

## IBM SSA Controllers (PCI)

Name	<b>IBM SSA RAID Adapter for PC Servers</b>
Implementation	<b>Option for IBM PC Server 320, 520, 720</b>
Design	PCI adapter / busmaster
I/O bus path / speed	32 bit / up to 132 MB/sec
Features	PCI Local Bus Specification 2.1 / 5 volt
Code name	Los Gatos
Vendor	IBM
SSA loops	Two SSA loops / 48 SSA disks in each loop
SSA max disks	96 disks via 2 loops x 48 disks
Ports	Six total: 4 external ports (two pairs) 2 internal ports (one pair) Can use any two pairs of ports at one time
SSA speed	20 MB/sec full duplex per port (80 MB/sec per loop)
RAID levels	<b>RAID 0, 1, 5</b> / 32 independent arrays
Processor	25 MHz VLSI ARM60
Size	312 mm long x 106 mm high
Devices supported	2 to 16 disks for RAID 0 2 disks for RAID 1 (only mirrors 1 physical disk with another) 3 to 16 disks for RAID 5 An array can span the two loops / hot spare support
Cache std / max	8 MB / 8 MB
Cache method	Two 4 MB 72 pin parity SIMMs / 70 ns fast page
Cache write policy	Used as write-through with RAID 1 and 5 Cache not used for non-array or RAID 0
Available date	October 1996
Warranty	3 year
Price (retail USD)	\$ 2,013
Part number	32H3811

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(1SSA) Compiled by Roger Dodson, IBM. October 1996

## IBM UltraSCSI Controllers (PCI)

Controller	UltraSCSI PCI Adapter	PCI Fast/Wide UltraSCSI Adapter	PC Server Ultra Wide SCSI PCI Adptr
Code name	None	Puritan	Foxtown 3
Vendor	Adaptec AHA-2940UW UltraWide	Adaptec AHA-2940UW UltraWide	Adaptec AHA-2940UW UltraWide
Implementation	Adapter in PC 360 desktop	Option for desktops and servers	Option for servers
SCSI type	UltraSCSI Fast/Wide	UltraSCSI Fast/Wide	UltraSCSI Fast/Wide
SCSI bus path / speed	16 bit / 40 MB/sec	16 bit / 40 MB/sec	16 bit / 40 MB/sec
I/O Architecture	<b>PCI</b>	<b>PCI</b>	<b>PCI</b>
I/O bus path / speed	32 bit / 132 MB/sec	32 bit / 132 MB/sec	32 bit / 132 MB/sec
RAID levels	None (use software)	None (use software)	None (use software)
Tagged Cmd Queuing	Yes	Yes	Yes
Chip architecture	AIC = 7880 (intelligent SCSI processor)	AIC = 7880 (intelligent SCSI processor)	AIC = 7880 (intelligent SCSI processor)
Channels	One (internal and/or external)	One (internal and/or external)	One (internal and/or external)
Connectors	Three total: Two internal - one is 8 bit narrow - one is 16 bit wide One external - 16 bit wide	Three total: Two internal - one is 8 bit narrow - one is 16 bit wide One external - 16 bit wide	Three total: Two internal - one is 8 bit narrow - one is 16 bit wide One external - 16 bit wide
Devices supported	15 devices total on one or both conctrs SCSI-1, SCSI-2, UltraSCSI	15 devices total on one or both conctrs SCSI-1, SCSI-2, UltraSCSI	15 devices total on one or both conctrs SCSI-1, SCSI-2, UltraSCSI
Features	Supports a bootable CD-ROM SCAM Level 1 support Busmaster DMA / ASPI compliant Flash BIOS	Supports a bootable CD-ROM SCAM Level 1 support Busmaster DMA / ASPI compliant Flash BIOS / BIOS level 1.25 Includes internal wide and narrow cables	Supports a bootable CD-ROM No SCAM Level 1 support Busmaster DMA / ASPI compliant Flash BIOS / BIOS level 1.25 Supports scanners and SCO
Cache std / max	None (FIFO buffer)	None (FIFO buffer)	None (FIFO buffer)
Available date	November 1995 for PC 360	January 1997	January 1997
Warranty	N/A	3 years	3 years
Price (retail USD)	N/A	\$ 299	\$ 286
Part number	94G3771	76H3579	76H5407
Controller	<b>IBM PC ServeRAID Adapter</b>		
Code name	Copperhead		
Vendor	IBM		
Implementation	Adapter in some PC Server 520 systems Available as an option for PC Servers		
SCSI type	UltraSCSI Fast/Wide		
SCSI bus path / speed	16 bit / 40 MB/sec		
I/O Architecture	<b>PCI</b>		
I/O bus path / speed	32 bit / 132 MB/sec		
RAID levels	Raid 0, 1, Hybrid 1, 5 8 independent (A,B,C,D,E,F,G,H) / 8 logical arrays / array can span channels		
Tagged Cmd Queuing	Yes		
Chip architecture	PowerPC 403GA RISC processor		
Channels	Three channels (can only use int or ext connector on Channel 1)		
Connectors	Four total: Three internal - 16 bit Channel 1 (can not use if using external) - 16 bit Channel 2 - 16 bit Channel 3 One external - 16 bit Channel 1 (can not use if using internal)		
Devices supported	15 devices on each channel; 3 channels x 15 = 45 devices max SCSI-1, SCSI-2, UltraSCSI		
Features	Supports a bootable CD-ROM Busmaster DMA ASPI compliant Flash BIOS Logical Drive Migration (change from RAID 0 to 5 (or 5 to 0) if have one logical drive in an array) Configuration stored on (1) NVRAM, (2) EEPROM, and (3) disk Local and remote monitoring Auto-Rearrange Drive Configuration Configuration Synchronization Support		
Cache std / max	4 MB std / 4 MB max (with parity) / write-through or write-back / 60ns		
Available date	June 1996		
Warranty	3 years		
Price (retail USD)	\$ 1,950		
Part number	70G8489		

**UltraSCSI is also known as SCSI-3 and Fast-20**

## IBM SCSI Controllers (ISA, VL-Bus)

Controller	16-Bit AT Fast SCSI Adapter	16-Bit AT Fast SCSI Adapter (PnP)	⚡ SCSI-2 VL-Bus Adapter
Implementation	Option (Options by IBM™)	Option (Options by IBM™)	Option (Options by IBM™)
SCSI type	SCSI-2 Fast	SCSI-2 Fast	SCSI-2 Fast
SCSI bus path / speed	8 bit / 10 MB/sec	8 bit / 10 MB/sec	8 bit / 10 MB/sec
I/O Architecture	<b>ISA</b>	<b>ISA</b>	<b>VL-Bus™</b>
I/O bus path / speed	16 bit / 3 MB/sec	16 bit / 3 MB/sec	32 bit / up to 40 MB/sec
RAID levels	None (use software)	None (use software)	None (use software)
Tagged Command Queuing	No	No	Yes
Processor	None (PIO)	None (PIO)	Custom (RISC based)
Size	4.25"H x .75"W x 7"D	3.35"H x .75"W x 7"D	3.5"H x .8"W x 6.9"D
Channels	One (internal/external)	One (internal/external)	One (internal/external)
Connectors	One internal; one external	One internal (50 pin); one external (50 pin)	One internal; one external
Other Features		<b>SCSI Configured Automatically (SCAM)</b> <b>Level 1 compatible</b> <b>Auto-sensing termination</b> <b>Plug and Play</b>	Includes diskette connector for on-board diskette controller which supports up to two diskette drives including 2.88 MB
Devices supported	7 devices per adapter	7 devices per adapter	7 devices per adapter
Cache std / max	0 KB / 0 KB (8 KB buffer)	0 KB / 0 KB (512 byte FIFO buffer)	0 KB / 0 KB (256 byte FIFO buffer)
Cache method	N/A	N/A	N/A
Cache write policy	N/A	N/A	N/A
Available date	January 1993	May 1996	July 1994 / withdrawn March 1996
Warranty	3 years	3 years	3 years
Price (retail USD)	\$ 179	\$ 165	\$ 275 ⚡
Part number	70G8496	06H9649	70G8482

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⚡ Price decrease effective March 28, 1995

⚡ = Withdrawn

No warranties are expressed or implied in this summary (4SCSI) Compiled by Roger Dodson, IBM. May 1996

## IBM UltraSCSI Disks (2.16 to 9.1 GB)

Capacity	<b>2.16 GB Ultrastar ES</b>	<b>2.16 GB Ultrastar ES</b>	<b>2.16 GB Ultrastar 2ES</b>	<b>2.16 GB Ultrastar 2ES</b>
Interface	Ultra SCSI	<b>Wide Ultra SCSI</b>	Ultra SCSI	<b>Wide Ultra SCSI</b>
SCSI data path	8 bit	16 bit	8 bit	16 bit
SCSI burst rate	20 MB/sec	40 MB/sec	20 MB/sec	40 MB/sec
Buffer size	512 KB	512 KB	512 KB	512 KB
Buffer type (no. of segments)	Adaptive	Adaptive	Adaptive	Adaptive
Buffer write caching	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)
Average seek time (ms)	8.5 ms	8.5 ms	8.5 ms	8.5 ms
Average latency	5.56 ms	5.56 ms	5.56 ms	5.56 ms
Rotational speed	5400 rpm	5400 rpm	5400 rpm	5400 rpm
Sustained transfer rate	3.8 to 5.7 MB/sec	3.8 to 5.7 MB/sec	5.0 to 8.0 MB/sec	5.0 to 8.0 MB/sec
Mean Time Between Failure	800,000 hrs	800,000 hrs	Not published	Not published
Form factor (width x height)	3.5" x 1" SL			
Tagged Command Queueing	Yes	Yes	Yes	Yes
Automatic Defect Reallocation	Yes	Yes	Yes	Yes
SMART / PFA	SMART / PFA	SMART / PFA	SMART / PFA	SMART / PFA
Head technology	Magneto-resistive	Magneto-resistive	Magneto-resistive	Magneto-resistive
No-ID™ sector format	Yes	Yes	Yes	Yes
Vendor / code name	IBM / Orion UltraSCSI	IBM / Orion UltraSCSI	IBM / Capricorn SCSI	IBM / Capricorn SCSI
Available date	April 1996	April 1996	January 1997	March 1997
Warranty	5 years	5 years	3 years	3 years
Part number	07H1126	07H1128	76H5809	76H5813
Price (retail USD)	\$ 369	\$ 379	\$ 365	\$ 375
Capacity	<b>4.33 GB Ultrastar 2ES</b>	<b>4.33 GB Ultrastar 2ES</b>	<b>4.51 GB Ultrastar 2XP</b>	<b>9.1 GB Ultrastar 2XP</b>
Interface	Ultra SCSI	<b>Wide Ultra SCSI</b>	<b>Wide Ultra SCSI</b>	<b>Wide Ultra SCSI</b>
SCSI data path	8 bit	16 bit	16 bit	16 bit
SCSI burst rate	20 MB/sec	40 MB/sec	40 MB/sec	40 MB/sec
Buffer size	512 KB	512 KB	512 KB	512 KB
Buffer type (no. of segments)	Adaptive	Adaptive	Adaptive	Adaptive
Buffer write caching	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)
Average seek time (ms)	8.5 ms	8.5 ms	7.5 ms	8.5 ms
Average latency	5.56 ms	5.56 ms	4.17 ms	4.17 ms
Rotational speed	5400 rpm	5400 rpm	7200 rpm	7200 rpm
Sustained transfer rate	5.0 to 8.0 MB/sec	5.0 to 8.0 MB/sec	6.5 to 10.0 MB/sec	6.5 to 10.0 MB/sec
Mean Time Between Failure	Not published	Not published	Not published	Not published
Form factor (width x height)	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1.6" <b>HH</b>
Tagged Command Queueing	Yes	Yes	Yes	Yes
Automatic Defect Reallocation	Yes	Yes	Yes	Yes
SMART / PFA	SMART / PFA	SMART / PFA	SMART / PFA	SMART / PFA
Head technology	Magneto-resistive	Magneto-resistive	Magneto-resistive	Magneto-resistive
No-ID™ sector format	Yes	Yes	Yes	Yes
Vendor / code name	IBM / Capricorn SCSI	IBM / Capricorn SCSI	IBM / Scorpion	IBM / Scorpion
Available date	January 1997	February 1997	February 1997	February 1997
Warranty	5 years	5 years	5 years	5 years
Part number	76H5811	76H5815	76H2687	76H2689
Price (retail USD)	\$ 645	\$ 675	\$ 1,049	\$ 1,799

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 ☞ New disks announced February 11, 1997

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 (14SCSI) Compiled by Roger Dodson, IBM. February 1997

# IBM SCSI Disks (2 GB to 2.25 GB)

Capacity	➤ <b>2 GB</b>	<b>2 GB</b>	<b>2.16 GB Ultrastar ES</b>	<b>2.25 GB Ultrastar XP</b>	☞ <b>2.14 GB for PC Server 704 SCSI-2 Fast/Wide</b>
Interface	SCSI-2 Fast	<b>SCSI-2 Fast/Wide</b>	SCSI-2 Fast	SCSI-2 Fast	<b>SCSI-2 Fast/Wide</b>
SCSI data path	8 bit	16 bit	8 bit	8 bit	16 bit
SCSI burst rate	10 MB/sec	20 MB/sec	10 MB/sec	10 MB/sec	20 MB/sec
Buffer size	512 KB	512 KB	512 KB	512 KB	512 KB
Buffer type (no. of segments)	Segmented (16)	Segmented (16)	Adaptive	Adaptive	Segmented (4)
Buffer write caching	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)
Average seek time (ms)	9.5 ms	9.5 ms	8.5 ms	7.5 ms	9.0 ms
Average latency	5.56 ms	5.56 ms	5.56 ms	4.17 ms	4.17 ms
Rotational speed	5400 rpm	5400 rpm	5400 rpm	7200 rpm	7200 rpm
Media transfer rate	5.22 MB/sec	5.22 MB/sec	5.9 to 8.9 MB/sec	9.95 to 12.58 MB/sec	6.08 to 10.9 MB/sec
Sustained transfer rate	5.2 MB/sec	5.2 MB/sec	3.8 to 5.7 MB/sec	5.50 to 7.44 MB/sec	4.2 to 8.9 MB/sec
Mean Time Between Failure	750,000 hrs	750,000 hrs	800,000 hrs	1,000,000 hrs	1,000,000 hrs
Form factor (width x height)	3.5" x 1.6" HH	3.5" x 1.6" HH	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL
Tagged Command Queueing	Yes	Yes	Yes	Yes	Yes
Automatic Defect Reallocation	Yes	Yes	Yes	Yes	Yes
Predictive Failure Analysis	Yes	Yes	Yes / ind std SMART	Yes	No
Head technology	Magneto-resistive	Magneto-resistive	Magneto-resistive	Magneto-resistive	Thin film-TPC
No-ID™ sector format	No	No	Yes	No	No
Other features	None	None	None	None	80 pin SCA connector
Vendor / code name	IBM / Allicat	IBM / Allicat	IBM / Orion	IBM	Conner
Available / withdrawn date	April 1993 / Mar 96	September 1993	February 1996	Starfire	CFP2107
Warranty	5 years	5 years	5 years	March 1995	May 1996
Part number (old)	32G4336	32G3796	N/A	5 years	3 years
Part number (new)	70G8493	70G8494	07H1124	94G3054	94G5882
Price (retail USD)	\$ 1,199	\$ 1,275	\$ 369	\$ 925	\$ 1,125
Capacity	<b>2.25 GB Ultrastar XP</b>	<b>2.25 GB Hot-Swap Disk Drive III</b>	<b>2.25 GB Hot Swap Ultrastar XP for 95 A, 3516</b>	<b>2.25 GB Hot Swap</b>	<b>2.25 GB for 95,300,310,320</b>
Interface	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>
SCSI data path	16 bit	16 bit	16 bit	16 bit	16 bit
SCSI burst rate	20 MB/sec	20 MB/sec	20 MB/sec	20 MB/sec	20 MB/sec
Buffer size	512 KB	1 MB	512 KB	512 KB	1 MB
Buffer type (no. of segments)	Adaptive	Adaptive	Adaptive	Adaptive	Adaptive
Buffer write caching	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)
Average seek time (ms)	7.5 ms	8.5 ms	7.5 ms	7.5 ms or 8.0 ms	8.5 ms
Average latency	4.17 ms	4.17 ms	4.17 ms	4.17 ms	4.17 ms
Rotational speed	7200 rpm	7200 rpm	7200 rpm	7200 rpm	7200 rpm
Media transfer rate	9.95 to 12.58 MB/sec	None available	9.95 to 12.58 MB/s	9.95 to 12.58 or 8.4	None available
Sustained transfer rate	5.50 to 7.44 MB/sec	4.9 to 8.2 MB/sec	5.50 to 7.44 MB/sec	5.50 to 7.44 MB/sec	4.9 to 8.2 MB/sec
Mean Time Between Failure	1,000,000 hrs	800,000	1,000,000 hrs	1,000,000 or 800,000	800,000
Form factor (width x height)	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL
Tagged Command Queueing	Yes	Yes	Yes	Yes	Yes
Automatic Defect Reallocation	Yes	Yes	Yes	Yes	Yes
Predictive Failure Analysis	Yes	Yes	Yes	Yes	Yes
Head technology	Magneto-resistive	Unknown	Magneto-resistive	Magneto-resistive	Unknown
No-ID™ sector format	No	No	No	No	No
Vendor	IBM	Quantum	IBM	IBM or Quantum™	Quantum
Code name	Starfire	Atlas	Starfire	Starfire or Atlas	Atlas
Available date	March 1995	January 1996	March 1995	Oct 94 or Oct 95	October 1995
Warranty	5 years	1 year	5 years	3 years	5 years
Part number	94G3055	70G9862	N/A	N/A	07H0387
Part number for 95 A, 3516, or 500 with Hot Swap Drive Tray	N/A	N/A	94G3056	94G2650	N/A
Price (retail USD)	\$ 985	\$ 1,079	\$ 1,079	\$ 1,079	\$ 1,125

Fast/Wide disks **require a 16 bit Wide SCSI-2** controller. They will not operate on an 8 bit SCSI-1 controller. SCSI-1 or SCSI-2 devices will work with SCSI-2 16 bit Wide controllers as long as any 16 bit devices are between the SCSI-2 controller and the SCSI-1 devices (SCSI-1 8 bit devices should be at end of the daisy chain).

☞ New disks announced March 14, 1996

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➤ = Withdrawn from marketing

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(8SCSI) Compiled by Roger Dodson, IBM. September 1996

# IBM SCSI Disks (4.51 GB)

Capacity	≈ 4.51 GB Hot Swap	4.51 GB Ultrastar XP	4.51 GB Ultrastar XP	≈ 4.51 GB	≈ 4.51 GB Hot-Swap Disk Drive III
Interface	<b>SCSI-2 Fast/Wide</b>	SCSI-2 Fast	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>
SCSI data path	16 bit	8 bit	16 bit	16 bit	16 bit
SCSI burst rate	20 MB/sec	10 MB/sec	20 MB/sec	20 MB/sec	20 MB/sec
Buffer size	512 KB	512 KB	512 KB	1 MB	1 MB
Buffer type (no. of segments)	Adaptive	Adaptive	Adaptive	Adaptive	Adaptive
Buffer write caching	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)
Average seek time (ms)	8.0 ms or 8.5 ms	8.0 ms	8.0 ms	8.5 ms	8.5 ms
Average latency	4.17 ms	4.17 ms	4.17 ms	4.17 ms	4.17 ms
Rotational speed	7200 rpm	7200 rpm	7200 rpm	7200 rpm	7200 rpm
Media transfer rate	9.95 to 12.58 or 8.4	9.95 to 12.58 MB/sec	9.95 to 12.58 MB/sec	None available	None available
Sustained transfer rate	5.53 to 7.48 MB/sec	5.53 to 7.48 MB/sec	5.53 to 7.48 MB/sec	4.9 to 8.2 MB/sec	4.9 to 8.2 MB/sec
Mean Time Between Failure	1,000,000 or 800,000	1,000,000 hrs	1,000,000 hrs	800,000	800,000
Form factor (width x height)	3.5" x <b>1.6" HH</b>	3.5" x <b>1.6" HH</b>	3.5" x <b>1.6" HH</b>	3.5" x <b>1.6" HH</b>	3.5" x <b>1.6" HH</b>
Tagged Command Queueing	Yes	Yes	Yes	Yes	Yes
Automatic Defect Reallocation	Yes	Yes	Yes	Yes	Yes
Predictive Failure Analysis	Yes	Yes	Yes	Yes	Yes
Head technology	Magneto-resistive	Magneto-resistive	Magneto-resistive	Unknown	Unknown
Vendor	IBM or Quantum	IBM	IBM	Quantum	Quantum
Code name	Starfire or Atlas	Starfire	Starfire	Atlas	Atlas
Available / withdrawn date	Dec 1994 or Oct 95	March 1995	March 1995	Dec 1995 / Oct 96	Jan 1996 / Apr 97
Warranty	3 years / Apr 97	5 years	5 years	5 years	1 year <b>Same as</b>
Part number	N/A	94G3196	94G3057	07H0834	70G9863 <b>07H0834</b>
Part number for 95 A, 3516, or 500 with Hot Swap Drive Tray	94G2651	N/A	N/A	N/A	N/A <b>except with Hot-Swap Tray III</b>
Price (retail USD)	\$ 1,264	\$ 1,079	\$ 1,149	\$ 1,499	\$ 1,264
Capacity	<b>4.51 GB for PC Server 704</b>	☞ <b>4.51 GB Ultrastar 2XP</b>	☞ <b>4.51 GB F/W SCSI-2 SL Hot-Swap</b>	☞ <b>4.51 GB F/W SCSI-2 SL Hot-Swap Disk III</b>	
Interface	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>	
SCSI data path	16 bit	16 bit	16 bit	16 bit	
SCSI burst rate	20 MB/sec	20 MB/sec	20 MB/sec	20 MB/sec	
Buffer size	512 KB	512 KB	512 KB	512 KB	
Buffer type	Adaptive	Segmented (16)	Segmented (16)	Segmented (16)	
Buffer write caching	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)	
Average seek time (ms)	8.2 ms	7.5 ms	8.0 ms	8.0 ms	
Average latency	4.17 ms	4.17 ms	4.17 ms	4.17 ms	
Rotational speed	7200 rpm	7200 rpm	7200 rpm	7200 rpm	
Media transfer rate	9.95 to 12.58 MB/sec	10.28 to 15.43 MB/sec	10.28 to 15.43 MB/sec	10.28 to 15.43 MB/sec	
Sustained transfer rate	5.53 to 7.48 MB/sec	6.7 to 10.3 MB/sec	6.7 to 10.3 MB/sec	6.7 to 10.3 MB/sec	
Mean Time Between Failure	1,000,000 hrs	Not published	Not published	Not published	
Form factor (width x height)	3.5" x <b>1.6" HH</b>	3.5" x <b>1.0" SL</b>	3.5" x <b>1.0" SL</b>	3.5" x <b>1.0" SL</b>	
Tagged Command Queueing	Yes	Yes	Yes	Yes	
Automatic Defect Reallocation	Yes	Yes	Yes	Yes	
Predictive Failure Analysis	Yes	Yes (SMART)	Yes (SMART)	Yes (SMART)	
Head technology	Magneto-resistive	Magneto-resistive	Magneto-resistive	Magneto-resistive	
No-ID™ sector format	No	No-ID™ sector format	No-ID™ sector format	No-ID™ sector format	
Other features	<b>80 pin SCA-2 connector</b>		<b>Includes hot swap trays</b>	<b>Includes hot swap trays</b>	
Vendor	IBM	IBM	IBM	IBM	
Code name	Starfire	Scorpion	Scorpion	Scorpion	
Available	October 1996	December 1996	December 1996	December 1996	
Warranty	3 years	5 years	3 years	3 years	
Part number	94G6679 (704 has trays)	76H0945	94G6489	94G6494	
Price (retail USD)	\$ 1,264	\$ 949	\$ 1,264	\$ 1,264	
Fast/Wide disks <b>require a 16 bit Wide SCSI-2</b> controller. They will not operate on an 8 bit SCSI-1 controller. SCSI-1 or SCSI-2 devices will work with SCSI-2 16 bit Wide controllers as long as any 16 bit devices are between the SCSI-2 controller and the SCSI-1 devices (SCSI-1 8 bit devices should be at end of the daisy chain).			☞ New disks announced December 3 and 23, 1996		

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 ≈ = Withdrawn from marketing

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 (SCSI) Compiled by Roger Dodson, IBM. March 1997

## IBM SCSI Disks (5 GB and higher)

	⚡ 5.31 GB Ultrastar	⚡ 5.31 GB Ultrastar
Capacity	⚡ 5.31 GB Ultrastar	⚡ 5.31 GB Ultrastar
Interface	<b>SCSI-2 Fast</b>	<b>SCSI-2 Fast/Wide</b>
SCSI data path	8 bit	16 bit
SCSI burst rate	10 MB/sec	20 MB/sec
Buffer size	512 KB	512 KB
Buffer type	Adaptive	Adaptive
Buffer write caching	Yes (read/write)	Yes (read/write)
Average seek time (ms)	8.0 ms	8.0 ms
Average latency	5.55 ms	5.55 ms
Rotational speed	5400 rpm	5400 rpm
Media transfer rate	7.6 to 12.5 MB/sec	7.6 to 12.5 MB/sec
Sustained transfer rate	4.4 to 7.6 MB/sec	4.4 to 7.6 MB/sec
Mean Time Between Failure	1,000,000 hrs	1,000,000 hrs
Form factor (width x height)	3.5" x <b>1.6" HH</b>	3.5" x <b>1.6" HH</b>
Tagged Command Queueing	Yes	Yes
Automatic Defect Reallocation	Yes	Yes
Predictive Failure Analysis	Yes	Yes
Head technology	Magneto-resistive	Magneto-resistive
Other features	None	None
Vendor	IBM	IBM
Code name	Starfire	Starfire
Available / withdrawn date	May 1995 / March 1996	May 1995 / March 1996
Warranty	5 years	5 years
Part number	94G3787	94G3059
Price (retail USD)	\$ 1,499	\$ 1,569

Fast/Wide disks **require a 16 bit Wide SCSI-2** controller. They will not operate on an 8 bit SCSI-1 controller. SCSI-1 or SCSI-2 devices will work with SCSI-2 16 bit Wide controllers as long as any 16 bit devices are between the SCSI-2 controller and the SCSI-1 devices (SCSI-1 8 bit devices should be at end of the daisy chain).

# IBM SCSI Controllers (PCI) - withdrawn

Controller	➤ <b>SCSI-2 Fast PCI Adapter</b>	➤ <b>SCSI-2 Fast PCI Adapter</b>	➤ <b>SCSI-2 Fast/Wide PCI Adapter</b>	➤ <b>SCSI-2 Fast/Wide Controller</b>
Code name			Earlybloomer	
Vendor		Adaptec AHA-2940U (has custom BIOS)	IBM	Adaptec®
Implementation	Option (not supported in PC 700) Adapter in IBM PC Server 300 (OPT)	Adapter in IBM PC Server 310	<b>Option for IBM PC Power Series</b>	Planar of IBM PC Server 320 (PCI/MCA)
SCSI type	SCSI-2 Fast	SCSI-2 Fast	SCSI-2 Fast/Wide	SCSI-2 Fast/Wide
SCSI bus path / speed	8 bit / 10 MB/sec	8 bit / 10 MB/sec	16 bit / 20 MB/sec	16 bit / 20 MB/sec
I/O Architecture	<b>PCI</b>	<b>PCI</b>	<b>PCI</b>	<b>PCI</b>
I/O bus path / speed	32 bit / up to 132 MB/sec	32 bit / up to 132 MB/sec	32 bit / up to 132 MB/sec	32 bit / up to 132 MB/sec
RAID levels	None (use software)	None (use software)	None (use software)	None (use software)
Tagged Command Que	Yes	Yes	Yes	Yes
Processor	Intelligent SCSI processor	Intelligent SCSI processor	Intelligent SCSI processor	Chip on planar
Size	PCI standard	PCI standard	PCI (smaller than half size)	N/A
Channels	One (internal/external)	One (internal/external)	One (internal and/or external)	One (internal and/or external)
Connectors	One internal; one external	Two total: One internal - 8 bit narrow One external - 8 bit narrow Can use two connectors at any one time	Three total: Two internal - 8 bit narrow - 16 bit wide One external - 16 bit wide Can use only one internal connector at one time; can use external connector at any time	Three total: Two internal - 8 bit narrow - 16 bit wide One external - 16 bit wide Can use only one internal connector at one time; can use external connector at any time
Devices supported	7 devices per adapter	7 devices per adapter	15 devices total on one or both connectors	15 devices total on one or both connectors
Cache std / max	None (32 byte FIFO buffer)	None (32 byte FIFO buffer)	None (FIFO buffer)	None (FIFO buffer)
Cache method	N/A	N/A	N/A	N/A
Cache write policy	N/A	N/A	N/A	N/A
Available / withdra date	May 1994 / October 1996	October 1995 / Feb 1997	June 1995 / March 1996	July 1995/ April 1996
Warranty	3 years	N/A	3 year	Same as PC Server
Price (retail USD)	\$ 199	N/A	\$ 280	N/A
Part number	32G3100	N/A	12H0823	N/A
Controller	➤ <b>SCSI-2 Fast/Wide PCI Adapter</b>	➤ <b>SCSI-2 Fast/Wide PCI Adapter II</b>	➤ <b>SCSI-2 Fast/Wide PCI RAID Adapter</b>	
Code name	Foxtown		Savannah	
Vendor / product	Adaptec / modification of AHA-2940W		Mylex / modification of DAC960P	
Implementation	Option Adapter in PC Server 320 non-array	Adapter in PC Server 520 & 720 non-array	Option Adapter in PC Server 320 array	
SCSI type	SCSI-2 Fast/Wide	<i>Supports a bootable CD-ROM</i>	SCSI-2 Fast/Wide	
SCSI bus path / speed	16 bit / 20 MB/sec		16 bit / 20 MB/sec	
I/O Architecture	<b>PCI</b>		<b>PCI</b>	
I/O bus path / speed	32 bit / 132 MB/sec		32 bit / 132 MB/sec	
RAID levels	None (use software)		<b>RAID 0, 1, Hybrid 1, 5</b>	
Tagged Command Queuing	Yes		4 independent (A,B,C,D) / 8 logical arrays	
Processor	None (intelligent SCSI processor)		i960 at 25 MHz	
Size	PCI standard		PCI standard	
Channels	One (internal and/or external)		Two (one internal; one internal or external)	
Connectors	Three total: Two internal - one is 8 bit narrow - one is 16 bit wide One external - 16 bit wide		Three total: (Pigtail cable and side card included except PC Server 320 does not include) Can only use two connectors at any one time	
Devices supported	15 devices total on one or both connectors		14 per adapter (7 max per channel)	
Cache std / max	None (FIFO buffer)		4 MB / 4 MB (with parity) 70 ns	
Cache method	N/A		One 72 pin socket	
Cache write policy	N/A		Write-through or write-back	
Available / withdra date	March 95 / Feb 96	October 95 / Jan 97	June 1995 / April 1997	
Warranty	1 year	1 year	1 year	
Price (retail USD)	\$ 299	\$ 299	\$ 1,840	
Part number	94G3771	94G4673	94G2764	

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(6SCSI) Compiled by Roger Dodson, IBM. March 1997

# IBM SCSI Controllers (Micro Channel) - withdrawn

Controller	⚡ <b>Micro Channel SCSI Adapter with Cache</b>	⚡ <b>PS/2 SCSI-2 Adapter/A</b>	⚡ <b>SCSI-2 Fast/Wide Adapter/A</b>
Implementation	Planar/card - old PS/2's	Adapter in 76s, 77s	Planar in Model 85 433, 466 Adapter in 95 466, 560, 566 Adapter in Serv 500 non-array models
SCSI type	Option (Options by IBM™) SCSI-1	Option SCSI-2 Fast	Option (Options by IBM) SCSI-2 Fast/Wide
SCSI bus path / speed	8 bit / 5 MB/sec	8 bit / 10 MB/sec	16 bit / 20 MB/sec
I/O Architecture	<b>Micro Channel®</b>	<b>Micro Channel</b>	<b>Micro Channel</b>
I/O bus path / speed	32 bit / 16.6 MB/sec	16 bit / 3 MB/sec	32 bit / 40 MB/sec streaming
I/O features			Streaming data transfer Address parity and data parity
RAID levels	None (use software)	None (use software)	None (use software)
Tagged Command Queuing	No	No	Yes
Processor	80188 at 16 MHz	None (PIO)	80C186 at 20 MHz
Size	Type 3 (long)	Half length - Type 3	Type 3 (short)
Channels	One (internal/external)	One (internal/external)	Two (one internal/one external)
Connectors	One internal; one external	One internal; one external	Two internal for SCSI-1 or SCSI-2 cabling (only one active); one external
Devices supported	7 devices per adapter	7 devices per adapter	7 devices per adapter 15 devices on Server 500 on one or two channels
Cache std / max	512 KB / 512 KB	0 KB / 0 KB (8 KB buffer)	0 KB / 0 KB (128 byte buffer)
Cache method	Two SIMMs	N/A	N/A
Cache configurations	N/A	N/A	N/A
Cache write policy	Write-through	N/A	N/A
Available date	March 1992	June 1994	September 1993
Price (retail USD)	\$ 379	\$ 233	\$ 515
Part number	70G8497 (old 6451133)	82G4868	70G8498 (old 6451280)
Controller	⚡ <b>SCSI-2 RAID Controller</b>	⚡ <b>SCSI-2 Fast/Wide Streaming RAID Adapter/A</b>	
Code name	Passplay	Cheetah	
Implementation	Adapter in Model 95 array models Not available as option	Adapter in PC Server 500 and 720 array models Option	
SCSI type	SCSI-2 Fast/Wide	SCSI-2 Fast/Wide	
SCSI bus path / speed	16 bit / 20 MB/sec	16 bit / 20 MB/sec	
I/O Architecture	<b>Micro Channel</b>	<b>Micro Channel</b>	
I/O bus path / speed	32 bit / 40 MB/sec streaming	32 bit / 40 MB/sec streaming (80 MB/sec on PC Server 720)	
I/O features	Streaming data transfer Address parity and data parity	Streaming data transfer Address parity and data parity	
RAID levels	RAID 0, 1, Hybrid 1, 5 4 ind (A,B,C,D) / 8 logical arrays	RAID 0, 1, Hybrid 1, 5 4 ind (A,B,C,D) / 8 logical arrays	
Tagged Command Queuing	Yes	Yes	
Processor	i960 at 25 MHz	i960 at 25 MHz	
Size	Type 5 (only fits in Model 85 or 95)	Type 3 (full length)	
Channels	Two (both internal)	Two (one internal; one internal or external) See Note 1	
Connectors	Two internal only (can not attach external devices)	Three total: Two internal - 16 bit wide (side card included except One external - 16 bit wide PC Server 500 does not include) Can only use two connectors at any one time	
Devices supported	7 devices per adapter	14 per adapter (7 per max per channel)	
Cache std / max	4 MB / 64 MB (with parity)	4 MB / 4 MB (with parity) 60 ns	
Cache method	4 sockets for 30 pin 80ns SIMMs	Soldered on adapter	
Cache configurations	4, 16, or 64 MB only	N/A	
Cache write policy	Write-through or write-back	Write-through or write-back	
Available / withdrawn date	N/A (November 1993 for Servers)	May 1994 / April 1997	
Price (retail USD)	N/A	\$ 1, 840	
Part number	N/A (not available as option)	70G9263	
<p><b>Note1: SCSI-2 Fast/Wide Streaming RAID Adapter/A</b>            There are 3 connectors on adapter: one external and two internal.            One internal is the opposite end of the external and can only be used if external is not used (this is first SCSI bus which has 2 connectors).            The other internal can go to internal devices or go to the standard sidecard (this is second SCSI bus which has 1 connector).            The sidecard ships standard and uses a Micro Channel slot. It is only used if want external devices on this bus (sidecard does not ship on PC Server 500 array models).            So only two connectors can be used at one time and can not mix internal and external devices on the same bus.            It supports 8 drives as part of the same physical array spread across two SCSI buses            The 2 SCSI buses will be either ① both external or ② one internal and one external or ③ both internal.</p>			

# IBM SCSI Disks (up to 1.27 GB) - withdrawn

Capacity	⚡ <b>540MB Deskstar</b>	⚡ <b>1 GB</b>	⚡ <b>1 GB Hot Swap</b> for 95A or 3516	⚡ <b>1.08 GB Deskstar XP™</b>	⚡ <b>1.12 GB Hot-Swap Disk Drive III</b>
Interface	SCSI-2 Fast	SCSI-2 Fast	<b>SCSI-2 Fast/Wide</b>	SCSI-2 Fast	<b>SCSI-2 Fast/Wide</b>
SCSI data path	8 bit	8 bit	16 bit	8 bit	16 bit
SCSI burst rate	10 MB/sec	10 MB/sec	20 MB/sec	10 MB/sec	20 MB/sec
Buffer size	128 KB	512 KB	512 KB	512 KB	1 MB
Buffer type (no. of segments)	Adaptive	Segmented (16)	Segmented (16)	Adaptive	Adaptive
Buffer write caching	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)
Average seek time (ms)	12 read / 12.7 wrt	8.6 ms	8.6 ms	10.5 ms	8.5 ms
Average latency	6.67 ms	5.56 ms	5.56 ms	5.56 ms	4.17 ms
Rotational speed	4500 rpm	5400 rpm	5400 rpm	5400 rpm	7200 rpm
Media transfer rate	4.03 - 6.09 MB/sec	4.8 MB/sec	4.8 MB/sec	4.87 to 6.88 MB/sec	None available
Sustained transfer rate	2.5 - 3.7 MB/sec	4.3 MB/sec	4.3 MB/sec	2.9 to 4.0 MB/sec	4.9 to 8.2 MB/sec
Mean Time Between Failure	350,000 hrs	800,000 hrs	800,000 hrs	500,000 hrs	800,000
Form factor (width x height)	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL
Tagged Command Queueing	Yes	Yes	Yes	Yes	Yes
Automatic Defect Reallocation	Yes	Yes	Yes	Yes	Yes
Predictive Failure Analysis	No	Yes	Yes	Lmtd media failures	Yes
Head technology	Magneto-resistive	Magneto-resistive	Magneto-resistive	Magneto-resistive	Unknown
No-ID™ sector format	Yes	No	No	Yes	No
Vendor	IBM	IBM	IBM	IBM	Quantum™
Code name	Aladdin	Spitfire	Spitfire	Pegasus Enhanced	Atlas
Available / withdrawn date	July 95 / Oct 96	June 93 / Feb 97	August 94 / 1996	July 95 / May 96	January 96 / April 97
Warranty	3 years	5 years	N/A	5 years	1 year <b>Same as</b>
Part number (old)	N/A	32G4198	N/A	N/A	70G9861 <b>07H0386</b>
Part number (new)	06H8558	70G8492	N/A	06H8891	N/A <b>except with</b>
Part number for 95 A or 3516 with carrier unit/housing	None	None	70G9743	N/A	N/A <b>Hot-Swap</b>
Price (retail USD)	\$ 225	\$ 799	\$ 809	\$ 325	\$ 829 <b>Tray III</b>
Capacity	⚡ <b>1.12 GB Hot Swap</b>	⚡ <b>1.12 GB Ultrastar XP™</b> for PC Server 300, 320	⚡ <b>1.12 GB</b> for 95, 300, 310, 320	⚡ <b>1.27 GB</b>	
Interface	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>	<b>SCSI-2 Fast/Wide</b>	SCSI-2 Fast	
SCSI data path	16 bit	16 bit	16 bit	8 bit	
SCSI burst rate	20 MB/sec	20 MB/sec	20 MB/sec	10 MB/sec	
Buffer size	512 KB	512 KB	1 MB	128 KB	
Buffer type (no. of segments)	Adaptive	Adaptive	Adaptive	Adaptive	
Buffer write caching	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)	
Average seek time (ms)	6.9 ms or 8.0 ms	6.9 ms	8.5 ms	11 ms	
Average latency	4.17 ms	4.17 ms	4.17 ms	5.56 ms	
Rotational speed	7200 rpm	7200 rpm	7200 rpm	5400 rpm	
Media transfer rate	9.95 to 12.58 or 8.4	9.95 to 12.58 MB/sec	None available	5.8 to 10.4 MB/sec	
Sustained transfer rate	5.45 to 7.37 MB/sec	5.45 to 7.37 MB/sec	4.9 to 8.2 MB/sec	Unknown	
Mean Time Between Failure	1,000,000 or 800,000	1,000,000 hrs	800,000	500,000	
Form factor (width x height)	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL	3.5" x 1" SL	
Tagged Command Queueing	Yes	Yes	Yes	Yes	
Automatic Defect Reallocation	Yes	Yes	Yes	Yes	
Predictive Failure Analysis	Yes	Yes	Yes	Yes	
Head technology	Magneto-resistive	Magneto-resistive	Unknown	Thin-Film	
No-ID™ sector format	No	No	No	No	
Vendor	IBM or Quantum	IBM	Quantum™	Quantum™	
Code name	Starfire or Atlas	Starfire	Atlas	Parrot 2s	
Available / withdrawn date	Oct 94 or Oct 95/ 1/97	March 95 / October 96	October 95 / October 96	May 96 / March 97	
Warranty	5 years or 3 years	5 years	5 years	3 years	
Part number	N/A	94G3052	07H0386	75H8974	
Part number with Hot Swap Drive Tray	94G2649	N/A	N/A	N/A	
Price (retail USD)	\$ 829	\$ 850	\$ 850	\$ 345	

Fast/Wide disks **require a 16 bit Wide SCSI-2 controller**. They will not operate on an 8 bit SCSI-1 controller. SCSI-1 or SCSI-2 devices will work with SCSI-2 16 bit Wide controllers as long as any 16 bit devices are between the SCSI-2 controller and the SCSI-1 devices (SCSI-1 8 bit devices should be at end of the daisy chain).

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# IBM SCSI Disks - withdrawn

Capacity	≈ <b>170 MB</b>	≈ <b>270 MB</b>	≈ <b>340 MB</b>	≈ <b>364 MB</b>	≈ <b>540 MB</b>
Interface	SCSI-2 Fast	SCSI-2 Fast	SCSI-2 Fast	SCSI-2 Fast	SCSI-2 Fast
SCSI data path	8 bit	8 bit	8 bit	8 bit	8 bit
SCSI burst rate	10 MB/sec	10 MB/sec	10 MB/sec	10 MB/sec	10 MB/sec
Buffer size	64 KB	96 KB	64 KB	96 KB	256 KB
Buffer type (no. of segments)	Read ahead (1)	Adaptive	Read ahead (1)	Adaptive	Segmented (4)
Buffer write caching	No (read only)	Yes (read/write)	No (read only)	Yes (read/write)	No (read only)
Average seek time (ms)	13 ms	12 read / 14 wrt	13 ms	12 read / 14 wrt	8.7 ms
Average latency	7.5 ms	6.67 ms	7.5 ms	6.67 ms	4.76 ms
Rotational speed	4011 rpm	4500 rpm	4011 rpm	4500 rpm	6300 rpm
Media transfer rate	3.5 MB/sec	3.8 MB/sec	3.5 MB/sec	3.8 MB/sec	3.8 MB/sec
Sustained transfer rate		2.5 MB/sec		2.5 MB/sec	
Mean Time Between Failure	250,000 hrs	300,000 hrs	250,000 hrs	300,000 hrs	300,000 hrs
Form factor (width x height)	3.5" x 1" SL	3.5" x 1" SL			
Tagged Command Queueing	No	Yes	No	Yes	Yes
Automatic Defect Reallocation	Yes	Yes	Yes	Yes	Yes
Predictive Failure Analysis	No	No	No	No	No
Head technology	Metal in gap	Magneto-resistive	Metal in gap	Magneto-resistive	Metal in gap
Vendor	Conner	IBM	Conner	IBM	Maxtor
Code name		Satsuma		Satsuma	
Available date	February 1994	July 1994	February 1994	July 1994	July 1993
Warranty		2 years		2 years	
Withdrawal date	September 1994	January 1995	September 1994	May 1995	September 1994
Part number (old)	N/A	N/A	N/A	N/A	32G4151
Part number (new)	70G8480	94G2439	70G8481	94G2440	70G8491
Part number for 95 A or 3516 with carrier unit/housing	None	None	None	None	70G7163
Price (retail USD)	\$ 279	\$ 199	\$ 455	\$ 245	\$ 519
Price with carrier unit	N/A	N/A	N/A	N/A	\$ 609
Capacity	≈ <b>540 MB</b>	≈ <b>728 MB</b>	≈ <b>1 GB</b>	≈ <b>1.08 GB Deskstar XP™</b>	
Interface	SCSI-2 Fast	SCSI-2 Fast	SCSI-2 Fast	SCSI-2 Fast	
SCSI data path	8 bit	8 bit	8 bit	8 bit	
SCSI burst rate	10 MB/sec	10 MB/sec	10 MB/sec	10 MB/sec	
Buffer size	96 KB	96 KB	512 KB	512 KB	
Buffer type (no. of segments)	Adaptive	Adaptive	Segmented (16)	Adaptive	
Buffer write caching	Yes (read/write)	Yes (read/write)	Yes (read/write)	Yes (read/write)	
Average seek time (ms)	12 read / 14 wrt	12 read / 14 wrt	8.6 ms	10.5 ms	
Average latency	6.67 ms	6.67 ms	5.56 ms	5.56 ms	
Rotational speed	4500 rpm	4500 rpm	5400 rpm	5400 rpm	
Media transfer rate	3.8 MB/sec	3.8 MB/sec	4.8 MB/sec	4.97 to 6.88 MB/sec	
Sustained transfer rate	2.5 MB/sec	2.5 MB/sec	4.3 MB/sec	3.2 to 4.0 MB/sec	
Mean Time Between Failure	300,000 hrs	300,000 hrs	800,000 hrs	500,000 hrs	
Form factor (width x height)	3.5" x 1" SL				
Tagged Command Queueing	Yes	Yes	Yes	Yes	
Automatic Defect Reallocation	Yes	Yes	Yes	Yes	
Predictive Failure Analysis	No	No	Yes	No	
Head technology	Magneto-resistive	Magneto-resistive	Magneto-resistive	Magneto-resistive	
Vendor	IBM	IBM	IBM	IBM	
Code name	Satsuma	Satsuma	Spitfire	Pegasus	
Available date	July 1994	July 1994	June 1993	November 1994	
Warranty	2 years	2 years	5 years	3 years	
Withdrawal date	March 1996	June 1995	Jan 1996	July 1995	
Part number (old)	N/A	N/A	N/A	N/A	
Part number (new)	94G2441	94G2442	N/A	94G3187	
Part number for 95 A or 3516 with carrier unit/housing	None	None	N/A	N/A	
Price (retail USD)	\$ 225	\$ 285	\$ 899	\$ 325	

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