM interconnect network, intended to illustrate the following key points:

The interconnect bus is a logically and physically distinct entity from any LAN connection. Thus, ASM nodes are not required to be connected to the LAN that connects the focal point to the Director server. The interconnect bus may not be used as a bridge between two LANs. This improves security and scalability.

Multiple hot-spare Director servers (or other management consoles) may exist for any interconnect network. A Director server may also act as an interconnect node (compatible IBM hardware only), allowing remote diagnosis and repair of the Director server itself from a hot-spare server. This provides greatly improved availability and scalability.

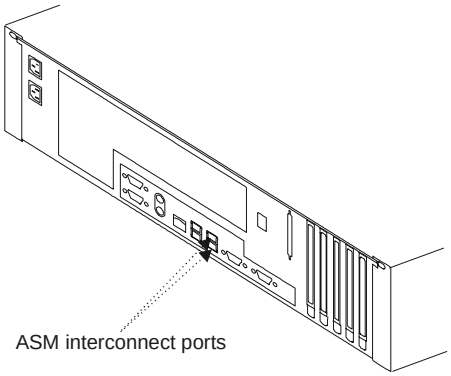
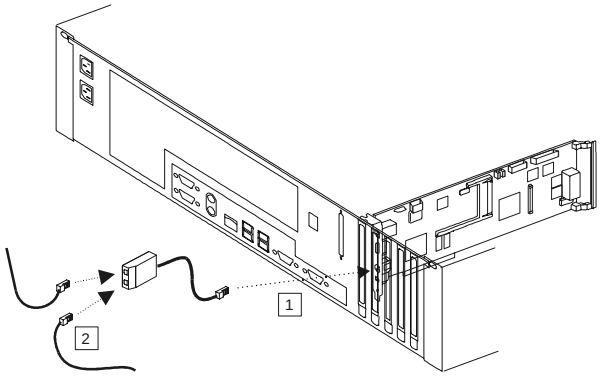
Multiple hot-spare ASM focal points may exist for any interconnect network, allowing access to ASM functionality even in the event of a complete failure of the default focal point. This provides improved availability.

ASM interconnect networks may consist of up to 24 ISMP and/or RSA processors.

ASM interconnect networks may consist of up to 12 ASMP and/or ASMA processors, to which an additional 12 ISMP and/or RSA processors may be added.

Each ASM node on this diagram may be any xSeries server containing suitable ASM hardware.

xSeries Advanced System Management Interconnect Network Scenarios

Configuration	Interconnect hardware connections
1. Server with ASMP or ISMP and two integrated RS-485 ASM interconnect ports on the rear of the chassis **Key Features:** Allows standard system management functionality, including remote flash update of BIOS and adapter microcode, remote hardware diagnostics, and monitoring and alerting of critical voltage and temperature thresholds. Remote BIOS update only available on ASMP. Only includes ISMP with firmware v2 or later. **Servers:** xSeries 232, 250, 330, 342, 350 **Instructions:** 1. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the integrated RS-485 ASM interconnect ports at the rear of the server. Unused RS-485 ASM ports must be terminated with the supplied RS-485 terminator.	
2. Server with standard ASMA **Key Features:** xSeries 370 ships standard with ASMA, which provides all basic system management functionality including remote management via Telnet or a Web interface. Requires purchase of ASM Interconnect Cable Kit (P/N 03K9309). **Servers:** xSeries 370 **Instructions:** 1. Insert pigtail cable into RS-485 ASM interconnect port on adapter panel. 2. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the integrated RS-485 ASM interconnect ports of the pigtail adapter. Unused RS-485 ASM ports must be terminated with the supplied RS-485 terminator.	

3. Server with standard RSA

Key Features:

xSeries 360 ships standard with RSA, which provides the latest generation of system management functionality. In addition to standard system management capabilities, RSA adds advanced features such as full remote operation of server NOS, advanced Ethernet features and system management access even in the event of a complete server NOS failure.

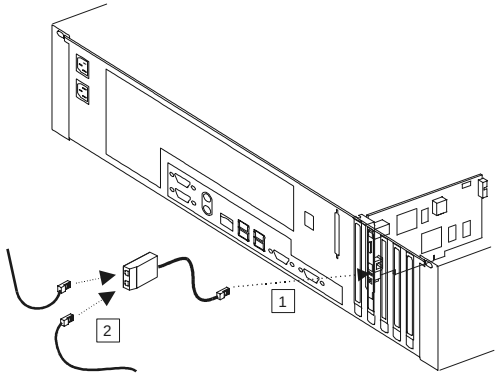
Requires purchase of ASM Interconnect Cable Kit (P/N 03K9309).

Servers:

xSeries 360, 440

Instructions:

1. Insert pigtail cable into RS-485 ASM interconnect port on rear of adapter.
2. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ASM interconnect ports of the pigtail adapter. Unused
RS-485 ASM ports must be terminated with the supplied RS-485 terminator.



4. Server with no standard service processor and optional RSA

Key Features:

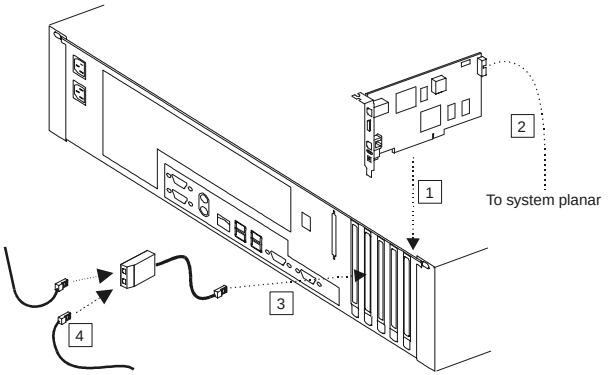
xSeries 220 ships standard without system management capability. To enable system management, an optional Remote Supervisor Adapter (P/N 09N75xx) is required.

Servers:

xSeries 220

Instructions:

1. Insert RSA into PCI slot on system planar (see system I/O section for any slot restrictions).
2. Connect 20-pin RSA planar hook-up cable between system planar and connector on RSA adapter.
3. Insert pigtail cable into RS-485 ASM interconnect port on adapter panel.
4. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ASM interconnect ports of the pigtail adapter. Unused
RS-485 ASM ports must be terminated with the supplied RS-485 terminator.



5. Server with ISMP plus optional RSA

Key Features:

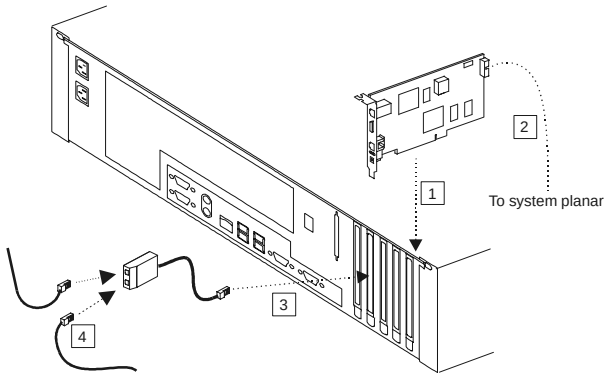
Adding an RSA to a server containing an ISMP disables the ISMP. The RSA takes over the system management role, providing a full complement of latest generation system management functionality. Only applicable to ISMP with firmware v2 or later.

Servers:

xSeries 232, 342

Instructions:

1. Insert RSA into PCI connector on System Planar (see system I/O section for slot restrictions).
2. Connect 20-pin RSA planar hook-up cable between system planar and connector on RSA adapter.
3. Insert pigtail cable into RS-485 ASM interconnect port on adapter panel.
4. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ASM interconnect ports of the pigtail adapter. Unused
RS-485 ASM ports must be terminated with the supplied RS-485 terminator.



6. Server with standard ASMP and two integrated RS-485 ASM interconnect ports on the rear of the server chassis, into which an ASMA is installed

Key Features:

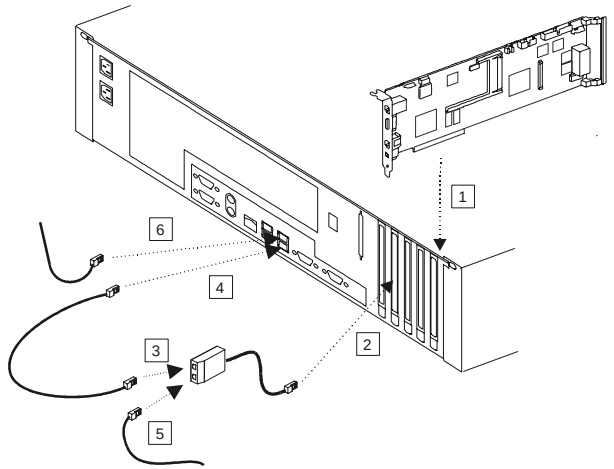
Adding an ASMA to a server containing an ASMP enables the ASMP to access the additional communication methods available on ASMA hardware. The ASMP retains full control of the system management role, with the ASMA acting as a gateway between system management and Ethernet. Requires purchase of optional ASM PCI Adapter P/N 36L96xx.

Servers:

xSeries 250, 350

Instructions:

1. Install ASMA into PCI slot on system planar (see system I/O section for any slot restrictions).
2. Plug the pigtail adapter into the RS-485 interconnect port of the ASMA.
3. Attach one end of the 1ft Cat5 cable (included with the ASMA option) to one of the RS-485 interconnect ports of the pigtail cable.
4. Attach the other end of the included 1ft Cat5 cable to one of the RS-485 interconnect ports built into the chassis.
5. Attach the customer-supplied Cat5 ASM interconnect cable into the other RS-485 ASM interconnect port of the pigtail cable.
6. If interconnection to a second ASM interconnect node is required, plug a second ASM interconnect cable into the available integrated RS-485 ASM interconnect port at the rear of the chassis. Otherwise, the second RS-485 port should be terminated using the supplied RS-485 terminator.



7. Server with standard ASMP and two integrated RS-485 ASM interconnect ports on the rear of the server chassis, into which an RSA is installed

Key Features:

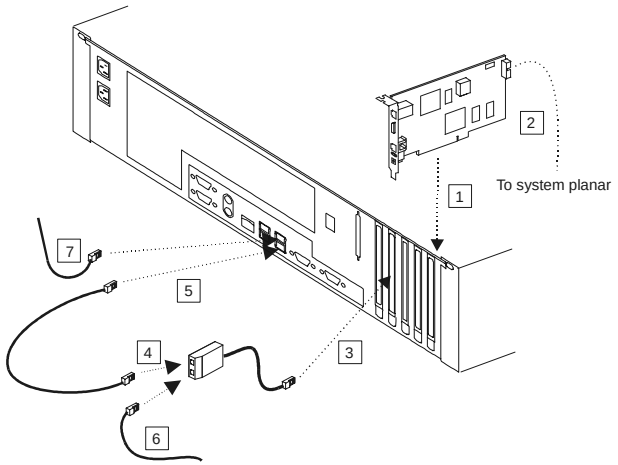
Adding an RSA to a server containing an ASMP enables the ASMP to access the additional communication methods available on RSA hardware. The ASMP retains full control of the system management role, with the RSA acting as a gateway between system management and Ethernet. Requires purchase of optional Remote Supervisor Adapter (P/N 09N75xx).

Servers:

xSeries 330 (models listed in COG)

Instructions:

1. Connect the RSA in a compatible PCI slot on the planar.
2. Connect 20-pin RSA planar hook-up cable between system planar and connector on RSA adapter (not required for x330 Model P/N K54MXxx).
3. Plug the pigtail adapter into the RS-485 interconnect port of the RSA.
4. Attach one end of the 1ft Cat5 cable (included with the RSA option) to one of the RS-485 interconnect ports of the pigtail cable.
5. Attach the other end of the included 1ft Cat5 cable to one of the RS-485 interconnect ports built into the chassis.
6. Plug one ASM interconnect cable into the available RS-485 ASM interconnect port of the pigtail cable.
7. If interconnection to a second ASM interconnect node is required, plug a second ASM interconnect cable into the available integrated RS-485 ASM interconnect port at the rear of the chassis. Otherwise, the second RS-485 port should be terminated using the supplied RS-485 terminator.



8. Server with ASMP and no standard RS-485 ports

Key Features:

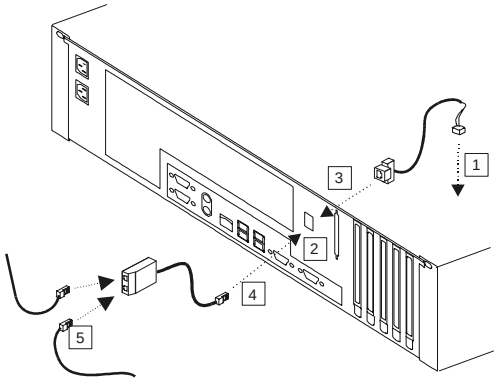
Enables basic ASM functionality for certain legacy systems
Requires purchase of ASM Interconnect Cable Kit (P/N 03K9309).

Servers:

xSeries 230, 240, 340

Instructions:

1. Connect interconnect knockout cable to the ASMP connector on the system planar.
2. Create knockout space on rear of system chassis.
3. Fix knockout fitting into place.
4. Plug single pigtail cable into knockout cable port.
5. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ASM interconnect ports of the pigtail adapter. Unused RS-485 ASM ports must be terminated with the supplied RS-485 terminator.



9. Server with ASMP and no standard RS-485 ports into which an optional ASMA is installed

Key Features:

Enables basic ASM functionality with improved connectivity for certain legacy systems.
Requires purchase of optional ASM PCI Adapter P/N 36L96xx.

Servers:

xSeries 230, 240, 340

Instructions:

1. Connect interconnect knockout cable to the ISMP or ASMP connector on the system planar.
2. Create knockout space on rear of system chassis.
3. Fix knockout fitting into place.
4. Insert ASMA into PCI slot on system planar.
5. Plug one pigtail cable into knockout cable port.
6. Plug other pigtail cable into the RS-485 interconnect port of ASMA.
7. Attach customer-supplied Cat5 cables (for connection to one or two other ASM interconnect nodes) to the RS-485 ASM interconnect ports of the pigtail adapter. Unused
RS-485 ASM ports must be terminated with the supplied RS-485 terminator.

IBM xSeries Selection Guide

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This chart represents general guidelines for selecting the appropriate server based on the number of users that can be supported in a particular application environment. This chart is for general guidance only, since each customer environment is unique and is unlikely to be precisely represented by any of the specific applications in the chart. However by using the chart, it is expected that a reasonable approximation can be reached. External Storage Units are utilised when internal capacities are exceeded. Basic guidelines on the use of the chart are given at the bottom of the next page. These are not published benchmark results. **Access: http://www.ibm.com/pc/us/techlink/srvperf.html to obtain benchmark data**.

Application/Expectation of Maximum # of Users		xSeries 200 Uni-Pentium® III 1.26GHz[1]/ 512KB	xSeries 220 Dual Pentium III 1.4GHz/ 512KB	xSeries 300 Uni-Pentium III 1GHz/ 256KB	xSeries 330 Dual Pentium III 1.4GHz/ 512KB	xSeries 342 Dual Pentium III 1.4GHz/ 512KB	xSeries 232 Dual Pentium III 1.4GHz/ 512KB
DB Transaction Processing Select, Update and Delete; Does not include image or Decision Support	**# of Users**	**1500**	**2030**	**1500**	**2175**	**3680**	**3680**
	# of processors	1	2	1	2	2	2
	Memory	1.5GB	2GB	1.5GB	2GB	4GB	4GB
	# Hard Disk Drives	12 to 18	40 to 50	12 to 20	36 to 48	50 to 70	50 to 70
	# RAID Adapters	≥1	≥2	1	≥2	≥2	≥2
	#Network Connections	1	1	1	1	1 to 2	1 to 2
File and Print Application is stored locally. (For server stored applications - cut number of users in half).	**# of Users**	**800**	**1000**	**800**	**2100**	**2300**	**2300**
	# of Processors	1	2	1	2	2	2
	Memory	1.5GB	2GB	1.5GB	2GB	2GB	2GB
	# Hard Disk Drives	5 to 10	4 to 8	5 to 10	20 to 30	20 to 30	20 to 30
	# RAID Adapters	≥ 1	1	1	1 to 2	1 to 2	1 to 2
	# 100Mbps Ethernet Connections	≥2	2	2	4	4 or 1Gb.	4 or 1Gb.
Lotus® Notes® 10% Power Users 40% Mail 50% Mail & DB	**# of Users**	**900**	**1215**	**900**	**2010**	**3200**	**3200**
	# of Processors	1	1	1	2	2	2
	Memory	1.5GB	2GB	1.5GB	2GB	3GB	3GB
	# Hard Disk Drives	5 to 10	10 to 15	5 to 10	20 to 30	20 to 30	20 to 30
	# RAID Adapters	≥ 1	1	1	1 to 2	1 to 2	1 to 2
	# Network Connections	≥ 1	≥2	≥ 2	≥2	≥3	≥3
Microsoft® Exchange Server 2000 100% Med Users 30MB Mailbox	**# of Users**	**1600**	**3820**	**1600**	**5070**	**5320**	**5320**
	# of Processors	1	2	1	2	2	2
	Memory	1GB	1GB	1GB	2GB	4GB	4GB
	# Hard Disk Drives	9	10	10 to 14	10	6	9
	# RAID Adapters	1	≥ 1	1	1	1	1
	# Network Connections	≥1	≥1	≥2	≥2	≥1	≥1
SAP 3-Tier Distributed Ver 4.0b Processing Sales and Distribution Application (Minimum of 16-20 Servers) See Note 2.	**# of Users**	-	-	-	-	-	-
	# of Processors	-	-	-	-	-	-
	Memory (MB)	-	-	-	-	-	-
	# Hard Disk Drives	-	-	-	-	-	-
	# RAID Adapters	-	-	-	-	-	-
	# Network Connections	-	-	-	-	-	-
SAP Central Ver 4.0b Processing Sales and Distribution Application (One Server) See Note 2.	**# of Users**	**75**	**80**	**75**	**130**	**130**	**130**
	# Processors	1	1	1	2	2	2
	Memory	1GB	1GB	1GB	1GB	1GB	1GB
	# Hard Disk Drives	12	12	12	12 to 24	12 to 24	12 to 24
	# RAID Adapters	≥1	≥1	≥1	≥1	≥1	≥1
	# Network Connections	1	1	1	1	1	1
High Availability Features	Hot-Swap HDD Bays	-	-	-	X	X	X
	Hot-Plug PCI Slots	-	-	-	-	-	-
	Hot-Swap Power	-	-	-	-	X	X
	Hot-Swap Fans	-	-	-	-	X	-
	RAID	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.
	Clustering Support	-	-	-	-	X	X
	Sys. Mgt. Processor	-	Opt.	-	-	X	X
Other Distinquishing Features	Max # Processors	1	2	1	2	2	2
	Max Memory	1.5GB	4GB	1.5GB	4GB	4GB	4GB
	Max Int. Storage	293.6GB[3]	293.6GB	146.8GB	146.8GB	440.4GB[5]	660.6[5]GB
	Max Int. Storage with Internal Tape drive	293.6GB[6]	293.6GB	-	-	220.2GB	440.4GB
	Available PCI Slots	4	5	1	2	5	5
	19" Rack Models	-	-	X	X	X	X

IBM xSeries Selection Guide

Application/Expectation of Maximum # of Users		xSeries 235 Dual Xeon™ 2.4GHz/ 512KB	xSeries 250 Quad Pentium III Xeon 900MHz/ 2048KB	xSeries 255 Quad Xeon MP 1.6GHz/ 1024KB	xSeries 350 Quad Pentium III Xeon 900MHz/ 2048KB	xSeries 360 Quad Pentium III Xeon 1.6GHz/ 1024KB	xSeries 370 Eight-Way Pentium III Xeon 900MHz/ 2048KB	xSeries 440 Eight-Way Xeon MP 1.6GHz/ 1024KB
DB Transaction Processing Select, Update and Delete; Does not include image or Decision Support	**# of Users**	**7150**	**7030**	**11000**	**7030**	**9225**	**12600**	**16740**
	# of processors	2	4	4	4	4	8	8
	Memory	8GB	4GB	8GB	4GB	8GB	8GB	16GB
	# Hard Disk Drives	50 to 70	80 to 140	125 to 200	80 to 140	100 to 175	150 to 200	150 to 200
	# RAID Adapters	≥2	≥4	≥4 or Fibre	≥4	≥4	≥5 or Fibre	≥5 or Fibre
	#Network Connections	1 to 2	2 to 3	2 to 3	2 to 3	2 to 3	2 to 3	2 to 3
File and Print Application is stored locally. (For server stored applications - cut number of users in half).	**# of Users**	**5500**	**5000**	**6500**	**5000**	**6500**	**6000**	**7150**
	# of Processors	2	2	3 to 4	2	3 to 4	3 to 4	3 to 4
	Memory	2 to 4GB	2 to 4GB	4GB	2 to 4GB	3 to 4GB	4GB	4GB
	# Hard Disk Drives	50 to 90	50 to 90	75 to 150	50 to 90	60 to 100	75 to 150	75 to 150
	# RAID Adapters	≥4	≥4	≥4 or Fibre	≥4	≥3	≥4 or Fibre	≥4 or Fibre
	# 100Mbps Ethernet Conn.	4 or 1Gb	4 or 1Gb	4 or 1Gb	4 or 1Gb	4 or 1Gb	4 or 1Gb	4 or 1Gb
Lotus Notes 10% Power Users 40% Mail 50% Mail & DB	**# of Users**	**4500**	**4615**	**5580**	**4615**	**5075**	**7335**	**8800**
	# of Processors	2	4	4	4	4	4	4
	Memory	3GB	3GB	3GB	3GB	3GB	4GB	4GB
	# Hard Disk Drives	20 to 30	20 to 30	25 to 30	20 to 30	25 to 30	30 to 40	30 to 40
	# RAID Adapters	2 to 3	2 to 3	2 to 3	2 to 3	2 to 3	≥3	≥3
	# Network Connections	≥3	≥3	≥3 or 1Gb	≥3	≥3 or 1Gb	≥4	≥4 or 1Gb
Microsoft Exchange Server 2000 100% Med Users 30MB Mailbox	**# of Users**	**5850**	**7250**	**9000**	**8800**	**10200**	**10500**	**11300**
	# of Processors	2	4	4	4	4	8	8
	Memory	4GB	≥3GB	4GB	3GB	4GB	3GB	3GB
	# Hard Disk Drives	9	30 to 40	30 to 40	30	50 to 70	50 to 70	50 to 70
	# RAID Adapters	1	≥2	≥2	2	≥3	≥3	≥3
	# Network Connections	≥1	≥2	≥2	≥2	≥2	≥2	≥2
SAP 3-Tier Distributed Ver 4.0b Processing Sales and Distribution Application (Minimum of 16-20 Servers) See Note 2.	**# of Users**	-	**4000**	**4800**	**4000**	**4600**	**6400**	**6400**
	# of Processors	-	4	4	4	4	8	8
	Memory	-	≥4GB	≥4GB	≥4GB	8GB	≥4GB	≥4GB
	# Hard Disk Drives	-	48 to 60	48 to 60	48 to 60	48 to 60	48 to 60	48 to 60
	# RAID Adapters	-	≥3	≥3	≥3	≥3	≥3	≥3
	# Network Connections	-	1	1	1	1	1	1
SAP Central Ver 4.0b Processing Sales and Distribution Application (One Server) See Note 2.	**# Users**	**180**	**300**	**375**	**300**	**345**	**480**	**480**
	# Processors	2	4	4	4	4	8	8
	Memory	2GB	≥2GB	≥2GB	≥2GB	8GB	≥4GB	≥4GB
	# Hard Disk Drives	12 to 24	24 to 36	24 to 36	24 to 36	24 to 36	24 to 36	24 to 36
	# RAID Adapters	≥1	≥2	≥2	≥2	≥2	≥2	≥2
	# Network Connections	1	1	1	1	1	1	1
High Availability Features	Hot-Swap HDD Bays	X	X	X	X	X	X	X
	Hot-Plug PCI Slots	X	X	X	X	X	X	X
	Hot-Swap Power	X	X	X	X	X	X	X
	Hot-Swap Fans	X	X	X	X	X	X	X
	RAID	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.
	Clustering Support	X	X	X	X	X	X	X
	Sys. Mgt. Processor	X	X	X	X	X	X	X
Other Distinguishing Features	Max # Processors	2	4	4	4	4	8	8
	Max Memory	6GB	16GB	12GB	16GB	8GB	32GB	32GB
	Max Int. Storage	660.6GB[5]	734.0GB	880.8GB[5]	440.4GB[5]	220.2GB	146.8GB	146.8GB
	Max Int. Storage with Internal Tape drive	440.4GB	734.0GB	880.8GB	-	-	-	-
	Available PCI Slots	6	6	7	6	6	12	6
	19in Rack Models	X[4]	X	X	X	X	X	X

1. The processor speed quoted here only represents the microprocessor internal clock speed, not application performance. Many factors affect application performance.
2. This information for SAP is a guide only. Refer to your IBM representative, for more information.
3. When referring to hard disk drive capacity, GB equals one billion bytes. Total user accessible capacity may vary depending on operating environments.
4. With a Rack-to-Tower conversion kit installed.
5. Assumes installation of the relevant Expansion Kit P/N 33L5050 to enable the maximum number of internal HDD bays.
6. Maximum internal storage with tape drive installed in x200 IDE Models is 120GB (maximum four devices = 2x60GB HDD, 1xCD-ROM, 1xTape).

Procedure for Server Selection Guidance Chart

File and Print numbers are Novell Netware-based with all others based on Microsoft Windows NT®. Other Networking Operating System (NOS) results could vary.
Extensive SAP sizings are available from IBM/SAP Competency Centres. Contact your IBM Marketing Representative for additional information**.**
Step 1: Determine which application row most closely represents the customer's environment.
Step 2: Move from left to right along the row (chosen in Step 1) noting which columns contain numbers that are equal to or greater than the customer's maximum planned number of users.
Step 3: Move up the columns (chosen in Step 2) to the top row to determine which IBM xSeries or Netfinity Servers should be considered as possible solutions.
Step 4: Evaluate other features such as storage, memory capacity, high availability components, number of available expansion slots, etc., which are unique to each server, in order to determine which is the most appropriate to recommend.
For your reference, configuration information corresponding to the number of users is also provided.

Important Notes

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Processor speeds stated only represent microprocessor internal clock speed, not application performance. Many factors affect application performance.

When referring to storage capacity, 1GB stands for 1,000,000,000 bytes. Total user-accessible capacity may be less.

Tape Drives which utilise data compression technology have storage capacity that will vary depending upon whether the drive is operating in native mode (without compression) or compressed mode. Actual storage capacity will vary based upon many factors and may be less than the maximum possible.

Maximum internal hard disk drive capacities assume the replacement of any hard disk drives and the population of all hard disk drive bays with the largest currently supported drives available from IBM.

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