HP 3000 900 Series
Computer Systems

Configuration Guide Addendum

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SPU Model Number	SPU Product Number	User based License for All systems	Slots per Box	Memory		Performance Relative to		Options for FL PT.	# Cards Supported IB/SC/FL	Max DTCs
				Std MBs	Max MBs	917LX	922			
917LX	A1770B	8	2	32	192	1	5.32	0DT	1/2/01	4
927LX	A1771C	20	2	32	192	1	5.32	0DT	1/2/01	4
937LX	A1772B	32/40/64	2	32	192	1	5.32	0DT	1/2/01	6
937RX	A1772B	32/40/64	4	32	384	1	5.32	0DT	2/4/02	6
937SX	A1772B	32/40/64	12	32	384	1	5.32	0DT	2/4/02	6
947LX	A1708C	100/160/256	2	64	192	1	5.32	0DT	1/2/01	12
947RX	A1708C	100/160/256	4	64	384	1	5.32	0DT	2/4/02	12
947SX	A1708C	100/160/256	12	64	384	1	5.32	0DT	3/10/04	12
957RX	A1709B	64/100/160/256/UL	4	64	384	1.6	8.51	0DU	2/4/02	24
957SX	A1709B	64/100/160/256/UL	12	64	384	1.6	8.51	0DU	3/10/04	24
967RX	A1710B	100/160/256/UL	4	64	512	2	10.65	0DV	2/4/02	24
967SX	A1710B	100/160/256/UL	12	64	512	2	10.7	0DV	3/10/04	24
987RX	A2317B	100/160/256/UL	4	64	768	3.2	17.69	std	2/4/02	24
987SX	A2317B	100/160/256/UL	12	64	768	3.2	17.69	std	3/10/04	24
987/150RX	A3004A	100/160/256/UL	4	64	768	4.5		std	2/4/02	24
987/150SX	A3004A	100/160/256/UL	12	64	768	4.5		std	3/12/04	24
987/200RX	A3045A	100/160/256/UL	4	64	768	6		std	2/4/02	24
987/200SX	A3045A	100/160/256/UL	12	64	768	6		std	3/12/04	24

SPU Model Number	SPU Product Number	User based License for All systems	Add'l Slots	Memory		Perf. Rel. to 917LX	Gartner est'd. MIPs	Options for FL PT.	Number of I/O cards per HP-PB I/O	Max DTCs
				Std MBs	Max MBs					
990	A1809A/A1811A	100/160/256/384/UL	103	128	2048	2.8	31	std	2/5/05	120
992/100	A1809A/A1811A	100/160/256/384/UL	103	128	2048	3.5	40	std	2/5/05	120
992/200	A1809A/A1811A	100/160/256/384/UL	103	128	2048	6	66	std	2/5/05	120
992/300	A1809A/A1811A	100/160/256/384/UL	103	128	2048	8.1	91	std	2/5/05	120
992/400	A1809A/A1811A	100/160/256/384/UL	103	128	2048	10	116	std	2/5/05	120
991	A3080A/A3079A	100/160/256/384/UL	105	256	2048	3.3		std	2/5/05	120
995/100	A3080A/A3079A	100/160/256/384/UL	105	256	2048	4.2		std	2/5/05	120
995/200	A3080A/A3079A	100/160/256/384/UL	105	256	2048	7.1		std	2/5/05	120
995/300	A3080A/A3079A	100/160/256/384/UL	105	256	2048	9.6		std	2/5/05	120
995/400	A3080A/A3079A	100/160/256/384/UL	105	256	2048	11.8		std	2/5/05	120
995/500	A3080A/A3079A	100/160/256/384/UL	105	256	2048	13.9*		std	2/5/05	120
995/600	A3080A/A3079A	100/160/256/384/UL	105	256	2048	16.0*		std	2/5/05	120
995/700	A3080A/A3079A	100/160/256/384/UL	105	256	2048	18.0*		std	2/5/05	120
995/800	A3080A/A3079A	100/160/256/384/UL	105	256	2048	20.0*		std	2/5/05	120

* Performance is highly dependent on workload.

Note: Relative OLTP performance is a general guideline since the factors influencing the performance of an application vary widely. Unless otherwise stated, the OLTP performance numbers are estimated TPS numbers.

Note: Refer to the July 1993 Configuration Guide (Pub. # 5091-7438E) for configuration information pertaining to the HP 3000.

SPU Model Number	SPU Product Number	Instr/Data Cache (KB)	Total Cache Entries (KB)	Supported External SCSI i/f	OLTP ALLBASE (TPS)	Max. Work-Stations	STD Int. Disk (GB)	Optional Int. Disk (GB)	Clock Speed MHz
917LX	A1770B	32/64	96	2	41 est	64	1	2	32
927LX	A1771C	32/64	96	2	41 est	64	1	2	32
937LX	A1772B	32/64	96	2	41 est	152	1	2	32
937RX	A1772B	32/64	96	4	41 est	152	1	6	32
937SX	A1772B	32/64	96	10	41 est	152	1	6	32
947LX	A1708C	32/64	96	2	41 est	530	1	2	32
947RX	A1708C	32/64	96	4	41 est	530	1	6	32
947SX	A1708C	32/64	96	10	41 est	530	1	6	32
957RX	A1709B	64/64	128	4	84 est	850	1	6	48
957SX	A1709B	64/64	128	10	84 est	850	1	6	48
967RX	A1710B	256/256	512	4	82 est	900	1	6	48
967SX	A1710B	256/256	512	10	82 est	900	1	6	48
987RX	A2317B	256/256	512	4	>180 est	1200	1	6	96
987SX	A2317B	256/256	512	10	>180 est	1500	1	6	96
987/150RX	A3004A	1024/1024	2048	4		1700	1	6	96
987/150SX	A3004A	1024/1024	2048	12		1700	1	6	96
987/200RX	A3045A	2* (1024/1024)	4096	4		1700	1	6	2×96
978/200SX	A3045A	2* (1024/1024)	4096	12		1700	1	6	2×96

SPU Model Number	SPU Product Number	Cache Inst/Data	Total Cache	Max # Users Log-on	TPS est	Clock Speed MHz	Max. Optical Disk	Max SCSI Cards	Max PB-FL Cards	Max.** Disks
990	A1809A/A1811A	2MB/2MB	4MB	2300	145	48*	3	40	40	255
992/100	A1809A/A1811A	2MB/2MB	4MB	2300	185	60	3	40	40	255
992/200	A1809A/A1811A	2MB/2MB	4MB	2300	315	60	3	40	40	255
992/300	A1809A/A1811A	2MB/2MB	4MB	2300	420	60	3	40	40	255
992/400	A1809A/A1811A	2MB/2MB	4MB	2300	500+	60	3	40	40	255
991	A3080A/A3079A	1MB/1MB	2MB	2700		72*	3	40	40	255
995/100	A3080A/A3079A	1MB/1MB	2MB	2700		90	3	40	40	255
995/200	A3080A/A3079A	1MB/1MB	2MB	2700		90	3	40	40	255
995/300	A3080A/A3079A	1MB/1MB	2MB	2700		90	3	40	40	255
995/400	A3080A/A3079A	1MB/1MB	2MB	2700		90	3	40	40	255
995/500	A3080A/A3079A	1MB/1MB	2MB	2700		90	3	40	40	255
995/600	A3080A/A3079A	1MB/1MB	2MB	2700		90	3	40	40	255
995/700	A3080A/A3079A	1MB/1MB	2MB	2700		90	3	40	40	255
995/800	A3080A/A3079A	1MB/1MB	2MB	2700		90	3	40	40	255

* Effective with software
**Configurations greater than 128 spindles require factory approval

Note: Relative OLTP performance is a general guideline since the factors influencing the performance of an application vary widely. Unless otherwise stated, the OLTP performance numbers are estimated TPS numbers.

SPU Model Number	SPU Product Number	Maximum Number of External Disks			Max. Supported Disk (Gb)	Int. Supported DDS	Typical # users	Max. System Printers	Max. Serial Printers	Max. LAN cards Inc. MFIO Lan	Max. PSI Cards	Max. Token Ring
		SCSI	HP-IB	HP-FL								
917LX	A1770B	20	6	8	40	2GB	4 - 8	6	32	2	2	1
927LX	A1771C	20	6	8	40	2GB	16 - 20	6	32	2	2	1
937LX	A1772B	20	6	8	40	2GB	24 - 64	6	32	2	2	1
937RX	A1772B	34	12	16	68	2GB	24 - 64	8	48	2	4	1
937SX	A1772B	49	12	32	98	2GB	24 - 64	8	48	2	5	1
947LX	A1708C	20	6	8	40	2GB	64 - 100	6	32	2	2	1
947RX	A1708C	34	12	16	68	2GB	64 - 100	8	48	2	4	1
947SX	A1708C	49	12	32	98	2GB	64 - 100	8	48	2	5	1
957RX	A1709B	34	6	16	68	2GB	64 - 160	8	64	2	4	1
957SX	A1709B	49	12	32	98	2GB	64 - 160	8	64	2	5	1
967RX	A1710B	34	6	16	68	2GB	96 - 250	8	64	2	4	1
967SX	A1710B	49	12	32	98	2GB	96 - 250	8	64	2	5	1
987RX	A2317B	34	12	16	68	2GB	96 - 380	8	64	2	4	1
987SX	A2317B	49	12	32	98	2GB	96 - 380	8	64	2	5	1
987/150RX	A3004A	34	12	32	120	2GB	128 - 500	8	96	2	5	1
987/150SX	A3004A	65	12	32	250	2GB	128-500	8	96	2	5	1
987/200RX	A3045A	34	12	32	120	2GB	170-650	8	96	2	5	1
987/200SX	A3045A	65	12	32	250	2GB	170-650	8	96	2	5	1

SPU Model Number	SPU Product Number	Maximum PBA-IB Cards	Maximum Disks		Max. * Supported Disk (Gb)	Max Supported DDS/3480	Typical # Users	Max. System Printers SCSI/HPIB	Max. Serial Printers	Max. LAN Cards Inc Lan/Consol	Max. PSI Cards	Max. Token Ring
			HP-IB	HP-FL *								
990	A1809A/A1811A	16	48	255	2040	8	200 - 580	04/08	250	2	8	1
992/100	A1809A/A1811A	16	48	255	2040	8	200 - 580	04/08	250	2	8	1
992/200	A1809A/A1811A	16	48	255	2040	8	325 - 775	04/08	250	2	8	1
992/300	A1809A/A1811A	16	48	255	2040	8	425 - 945	04/08	250	2	8	1
992/400	A1809A/A1811A	16	48	255	2040	8	500 - 1000	04/08	250	2	8	1
991	A3080A/A3079A	16	48	255	2040	8	200 - 580	04/08	250	3	8	1
995/100	A3080A/A3079A	16	48	255	2040	8	200 - 580	04/08	250	3	8	1
995/200	A3080A/A3079A	16	48	255	2040	8	375 - 775	04/08	250	3	8	1
995/300	A3080A/A3079A	16	48	255	2040	8	425 - 945	04/08	250	3	8	1
995/400	A3080A/A3079A	16	48	255	2040	8	500 - 1050	04/08	250	3	8	1
995/500	A3080A/A3079A	16	48	255	2040	8	500 - 1050	04/08	250	3	8	1
995/600	A3080A/A3079A	16	48	255	2040	8	650 - 1200	04/08	250	3	8	1
995/700	A3080A/A3079A	16	48	255	2040	8	650 - 1200	04/08	250	3	8	1
995/800	A3080A/A3079A	16	48	255	2040	8	800 - 1300	04/08	250	3	8	1

* Configurations greater than 128 spindles require factory approval

Note: Relative OLTP performance is a general guideline since the factors influencing the performance of an application vary widely. Unless otherwise stated, the OLTP performance numbers are estimated TPS numbers.

SPU	Height	Width	Depth	Weight	AC power	Processor Type	Frequency	Heat BTU/hour	Internal card/cages	External card/cages	Supported on MPE/iX
917LX	433mm (16.9")	22mm (8.9")	533mm(21")	31.8kg(70lb)	100-240 Volt	CMOS	50/60HZ	1383	1		3.1 - 4.0
927LX	433mm (16.9")	22mm (8.9")	533mm(21")	31.8kg(70lb)	100-240 Volt	CMOS	50/60HZ	1383	1		3.1 - 4.0
937LX	433mm (16.9")	22mm (8.9")	533mm(21")	31.8kg(70lb)	100-240 Volt	CMOS	50/60HZ	1383	1		3.1 - 4.0
937RX	433mm (16.9")	22mm (8.9")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		3.1 - 4.0
937SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		3.1 - 4.0
947LX	433mm (16.9")	22mm (8.9")	533mm(21")	31.8kg(70lb)	100-240 Volt	CMOS	50/60HZ	1383	1		3.1 - 4.0
947RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		3.1 - 4.0
947SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		3.1 - 4.0
957RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		3.1 - 4.0
957SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		3.1 - 4.0
967RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		3.1 - 4.0
967SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		3.1 - 4.0
987RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		4.0 & >
987SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		4.0 & >
987/150RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		4.0 & >
987/150SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		4.0 & >
987/200RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		5.0
987/200SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 Volt	CMOS	50/60HZ	2766	1		5.0
99x/100-400	1.6M Cabinet	(19.0")			200-240 Volt	CMOS	50/60HZ	2766	1	7	4.0 & >
991,995	1.62M	(19.0")			200-240 Volt	CMOS	50/60HZ		1	7	5.0

Who's	who in	the card	game:
27251A	SCSI	CIO card	only CIO
28642A	SCSI	NIO card	917-992
		&	920-958
27113A	HP-IB	CIO card	only CIO
A1747A	HP-IB	PBA NIO	920-958
27115A	HP-FL	CIO card	only CIO
A1748A	HP-FL	PBA NIO	920-958
28616A	PB-FL	NIO	917-992

SYS Type	est. mips	OLTP est	Perf. rel. to 917LX
920	7	4.9	0.1
922	10	7.7	0.2
932	15	13.6	0.3
948		38.4	0.9
958		49	1.1
949	28	32.2	0.8
950		18-19	0.4
955	22	27-28	0.7
960	30	38.2	1
980/100		80	2.2
980/200		150	3.66
980/300		200	4.88
980/400		240	5.85
925	8	7-8	0.2
935	15	14-16	0.4
s/70	1.5	10-11	0.3
s/58	0.8	4-5	0.1
977SX	20.8	150.6	2.6

Note: Relative OLTP performance is a general guideline since the factors influencing the performance of an application vary widely. Unless otherwise stated, the OLTP performance numbers are estimated TPS numbers.

Business Systems at-a-Glance (cont'd)

HP 3000/HP 9000 Comparison by Packaging

MHz	Package Cache	2 Slots 3000	2 Slots 9000	4 Slots 3000	4 Slots 9000	6 Slots 9000	8 Slots 9000	12 Slots 3000	12 Slots 9000
2*96	4096			987/200RX	G70		H70	987/200SX	170
96	2048			987/150RX	G60		H60	987/150SX	160
96	512			987RX	G50	887	H50	987SX	987/150
64	512				G40	867	H40	977	877/140
48	512		837/F30	967RX	G30	847	H30	967SX	857/130
48	128		817/F20	957RX		827	H20	957SX	
32	96	947LX	807/F10	947RX				947SX	
32	96	937LX		937RX				937SX	
32	96	927LX							
32	96	917LX							

This chart only illustrates how the HP 3000 and HP 9000 align based on the processors used in them. To obtain similar performance to an HP 3000 at comparable user levels, it would typically require moving up one or more HP 9000 processor levels.

Notes:
* For the Corporate Business systems and the 987RX thru 987/150SX MPE/iX 4.5 has not been tested with all patches at this time.

** The following peripherals are supported on 4.0 plus patches only:
- 7980S 1/2-inch SCSI tape drive
- 7980SX 1/2-inch SCSI tape drive
- 4220 1/2-inch Cartridge tape drive with autoloader
- 4280 model A01 (single drive unit) 1/2-inch Cartridge tape drive
- 4280 model A02 (double drive unit) 1/2-inch Cartridge tape drive
- C2258HA/B 4.0 HP-FI disk array   StorageTech device
- C2259HA/B 4.0 HP-FI disk array   StorageTech device
                                                    StorageTech device

Note: Relative OLTP performance is a general guideline since the factors influencing the performance of an application vary widely. Unless otherwise stated, the OLTP performance numbers are estimated TPS numbers.

Section 2
HP 3000 Corporate Business Systems

General System Configuration Information

Table 2.1 Maximum Supported Hardware Configuration*

	995/100 DX, 991 DX 995/100 CX, 991 CX	995/200 DX, 995/200 CX	995/300 DX, 995/300 CX	995/400 DX, 995/400 CX
MPE/iX release support	Rel. 5.0	Rel. 5.0	Rel. 5.0	Rel. 5.0
User license: (UL=unlimited) std/opt	100/160, 256, 384, UL			
Typical users	200–580	325–775	425–945	500–1050
Maximum connected workstations/terminals	2700	2700	2700	2700
Maximum memory card per SPU[3]	8	8	8	8
Maximum Dual Bus-Converter Cards	4	4	4	4
HP-PB I/O card cages[2]: Internal/External	1/7	1/7	1/7	1/7
HP-PB slots per HP-PB I/O card cage	14	14	14	14
Memory (MB): minimum/maximum	256/2048	256/2048	256/2048	256/2048
Maximum disk storage: Total = 2040 GB PB-FL[5] –255[4] spindles x 8 GB	2040	2040	2040	2040
Maximum disks: Total = 255[4] PB-FL[5] SCSI PBA-IB[6]	255 255 48	255 255 48	255 255 48	255 255 48
Maximum backup devices SCSI (DDS) PBA-IB (HP-IB)/SCSI (tape drive) Optical SCSI 1/2-inch cartridge (3480 compatible)	8 8 3 8 transports	8 8 3 8 transports	8 8 3 8 transports	8 8 3 8 transports
Maximum printers System PBA-IB (HP-IB) Serial System SCSI Line	8 250 4 16	8 250 4 16	8 250 4 16	8 250 4 16
Maximum number of devices per I/O card Per PBA-IB (HP-IB) Per PB-FL Per SCSI	6 8 7	6 8 7	6 8 7	6 8 7
Maximum DTCs	120	120	120	120
Maximum cards per HP-PB I/O card cage PBA-IB (HP-IB) cards PB-FL (HP-FL) cards SCSI cards	2 5 5	2 5 5	2 5 5	2 5 5
Maximum network links per system 802.3 LANIC[1] 802.5 Token Ring	2 1	2 1	2 1	2 1
Maximum PSI cards per system[7]	8	8	8	8

[1] First 802.3 LANIC standard on LAN/Console card.
[2] First HP-PB I/O card cage is internal to the SPU cabinet, seven additional card cages can be added to the 1.6 m Expansion Cabinet.
[3] Memory Cards available: 64 MB, 128 MB, 256 MB.
[4] Configurations exceeding 128 disks must be factory approved.
[5] This is a new FL interface, not PBA-FL.
[6] Not supported as LDEV 1.
[7] PSI (Programmable Serial Interface) cards are the hardware components for the SNA Link, BSC Link, and NS Point to Point 3000 products in chapter 7 of the HP 3000 900 Series Configuration Guide.

* For recommended configurations to optimize system performance, refer to HP-PB I/O Card Cage Performance Guidelines section of this chapter.

NOTE: Please refer to the July 1993 Configuration Guide (Pub. number 5091-7438E) for information pertaining to the other members of the Corporate Business System Family.

(continued)

General System Configuration Information (cont'd)

Table 2.1 Maximum Supported Hardware Configuration*

	995/500 DX, 995/500 CX	995/600 DX, 995/600 CX	995/700 DX, 995/700 CX	995/800 DX, 995/800 CX
MPE/iX release support	Rel. 5.0	Rel. 5.0	Rel. 5.0	Rel. 5.0
User license: (UL=unlimited) std/opt	100, 160, 256, 384, UL			
Typical users	500–1050	650–1200	650–1200	800–1300
Maximum connected workstations/terminals	2700	2700	2700	2700
Maximum memory card per SPU[3]	8	8	8	8
Maximum Dual Bus-Converter Cards	4	4	4	4
HP-PB I/O card cages[2]: Internal/External	1/7	1/7	1/7	1/7
HP-PB slots per HP-PB I/O card cage	14	14	14	14
Memory (MB): minimum/maximum	256/2048	256/2048	256/2048	256/2048
Maximum disk storage: Total = 2040 GB PB-FL[5] –255[4] spindles x 8 GB	2040	2040	2040	2040
Maximum disks: Total = 255[4] PB-FL[5] SCSI PBA-IB[6]	255 255 48	255 255 48	255 255 48	255 255 48
Maximum backup devices SCSI (DDS) PBA-IB (HP-IB)/SCSI (tape drive) Optical SCSI 1/2-inch cartridge (3480 compatible)	8 8 3 8 transports	8 8 3 8 transports	8 8 3 8 transports	8 8 3 8 transports
Maximum printers System PBA-IB (HP-IB) Serial System SCSI Line	8 250 4 16	8 250 4 16	8 250 4 16	8 250 4 16
Maximum number of devices per I/O card Per PBA-IB (HP-IB) Per PB-FL Per SCSI	6 8 7	6 8 7	6 8 7	6 8 7
Maximum DTCs	120	120	120	120
Maximum cards per HP-PB I/O card cage PBA-IB (HP-IB) cards PB-FL (HP-FL) cards SCSI cards	2 5 5	2 5 5	2 5 5	2 5 5
Maximum network links per system 802.3 LANIC[1] 802.5 Token Ring	2 1	2 1	2 1	2 1
Maximum PSI cards per system[7]	8	8	8	8

[1] First 802.3 LANIC standard on LAN/Console card.

[2] First HP-PB I/O card cage is internal to the SPU cabinet, seven additional card cages can be added to the 1.6 m Expansion Cabinet.

[3] Memory Cards available: 64 MB, 128 MB, 256 MB.

[4] Configurations exceeding 128 disks must be factory approved.

[5] This is a new FL interface, not PBA-FL.

[6] Not supported as LDEV 1.

[7] PSI (Programmable Serial Interface) cards are the hardware components for the SNA Link, BSC Link, and NS Point to Point 3000 products in chapter 7 of the HP 3000 900 Series Configuration Guide.

*For recommended configurations to optimize system performance, refer to HP-PB I/O Card Cage Performance Guidelines section of this chapter.

Figure 2.1 HP 3000 Corporate Business System

| Peripheral Bays | CS SPU Cabinet | Peripheral Bay | Console | Peripheral Bays |
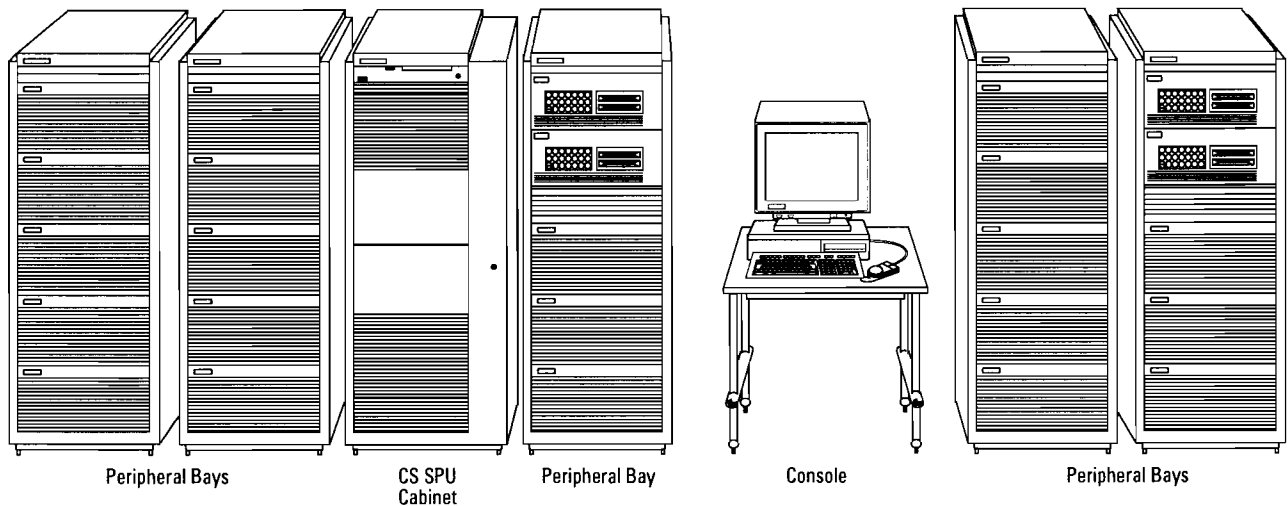
Product Description

The HP 3000 Corporate Business Systems (CS) are highly expandable, high-performance computers which feature a tightly coupled, symmetrical multiprocessing architecture. Multiprocessing of up to eight processors allows for economical modular growth as system performance requirements increase. The CS can be configured with up to 2 Gigabytes of main memory, 2040 Gigabytes of online disk storage, and up to 2700 online users in an OLTP environment. The base configuration consists of one CPU, 256 MB of ECC memory, and 14 HP-PB interface card slots for connection to peripherals, networks, and terminals. The base configuration can be expanded by adding additional processors, memory, and I/O for a broad range of system configurations.

The CS is a standalone System Processing Unit (SPU) in a 1.6 meter high system cabinet, with a factory integrated 1.6 meter high peripheral expansion cabinet that houses the standard system 3 kVA HP PowerTrust Uninterruptible Power Source (UPS) and provides space for peripherals and I/O expansion. Additional peripherals and I/O expansion can be separately installed in one or more subsequent 1.6 meter peripheral expansion cabinets.

The nine performance levels of the HP 3000 Corporate Business System 995/991 are available in two solution choices, each with its own product number. The customers' desired user license level and database management choice are then designated via an option selected within that product number. Product number A3080A (the CS 995/991 "DX") offers standard software for systems and performance management, and an OpenView Console PC. The A3079A product (the CS 995/991 "CX") does not include the systems and performance management software, and comes with a terminal console instead of a PC.

Table 2.2

A3080A CS 995/991 DX	A3079A CS 995/991 CX
CS 991 DX (uniprocessor)	CS 991 CX (uniprocessor)
CS 995/100 DX (fast uniprocessor)	CS 995/100 CX (fast uniprocessor)
CS 995/200 DX (2-way multiprocessor)	CS 995/200 CX (2-way multiprocessor)
CS 995/300 DX (3-way multiprocessor)	CS 995/300 CX (3-way multiprocessor)
CS 995/400 DX (4-way multiprocessor)	CS 995/400 CX (4-way multiprocessor)
CS 995/500 DX (5-way multiprocessor)	CS 995/500 CX (5-way multiprocessor)
CS 995/600 DX (6-way multiprocessor)	CS 995/600 CX (6-way multiprocessor)
CS 995/700 DX (7-way multiprocessor)	CS 995/700 CX (7-way multiprocessor)
CS 995/800 DX (8-way multiprocessor)	CS 995/800 CX (8-way multiprocessor)

Figure 2.2 SPU Frame, Cards, and Power Module Locations

Processor, Memory, and Dual Bus Converter Cards

Processor and Memory Cards

Cooling Fans

DC Power Modules

AC Power Module

3 kVA HP PowerTrust UPS

Front View

Rear View

Base Configuration

The base CS 995/100 CX and 991CX configuration contains the following hardware components:

• One Processing Module Chassis with capacity for 4 Processor Cards (8 processors), 8 Memory Cards, and 4 Dual I/O Bus Converters

• One Processor Card with one processor module containing integrated floating-point

• Service processor (SP) card

• One 256 MB ECC Memory Card with onboard memory controller

• One Upper Dual Bus Converter

• Internal HP-PB (HP Precision Bus) I/O card cage which includes the following base configuration cards and 9 available slots:
  – LAN/console card (multi-purpose card with connections for 802.3 LAN, internal ThinLAN Transceiver and AUI port, serial link for console terminal, and modem link for remote access)
  – One PB-FL fiber link interface card
  – One SCSI interface card
  – One Bus Converter (lower)

• One System Cabinet with modular power supply subsystem

• One Factory Integrated Expansion Cabinet with 3 kVA HP PowerTrust UPS for power protection

• OpenView PC Console (included only with the Corporate Business System DX)

• HP 700/96 console terminal and interconnect cable (included only with the Corporate Business System CX)

Unique Supplied Software for the CS DX

In addition to the MPE/iX Fundamental Operating Software standard with every HP 3000 system, all CS 995/991 DX systems come with the additional software listed below. (IMAGE/SQL and ALLBASE/SQL are available in any combination for all HP 3000 systems.)

Systems Management Software Group

• OpenView Console 486/33XM PC is included. OpenView Console provides full OpenView System Manager functionality (36936A) for the CS DX. See OpenView console discussion on page 2-5 for a complete listing of the software included.

• TurboSTORE/iX II (36398A) with online backup and support for rewritable optical disk

• AutoRestart/iX (36375A)

• ThinLAN 3000/iX (36923A)

• Security Monitor/iX (B3175A)

Performance Management Software Group

• GlancePLUS
• LaserRX/MPE
• RXForecast

NOTE: Of the unique supplied CS 995/991 DX software, only a complete group can be deleted. Individual pieces of software can not be deleted.

OpenView Console

CS 995/991 DX systems are shipped standard with an HP OpenView Console as the system console. The OpenView Console is a Vectra 486/20-based OpenView Workstation that supplies full HP OpenView System Manager (36936A) functionality to the CS 995/991 DX, serving as a console with user friendly icons in a windows environment.

The OpenView Console is the part of HP OpenView System Manager that serves as the central management node for managing an entire network of HP 3000s. Customers use the OpenView Console to manage their CS 995/991 DX system, and by ordering 36936A node licenses (separately), their OpenView Console can also manage other systems.

What's Included with OpenView Console

The OpenView Console consists of three elements:
1. PC configuration
2. Software that resides on the HP 3000
3. Software that resides on the PC

The PC configuration is detailed below, as is the software that resides on the PC. The PC software is preloaded on the internal hard disk at the factory prior to shipment. Software versions listed below are subject to change more frequently than revisions of this document, so please contact your HP representative if you need to know the current version number. Version numbers shown are current as of the date of this publication.

HP Vectra 486/33XM PC with:
• 8 Mbytes memory
• 160-Mbyte hard disk
• 3.5-inch floppy drive
• 17-inch color monitor
• integrated color monitor UVGA
• integrated ThinLan adapter card

OpenView Windows Workstation Software:
• MS-DOS® 6.0*
• MS Windows 3.1*
• OpenView Windows B.01.01*
• OpenView Sysman A.01.04
• Advancelink for Windows A.03.18*
• ARPA Services and Network Services C.00.00*

*Or later version

Required Hardware Ordered Separately

The CS 995 5-way to 8-way multiprocessor systems require a minimum of 512 Mbytes of main memory for optimum functionality. Base memory is 256 Mbytes.

The CS 995/991 DX systems (A3080A) are provided standard

with the OpenView Console as the system console. To ensure maximum availability of the OpenView Console in the event of power fluctuation or interruption, a continuous power source is required for the OpenView Console PC.

For CS 995/991 DX systems, the OpenView Console PC should be powered from an Expansion Cabinet protected by an HP PowerTrust UPS to ensure maximum availability.

The CS 995/991 CX systems (A3079A) are shipped with a 700/96 terminal and do not require a continuous power source for the 700/96 terminal.

Each HP PowerTrust UPS requires a 25-pin RS-232C DTC direct connect port for communication between it and the CS 995/991 system. Each HP-PB I/O Card Cage must be power protected by an HP PowerTrust UPS or a customer-provided power protection solution. (See section on Power Protection on page 2-14.)

Factory Software Pre-loading

Factory pre-loading of HP 3000 FOS, standard subsystem software, customized subsystem software, GlancePLUS* and Systems Management Software* is available with CS 995/991 systems. Software will be factory installed

*DX version only: Performance Management software (LaserRX/MPE and RXForecast) is always shipped separately and never pre-loaded. OpenView Console software (and its supporting PC software) is pre-loaded on the HP Vectra PC console.

on appropriate disk drives ordered with the standard 1.6 meter Integrated Expansion Cabinet (A1884A). If the CS 995/991 is ordered without this cabinet and a disk drive, then the FOS and subsystem software can not be installed at the factory prior to shipment.

The steps below should be followed when ordering a CS 995/991 system to ensure pre-installation of software:

• Use the ordering menu for the CS 995/991 to ensure that in the same section of the order as the SPU, the following are also ordered:

  – One appropriate disk drive (HP-FL or SCSI) to be used as LDEV1 (system boot device)

  – MPE/iX media product 51454B with option 0D1

• Specify a coordinated shipment

• Order any additional Integrated Expansion Cabinets on other sections of the order

NOTE: The SCSI C302x disks are supported as LDEV1 for factory software installation. The only HP-FL disk drives that can be used for factory software installation are the 2.7 GB and 4.0 GB versions. The 5.4 GB and 8.0 GB HP-FL disk drives are not supported as LDEV1.

HP Premier Account Support Program

The HP Premier Account Support Program is designed for the CS 995/991 DX and CX systems and includes the following:

• 24 × 7 hardware support service level with immediate response

• An enhanced level of software support with 24 × 7 software coverage

• An Account-assigned Response Center Engineer who handles daily technical problems as well as ensuring that the customer receives the highest level of remote support possible

• An enhanced level of 24 × 7 network support for the system

• Two person weeks of customer training

• Each fixed-price support package offers quota credit and commission when sold up front with the system.

Refer to Chapter 9 of your July 1993 HP 3000 900 Series Computer Systems Configuration Guide (P/N 5091-7438E) for details regarding the Premier Account Support.

Expansion Capabilities

Expansion of the CS 995 and 991 SPU is done by adding Processor Cards and processor modules, Memory Array Cards and Dual Bus-Converter Cards. These cards plug into a common backplane referred to as the Processor Memory Bus (PMB). The PMB consists of sixteen slots. Slot location rules are shown in the slot availability section of this chapter.

Processor Expansion

The base configuration for the CS 991 and CS 995/100 contains one processor board with one mounted processor module. Up to seven additional CS 995 processors can be added to the CS 995/100 in single module upgrades. Every two processor modules require one Processor Card. A maximum of 8 processor modules and 4 Processor Cards are supported. The CS 991 module is upgraded in the field to a 995/100 before it is upgraded with additional 995 processor modules.

Memory Expansion

Memory Array Cards use 4 Mbit RAMs and are available in increments of 64 MB, 128 MB, and 256 MB. Up to seven additional Memory Cards can be added for a maximum of eight Memory Array Cards per SPU. Interleaving is automatically achieved internally to each Memory Array Card, therefore any size Memory Array Card can be configured without having to consider memory interleaving rules. Each Memory

Figure 2.3 CS Expansion Capabilities

CS Expansion Capabilities
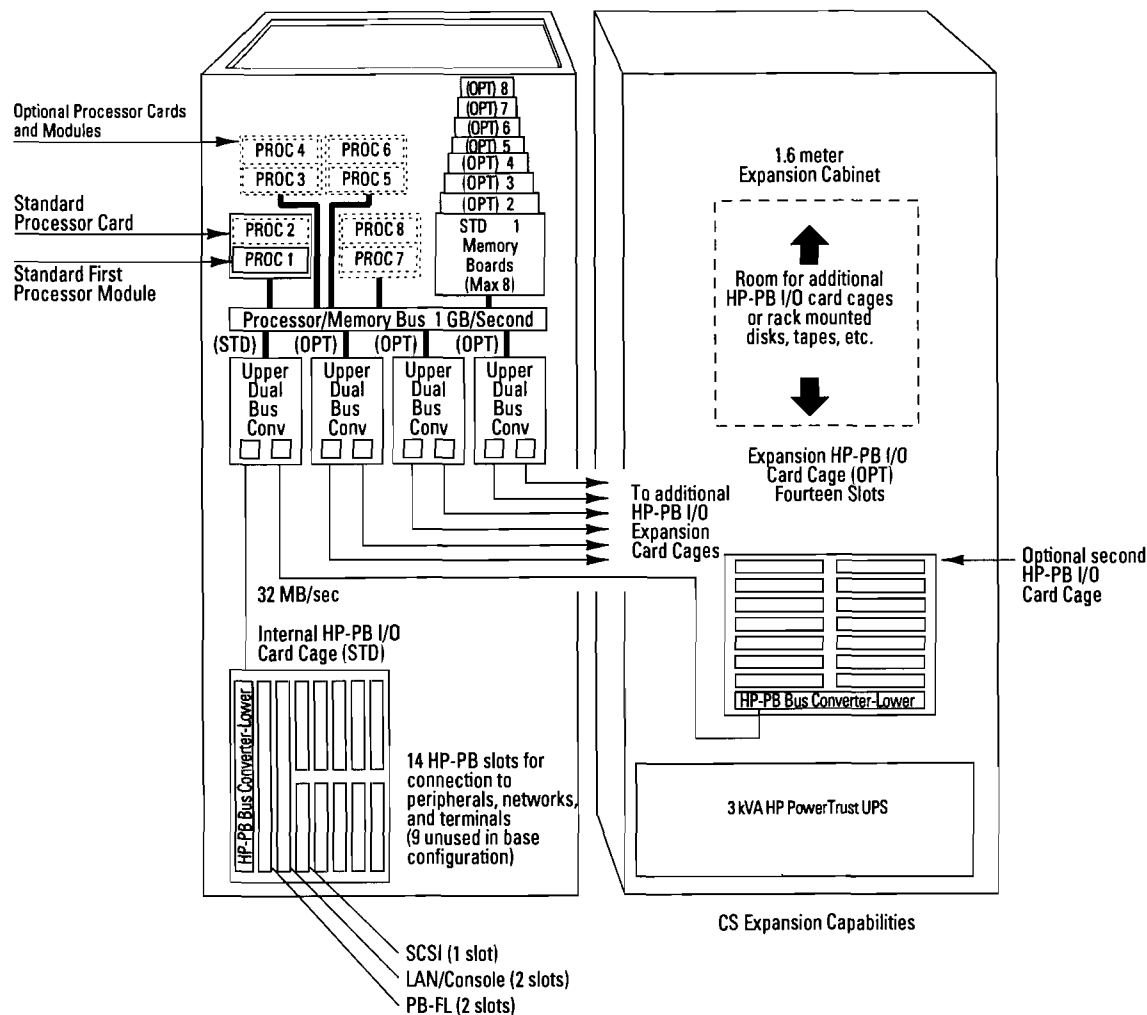
Array Card contains its own on-board Memory Controller chip, which eliminates the need to balance Memory Array Cards per memory controller.

The maximum memory supported is 2 GB. To achieve this memory capacity, all eight Memory Array Cards must be 256 MB cards. The base configuration memory supplied with the CS 995 and 991 systems is 256 MB (supplied as one 256 MB card). The CS 995 5-way to 8-way multiprocessor systems require a minimum of 512 Mbytes of main memory for optimum functionality.

I/O Expansion

The Dual Bus Converter is a communication link between the processor/memory bus (PMB) and the HP-PB (HP Precision Bus) I/O card cages. The Dual Bus Con-verter consists of an upper portion in the main SPU cabinet linked to a lower portion in each HP-PB I/O card cage. A maximum of four upper Dual Bus Converters are supported by the SPU cabinet for a maximum of eight I/O card cages (one internal and seven external to the SPU cabinet). Each HP-PB I/O card cage consists of 14 HP-PB slots, therefore the CS 995 and 991 can be ex-panded to 112 I/O slots.

Table 2.3

Total I/O Card Cage	Required Dual Bus Converters	Note
1	1	First dual bus converter supplied in the base system
2	1	
3	2	Order second dual bus converter
4	2	
5	3	Order third dual bus converter
6	3	
7	4	Order fourth dual bus converter
8	4	

The base SPU configuration has one HP-PB I/O card cage located at the bottom of the SPU cabinet. Five slots are already used for base configuration I/O cards, leaving nine of the 14 slots for expansion. The base configuration I/O cards for peripheral device support consist of the following cards:

• LAN/console (multi-purpose card with connection for 802.3 LAN, internal ThinLAN Transceiver and AUI ports, serial link for console terminal, and modem link for remote access)

• one PB-FL card

• one SCSI card

Seven additional HP-PB I/O card cages can be installed external to the SPU system cabinet in one or more 1.6 meter expansion cabinet units. The dual cable connecting the lower bus converter in each HP-PB I/O card cage in the 1.6 meter Expansion Cabinet and the Upper Dual Bus Converter in the SPU cabinet is 10 meters in length to allow flexibility in the placement of the expansion rack cabinets. The 10 meter HP-PB dual cable comes standard with each HP-PB I/O card cage ordered.

The first HP-PB I/O card cage added in the 1.6 meter Expansion Cabinet can be connected to the unused link port on the Dual Bus Converter Card supplied in the base configuration. The next HP-PB I/O card cage added (third total including SPU HP-PB I/O card cage) will require that an additional Dual Bus Converter Card also be ordered. That new Dual Bus Converter Card will then support the third and fourth HP-PB I/O card cages. Similarly, additional Dual Bus Converter Cards must be ordered when adding the fifth and sixth HP-PB I/O card cages. A total of four Dual Bus Converter Cards are supported, which can connect to a total of eight HP-PB I/O Card Cages.

Dual Bus Converter Cards are available as a standalone add-on product, product number A1829A. HP-PB I/O card cages (with Lower Bus Converter and 10 meter HP-PB dual cable) are available either with the 1.6 meter factory integrated expansion cabinet as product number A1828AZ or as a standalone add-on product (A1828A).

Slot Availability
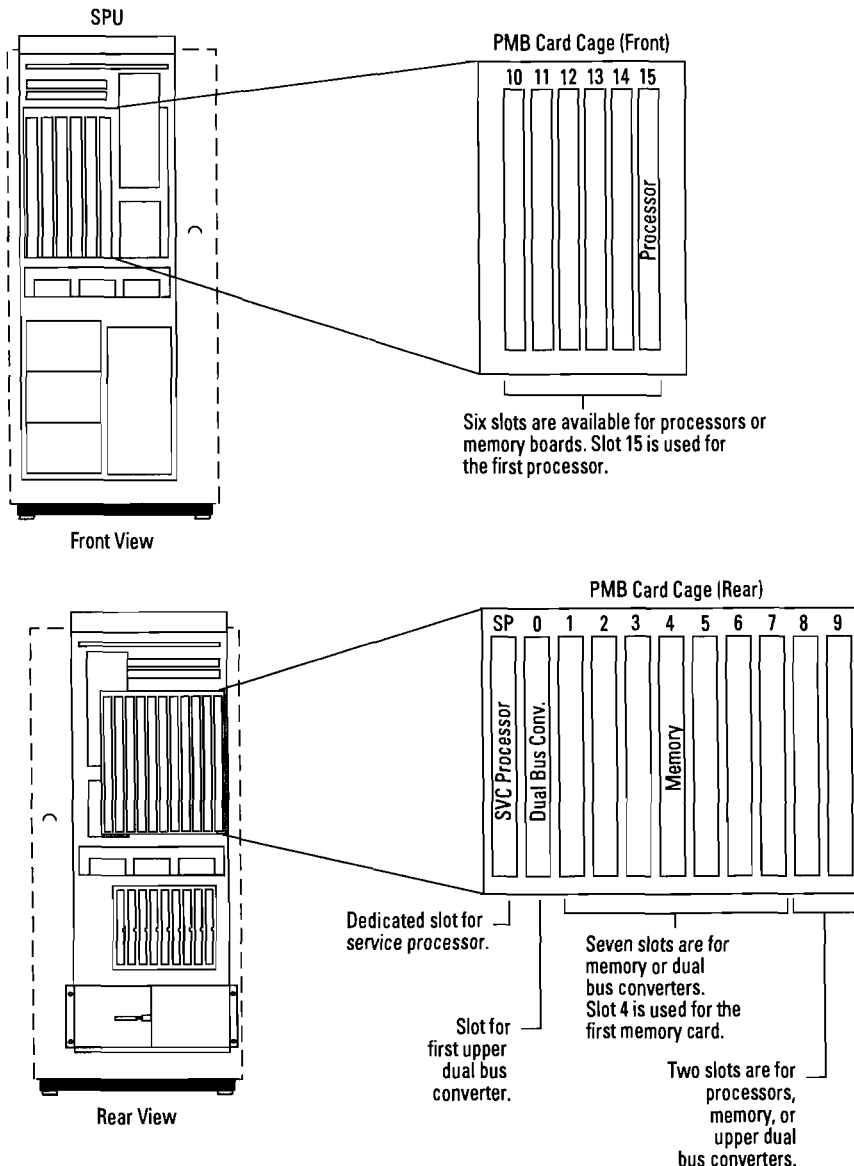
Processor/Memory Bus (PMB) Card Slot Availability

There is a front and a rear PMB card cage in the upper section of the SPU system cabinet. Refer to the PMB card cage slot illustration, Figure 2.4. The Processor Cards, Memory Array Cards, and Dual Bus Converter Cards must be added in a slot priority sequence when installing cards in the Processor Card Cage. The slot priority sequence is required to maximize cooling efficiency. The front PMB card cage contains six slots (10 through 15) for installation of Memory and Processor Cards. The first Processor Card is installed in slot 15. Each Processor Card can hold up to two processor modules. When adding additional processor modules, each Processor Card should be loaded with two processor modules before adding the next Processor Card. The rear PMB card cage contains a dedicated service processor (SP) slot and ten slots (0 through 9) which are available for Memory Array Cards, Dual Bus Converters, or Processor Cards (see illustration for restrictions). The first Memory Array Card is installed in slot 4 with add-on cards installed in slots 5 through 11. The first Dual Bus Converter Card is installed in slot 0 with add-on cards installed in slots 1 through 3. The following maximum PMB cards are supported:

- four Processor Cards (each with a maximum of two processor modules)

- eight Memory Array Cards

- four Dual Bus Converter Cards

Figure 2.4 Processor/Memory Bus (PMB) Card Cage Slots

SPU

PMB Card Cage (Front)

10 11 12 13 14 15

Processor

Six slots are available for processors or memory boards. Slot 15 is used for the first processor.

Front View

PMB Card Cage (Rear)

SP 0 1 2 3 4 5 6 7 8 9

SVC Processor

Dual Bus Conv.

Memory

Dedicated slot for service processor.

Slot for first upper dual bus converter.

Seven slots are for memory or dual bus converters. Slot 4 is used for the first memory card.

Two slots are for processors, memory, or upper dual bus converters.
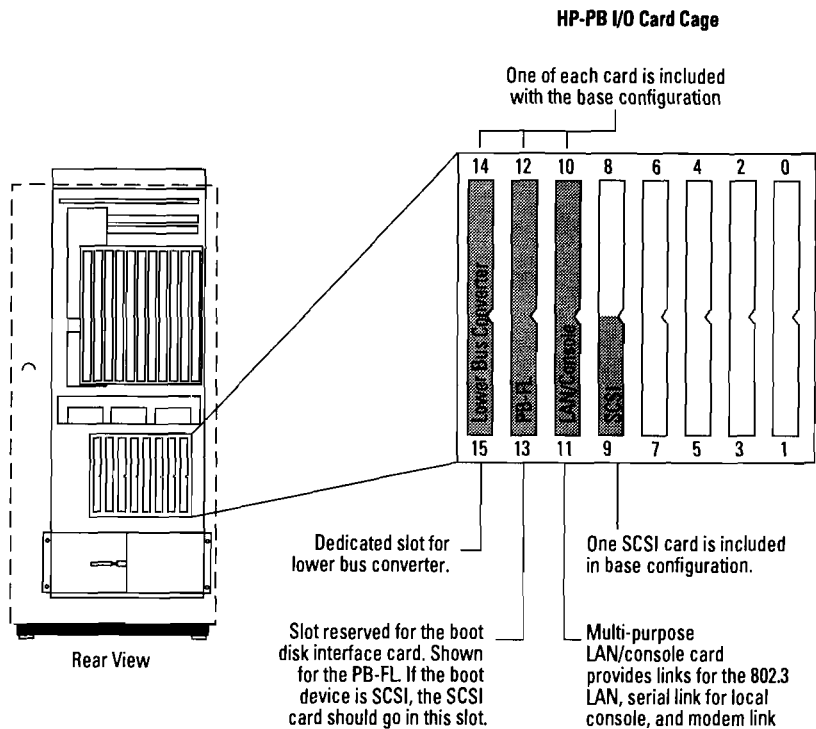
Rear View

HP-PB I/O Card Slot Availability

One HP-PB I/O card cage is located in the base of the SPU system cabinet and includes one Lower Bus Converter Card in slots 15 and 14, leaving a total of seven double-high or 14 single-high HP-PB slots. Three I/O cards included in the base configuration occupy five single-high slots. Slot 13 (single-high) or 13 and 12 (double-high) should be used as the primary boot device slot (PB-FL or SCSI). The Multi-Purpose LAN/Console card is located in slots 11 and 10. The Multi-Purpose LAN/Console card provides links for the 802.3 LAN, serial link for the local console, and a modem link for remote access. The SCSI card is also included in the base configuration in slot 9. The higher the slot number the higher the priority on the HP Precision Bus.

Up to seven additional HP-PB I/O card cages can be located in one or more 1.6 Meter Expansion Cabinet(s) (maximum of four per cabinet). It is recommended that HP-PB I/O card cages be racked

Figure 2.5 HP-PB I/O Card Cage Slots

HP-PB I/O Card Cage

One of each card is included with the base configuration

Rear View

Dedicated slot for lower bus converter.

Slot reserved for the boot disk interface card. Shown for the PB-FL. If the boot device is SCSI, the SCSI card should go in this slot.

One SCSI card is included in base configuration.

Multi-purpose LAN/console card provides links for the 802.3 LAN, serial link for local console, and modem link

starting at the base of the Expansion Cabinet working upwards. Each external HP-PB Card Cage includes one Lower Bus Converter (double-high), leaving 14 HP-PB card slots for expansion. This allows expansion of HP-PB slots from the base of fourteen slots to a maximum of 112 slots in fourteen slot increments.

LAN/Console Card

One LAN/Console card is supplied standard with each Corporate Business System. This card provides:

- 802.3 LAN connection for use with both DTC and system-to-system LAN traffic

- External ThinLAN Transceiver and AUI port

- Serial link for console terminal

- Modem link for remote access

The LAN/Console card is not orderable as a separate product and is supported only in the HP-PB I/O Card Cage in the SPU. The LAN/Console card has the 802.3 LANIC and ThinLAN Transceiver built onto it. In addition, the LAN/Console card has an external Attachment Unit Interface (AUI) connector for customers who want a connection to either a ThickLAN Transceiver (30241A) or EtherTwist Transceiver (28685B). These products must be ordered separately. If a second 802.3 LANIC is needed, the HP-PB 802.3 LAN card (36923A Option 002) must be ordered.

Table 2.4

HP-PB Cards	Product Number
PB-FL	28616A
SCSI	28642A
802.5 Token Ring	J2167A
802.3 LAN	36923A opt. 002
PSI	36922A opt. 002 (NS point-to-point)
	30291A opt. 002 (SNA/SDLC link)
	32007A opt. 002 (BSC link)
PBA-IB	A1747A opt. 002

NOTE: The PBA-FL (A1748A) is not supported on the Corporate Business Systems.

HP Precision Bus and Adapter

The Precision Bus (HP-PB) is used in the CS 995 and 991 systems to connect peripheral devices and data communication networks.

All supported I/O cards (connecting to peripherals) are Precision Bus (PB) cards with the exception of the HP-IB card which is a CIB card. In order to support the CIB HP-IB card on the Precision Bus, a CS 995/991 specific Precision Bus Adapter (PBA) must be used. The 9x7LX, 9x7RX, and 9x7SX Precision Bus Adapter cannot be used for the CS system. The CS 995/991 specific PBA combines the CIB adapter and physical bus adapter into a single, double-high card. Only one CIB HP-IB can be

connected to each PBA. The following ordering information should be used:

- A1747A, option 002—Corporate Business System Precision Bus Adapter with HP-IB interface card

- A1747A, option 001, 002— Corporate Business System Precision Bus Adapter without HP-IB interface card

- A1747A without option 002 will not work the Corporate Business System

HP-PB I/O Card Cage Performance Guidelines

The maximums stated in Table 2.5 are to optimize system performance. These values should not be confused with the maximum number of cards supported as shown in Table 2.1. To optimize system performance, the HP-PB I/O guidelines in Table 2.5 are recommended:

I/O and Cabinet Configuration Checklist

• Ensure that you have ordered the correct number of HP-PB slots for the I/O cards selected.

– The SPU Cabinet houses one HP-PB I/O card cage which consists of 14 single-high slots. Five of these single-high slots are occupied by base configuration I/O cards, leaving nine single-high HP-PB for I/O cards to be selected.

– Up to 7 additional HP-PB I/O card cages can be located in one or more 1.6 meter Expansion Cabinets (maximum of 4 per cabinet). Each HP-PB I/O Card Cage includes a Lower Bus Converter leaving 14 single-high HP-PB slots available.

• Ensure that the power supply capabilities have not exceeded the HP-PB I/O card cage. Refer to the HP-PB I/O Card Cage Power Budgeting Worksheet (Table 2.6).

• Ensure that all cabinets containing HP-PB I/O card cages are power protected by either an HP PowerTrust UPS or customer-provided power protection solution. (See section on Power Protection page 2-14.)

• Ensure that a Dual Bus Converter is ordered for every 2 HP-PB I/O card cages (including SPU cabinet card cage). The first Dual Bus Converter is supplied standard. Refer to Table 2.3.

• Ensure that the correct number of 1.6 meter Expansion Cabinets for peripherals and HP-PB I/O Card Cages (maximum of 4 per cabinet) are ordered. Refer to the Expansion Cabinet Racking discussion beginning on page 2-17.

Table 2.5

I/O card	Slot Height	Maximum I/O Cards per HP-PB Card Cage	Maximum Devices per I/O Card	Maximum I/O Cards per System
PB-FL	double-high	5[1]	5	Refer to "Power Budget Worksheet"
SCSI	single-high	5[1]	5	Refer to "Power Budget Worksheet"
PBA-IB	double-high	2	4	Refer to "Power Budget Worksheet"
802.3 LANIC	single-high	3[3]	N/A	2[2]
802.5 Token Ring	single-high	1	N/A	1
LAN/Console	double-high	1	N/A	1
PSI	single-high	N/A	N/A	8

[1] A maximum of 5 connections for SCSI and a maximum of 5 connections for PB-FL. Remaining slots can be used for any other non-disk activity as long as power limits are not violated. This limit applies to single disks as well as disk arrays.
[2] First 802.3 LANIC standard on LAN/Console card.
[3] A third card may be ordered for system-to-system communications.

Boot disk-system performance may be enhanced by separating system software and user data on separate disk arrays.

HP-PB I/O Card Cage Power and Space Budgeting

The HP-PB I/O Power Budgeting Worksheet (Table 2.6) will determine the supportability of a proposed HP-PB I/O configuration. The worksheet will ensure that the proposed total power consumption of all the cards in the I/O card cage does **not** exceed the total power available and that the available slots have not been exceeded. Use the worksheet as follows:

- Enter the proposed configuration in the quantity column and multiply the quantity entered in each row by the value given in each of the three "Power Req./Card" columns. Put the result in the appropriate "Total Power Required" column.

- Sum each column and compare the results with the three voltage power limits for each HP-PB I/O being used.

- The total power used for all three voltages must not exceed 222.82 watts.

CAUTION: It is possible to configure a combination of cards that is within the power limits per a specific voltage, yet exceed the total available from the card cage power supply.

Table 2.6 HP-PB I/O Card Cage Power and Space Budgeting Worksheet

I/O Card	Qty	Power Requirements per I/O Card (watts)			Total Power Required (watts)			Slots/ Card	Total Slots Used
		+12V	+5V	-12V	+12V	+5V	-12V		
LAN/Console[1,2] (ThinLAN)		0.40	14.20	0.40				2	
LAN/Console[2] (EtherTwist or ThickLAN)		6.60	14.20	0.40				2	
PB-FL[1]		0.48	19.65	0.60				2	
SCSI[1]		0.00	4.50	0.00				1	
PBA-IB (HP-IB)		1.13	27.50	0.66				2	
802.3 LAN		6.00	10.65	0.00				1	
802.5 Token Ring		0.00	8.30	0.00				1	
PSI		.98	12.00	1.07				1	
Sum of power used per voltage: (Must not exceed total below)								Total slots used	
								(Must not exceed 14)	
Maximum power available per voltage in HP-PB I/O card cage					71.64	161.58	23.64		
Total power used for +12V, +5V, -12V (Must be less or equal to 222.82 watts)									

[1] I/O cards included in base configuration.
[2] Refer to page 2-11 for a description of the LAN/Console card.

Note: The total rating of the power supply includes the bus converter card.

Power Protection

The CS 995/991 comes standard with one 3 kVA HP PowerTrust Uninterruptible Power Supply (UPS), product A2998A, for providing power protection to the SPU cabinet and the first Expansion Cabinet. Additional 3 kVA HP PowerTrust UPSs can be ordered for providing protection to additional Expansion Cabinets. The HP PowerTrust UPS provides up to 15 minutes of uninterrupted power after normal AC power has been interrupted for the CS 995/991 system. This is similar to the battery backup unit on other HP 3000 systems. MPE/iX 5.0 includes the HP PowerTrust UPS Monitor/iX for the management of all HP PowerTrust UPSs on the CS 995/991 systems. The HP PowerTrust UPS Monitor/iX detects and recovers from all incoming AC power failures on the CS 995/991 system and logs all HP PowerTrust UPS power failure events to the HP 3000 system logs and to the system operator (HP PowerTrust UPS Monitor/iX does not manage "non-HP PowerTrust UPSs"). If all components of the CS 995/991 system are protected by the HP PowerTrust UPS, then normal operation and/or system shutdown can be accomplished during the 15 minutes of power protection.

How to Order Power Protection

The first HP PowerTrust UPS for support of the SPU and first Expansion Cabinet is included standard as part of the CS 995/991 system. If the CS 995/991 system has customer supplied power protection, product A2443A option 750 can be ordered instead of the standard HP PowerTrust UPS, A2998A, to receive credit for not purchasing the standard HP PowerTrust UPS. Additional HP PowerTrust UPSs can be ordered for support of added Expansion Cabinets.

How to Plan for Power Protection

HP PowerTrust UPSs (or customer supplied power protection) for the SPU, first Expansion Cabinet, and all HP-PB I/O Card Cages are required to maintain data integrity on the CS 995/991 system. Additionally, continued system operation during a power failure for 15 minutes can be accomplished by providing power protection for all the CS 995/991 components. To determine how many HP PowerTrust UPSs are required to support all system components, use the A1884A Factory Integrated Expansion Cabinet Racking Configuration Worksheet or the C2786A Standalone Expansion Cabinet Racking Configuration Worksheet. In computing the Volt-Amperes to be provided by the first HP PowerTrust UPS, use

Table 2.7 to determine the Volt-Amperes used by the SPU cabinet. In general, you can expect to use one 3 kVA HP PowerTrust UPS for every two Expansion Cabinets. Each 3 kVA HP PowerTrust UPS will support no more than two Expansion Cabinets. When a single HP PowerTrust UPS supports two cabinets, the cabinets must be positioned side-by-side.

For the MPE HP PowerTrust UPS Monitor/iX to communicate with and manage the HP PowerTrust UPSs, each HP PowerTrust UPS unit uses one 25-pin RS-232C type serial I/O port on an HP 3000 Distributed Terminal Controller (DTC). In planning your DTC requirements, plan on reserving one 25-pin RS-232C port for each HP PowerTrust UPS. Any DTC supporting an HP PowerTrust UPS needs to be power protected by an HP PowerTrust UPS.

For CS 995/991 DX systems, the OpenView Console PC should be powered from an Expansion Cabinet protected by an HP PowerTrust UPS to ensure its maximum availability.

Table 2.7 CS995/991 Power Consumption Values for HP PowerTrust UPS Load Budgeting

How to Use This Table

Locate the cell that corresponds to the number of Dual I/O Bus Converters, memory boards, and CPUs that are configured in the CS 995/991 SPU. The value in that cell is the total Volt-Amperes (VA) of power that the SPU will draw from the HP PowerTrust UPS.

	Number of Memory Boards	Number of CPUs							
		1 CPU	2 CPUs	3 CPUs	4 CPUs	5 CPUs	6 CPUs	7 CPUs	8 CPUs
One Dual I/O Bus Converter	1	1081	1153	1254	1326	1427	1499	1600	1672
	2	1157	1229	1330	1402	1503	1575	1676	1748
	3	1233	1305	1406	1478	1579	1651	1752	1824
	4	1309	1381	1482	1554	1655	1727	1828	1900
	5	1385	1457	1558	1630	1731	1803	1904	1976
	6	1461	1533	1634	1706	1807	1879	1980	2052
	7	1537	1609	1710	1782	1883	1955	2056	2128
	8	1613	1685	1786	1858	1959	2031	2132	2204
Two Dual I/O Bus Converters	1	1152	1224	1325	1397	1498	1570	1671	1743
	2	1228	1300	1401	1473	1574	1646	1747	1819
	3	1304	1376	1477	1549	1650	1722	1823	1895
	4	1380	1452	1553	1625	1726	1798	1899	1971
	5	1456	1528	1629	1701	1802	1874	1975	2047
	6	1532	1604	1705	1777	1878	1950	2051	2123
	7	1608	1680	1781	1853	1954	2026	2127	2199
	8	1684	1756	1857	1929	2030	2102	2203	2275
Three Dual I/O Bus Converters	1	1223	1295	1396	1468	1569	1641	1742	1814
	2	1299	1371	1472	1544	1645	1717	1818	1890
	3	1375	1447	1548	1620	1721	1793	1894	1966
	4	1451	1523	1624	1696	1797	1869	1970	2042
	5	1527	1599	1700	1772	1873	1945	2046	2118
	6	1603	1675	1776	1848	1949	2021	2122	2194
	7	1679	1751	1852	1924	2025	2097	2198	2270
	8	1755	1827	1928	2000	2101	2173	2274	2346
Four Dual I/O Bus Converters	1	1294	1366	1467	1539	1640	1712	1813	1885
	2	1370	1442	1543	1615	1716	1788	1889	1961
	3	1446	1518	1619	1691	1792	1864	1965	2037
	4	1522	1594	1695	1767	1868	1940	2041	2113
	5	1598	1670	1771	1843	1944	2016	2117	2189
	6	1674	1746	1847	1919	2020	2092	2193	2265
	7	1750	1822	1923	1995	2096	2168	2269	2341
	8	1826	1898	1999	2071	2172	2244	2345	2417

Table 2.8 Components Supported in the 1.6 Meter Cabinets

Product Number	Description	EIA Units	Required Mounting Hardware	Current Consumption (VAC) 120	Current Consumption (VAC) 208 - 240	Power Required (VAC) 120	Power Required (VAC) 200 - 240
Tape Drives[1]							
7979A	1/2-inch tape drive (HP-IB)	5+1	Opt. 1A4 and three C2790A ballasts	2.81 A	1.46 A	337	350
7980A	1/2-inch tape drive (HP-IB)	5+1	Opt. 1A4 and three C2790A ballasts	2.81 A	1.46 A	337	350
7980S[6]	1/2-inch tape drive (SCSI)	5+1	Opt. 1A4 and three C2790A ballasts	2.81 A	1.46 A	337	350
7980XC	1/2-inch tape drive (HP-IB)	5+1	Opt. 1A4 and three C2790A ballasts	2.81 A	1.46 A	337	350
7980SX[6]	1/2-inch tape drive (SCSI)	5+1	Opt. 1A4 and three C2790A ballasts	2.81 A	1.46 A	337	350
Series 6000 SCSI Multi-Mechanism Package[2] (also available as integrated cabinet option)							
C3022R	1 GB disk	4	Included	3.0 A	1.8 A	360	432
C3023R/RZ	2 GB disk	4	Included	3.0 A	1.8 A	360	432
C3024R/RZ	Two SCSI 2 GB disks	4	Included	3.0 A	1.8 A	360	432
C3025R/RZ	Three SCSI 2 GB disks	4	Included	3.0 A	1.8 A	360	432
C2464R	2 GB DDS	4	Included	2.6 A	1.5 A	312	360
C2465R	Two 2 GB DDS	4	Included	2.6 A	1.5 A	312	360
C2466R	Up to 8 GB DDS-DC	4	Included	2.6 A	1.5 A	312	360
C2467R	8-16 GB DDS-DC	4	Included	2.6 A	1.5 A	312	360
C2476R[6]	600 MB CD-ROM drive	4	Included	2.6 A	1.5 A	312	360
HP-FL Disk Array[3, 6]							
C2252HA/HZ	2.72 GB high avail disk array	6	Included	4.0 A	2.0 A	480	480
C2254HA/HZ	5.44 GB high avail disk array	6	Included	4.0 A	2.0 A	480	480
C2252B/BZ	2.72 GB disk array with 2 disks	6	Included	4.0 A	2.0 A	480	480
C2254B/BZ	5.44 GB disk array with 4 disks	6	Included	4.0 A	2.0 A	480	480
C2258HA/HZ	4.0 GB high avail disk array	6	Included	5.3 A	3.2 A	636	768
C2259HA/HZ	8.0 GB high avail disk array	6	Included	5.3 A	3.2 A	636	768
C2258B/BZ	4.0 GB disk array with two disks	6	Included	5.3 A	3.2 A	636	768
C2259B/BZ	8.0 GB disk array with four disks	6	Included	5.3 A	3.2 A	636	768
Data Terminal Connects							
2340A	DTC16	6	35199E	2 A	1 A	240	240
J2062A(Z)	DTC16iX	1	E3664A[4]	0.5 A	0.25 A	60	60
J2063A(Z)	DTC16MX	1	Option 1AC (standalone)[4]	0.5 A	0.25 A	60	60
J2070A(Z)	DTC72MX	3-10	Option 1AC (standalone)[4]	1.8 A	0.9 A	216	216
Expansion Modules							
A1828A	HP-PB I/O expansion module	7	Included	6.5 A	3.5 A	780	840
Power Protection							
A2998A	3 kVA HP PowerTrust	12	Included	NA	NA	NA	NA
Filler Panels							
Package of Six One-EIA-Unit Filler Panels[5]							

[1] Three anti-tip ballasts (C2790A) are required for one or more 1/2-inch tape drive mechanism. 1/2-inch tape drives require five EIA units for the mechanism, plus one EIA unit for access to the tape drive handle for a total of six EIA units.

[2] All new disks require option 002 for HP 3000 to ensure correct firmware and option ODG for field service installation.

[3] If HP-FL disk is the bottom-most racked deviced in the cabinet, add two EIA space units. This will allow ample space for cables coming into the bottom of the cabinet.

[4] Customer must order E3664A rail kit to rack J2062A in 1.1 and 1.6 meter racks. J2070A option 1AC includes rail kit.

[5] Use this only when ordering separate from rack. Use option 1F9 with rack.

[6] Available on 4.0 plus patches.

Expansion Cabinet Racking

The HP 3000 Corporate Business System (CS) 995/991 supports the 1.6 meter expansion cabinet for racking disks, tapes, Distributed Terminal Controllers (DTCs), HP PowerTrust UPSs, and additional HP-PB I/O card cages. This is the same 1.6 meter cabinet that is supported on the 9x7 systems. The 1.6 meter cabinet provides 32 EIA (Electronic Industries Association) units of rack space (one EIA unit = 1.75 inches). Each component occupies a specific number of EIA units. Peripherals must be racked in the 1.6 meter expansion cabinet, **not** the SPU cabinet.

How to Order Cabinets and Peripherals

Cabinets can be ordered as a factory integrated product or as a standalone product. The factory integrated cabinet provides a choice of peripherals as options to the cabinet which are rack-mounted at the factory. Bundled standard into the CS 995/991 system is one Factory Integrated Cabinet for the system UPS and

initial system peripherals. Additional peripherals can be ordered as add-on products to the cabinet and rack-mounted at the customer site by an HP Customer Engineer (CE). The standalone cabinet and peripherals are both ordered as separate products. The standalone cabinet arrives unracked, and all peripherals are rack-mounted into the cabinet at the customer site by a Customer Engineer.

Supported Racked Components

The Corporate Business System cabinet supports a variety of disk drives, tape drives, DTCs, and the HP-PB I/O Card Cage. Combinations of supported products are limited only by space inside the cabinet, the 16-amp maximum current limit, and available power protection (if using the HP PowerTrust UPS). Factory integrated cabinets have been structured so that all orderable configurations will not exceed the 16-amp maximum current limit. When configuring cabinets to be installed in the field, the configuration should be checked to ensure it does not exceed the 16-amp maximum current limit.

Factory Integrated Expansion Cabinet

For quick, easy ordering, and installation, the Factory Integrated Expansion Cabinet (A1884A) is the desired racking choice. One is included standard with all CS 995/991 systems. The integrated cabinet contains options for SCSI disk or SCSI disk/tape, PB-FL disk, DTCs, HP-PB I/O Card Cages, and HP PowerTrust UPS. An integrated cabinet with an option for a disk allows software and subsystem software to be pre-loaded at the factory.

Certain add-on peripherals NOT in the Integrated Expansion Cabinet product structure can be installed at the customer site. (These include Series 6000 SCSI DDS, 7980, 7980XC, 7980S, 7980SX tape drives, and 4280 cartridge tape drives.) Peripherals that are part of the Integrated Expansion Cabinet can also be ordered later as standalone products and installed at the customer site. Refer to the Factory Integrated Expansion Cabinet Racking Configuration Worksheet (Table 2.9) for a list of supported options and add-on peripherals and their EIA units.

Integrated Cabinet Racking Configuration Worksheet

The Factory Integrated Expansion Cabinet Racking Configuration Worksheet (Table 2.9) illustrates the integrated expansion cabinet options and add-on products. Use the worksheet to determine supportability of the proposed peripheral and HP-PB I/O card cage racking configuration. Use the worksheet as follows:

1. After entering the proposed configuration in the quantity columns, multiply the quantity entered for each peripheral and card cage by the EIA number given for each component.

2. Sum all the components to ensure that the total EIA units are less than or equal to 32. If more than 32 EIA units are needed, an additional Expansion Cabinet must be ordered.

3. Multiply the quantity entered for each peripheral and card cage by the Power Required listed for each component (Table 2.8). If racking a component for which there is no listed Power Required value, then follow these rules to compute a number:

a. If a wattage number is given on the component and is labeld "Power Factor Corrected," then use this number.
b. If a wattage number is given which is not labeled "Power Factor Corrected," then multiply this number by 1.4.
c. If no wattage number is given on the component, then multiply the volts by the amperage of the component.

4. Sum all of the Volt-Amperes of all components to ensure that the total Power Required is less than or equal to 3000 Volt-Amperes if this cabinet is power protected by a 3 kVA HP PowerTrust UPS. Remember that up to two cabinets may be protected using a single 3 kVA HP PowerTrust UPS. If more than 3000 Volt-Amperes of power is consumed in the cabinet, an additional Expansion Cabinet and HP PowerTrust UPS must be ordered.

NOTE: If add-on peripherals are ordered with the factory integrated expansion cabinet, ensure that enough unracked space is left to install additional peripherals and enough Volt-Amperes are reserved for power protection.

Table 2.9 Factory Integrated Expansion Cabinet Racking Configuration Worksheet

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
I. A1884A 1.6 meter cabinet (same for the 9x7LX, 9x7RX, and 9x7SX systems). The A1883A 1.1 meter cabinet is not recommended for the CS 995 and 991 systems because its height is not the same as that of the CS 99x SPU. Filler panels to cover unused space will be installed automatically at the factory for integrated cabinet products.						

Power Options:

ABA—Adds U.S. 200V - 240V power
ABB—Adds European 200V - 240V power

Disk Product Number:

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
C3023RZ—Adds 2.0 GB Series 6000 SCSI disk	_____ ×	4	= _____	____ ×	_____	= _____
C3024RZ—Adds two 2.0 GB Series 6000 SCSI disks	_____ ×	4	= _____	____ ×	_____	= _____
C3025RZ—Adds three 2.0 GB Series 6000 SCSI disks	_____ ×	4	= _____	____ ×	_____	= _____
C2254HZ—Adds 5.4 GB HP-FL high availability disk	_____ ×	6	= _____	____ ×	_____	= _____
C2254BZ—Adds 5.4 GB HP-FL disk without parity	_____ ×	6	= _____	____ ×	_____	= _____
C2252HZ—Adds 2.7 GB HP-FL high availabiity disk	_____ ×	6	= _____	____ ×	_____	= _____
C2252BZ—Adds 2.7 GB HP-FL disk without parity	_____ ×	6	= _____	____ ×	_____	= _____
C2258HZ—Adds 4.0 GB HP-FL high availability disk	_____ ×	6	= _____	____ ×	_____	= _____
C2258BZ—Adds 4.0 GB HP-FL disk without parity	_____ ×	6	= _____	____ ×	_____	= _____
C2259HZ—Adds 8.0 GB HP-FL high availability disk	_____ ×	6	= _____	____ ×	_____	= _____
C2259BZ—Adds 8.0 GB HP-FL disk without parity	_____ ×	6	= _____	____ ×	_____	= _____

DTC Products:

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
J2070AZ—Add DTC72MX	_____ ×	3	= _____	____ ×	_____	= _____
Option 001—Configure DTC72MX with 24 direct ports	_____ ×	1	= _____			
Option 002—Configure DTC72MX with 48 direct ports	_____ ×	2	= _____			
Option 003—Configure DTC72MX with 72 direct ports	_____ ×	3	= _____			
Option UG4—Configure DTC72MX with 24 RS-423 direct ports	_____ ×	1	= _____			

Option UG5—Replace eight RJ-45 direct ports with eight DB-25 modem ports on 1 modem distribution panel (MDP). *Must order option 001, 002, or 003.*

Option UG6—Replace 24 RJ-45 direct ports with 24 DB-25 modem ports, on 3 modem distribution panels (MDPs). Must order option 001, 002, or 003, such that the number of total ports is at least equal to the number of modem ports ordered.   *(Continued)*

Table 2.9 Factory Integrated Expansion Cabinet Racking Configuration Worksheet (cont'd)

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
To rack in a 1.1 or 1.6 meter expansion cabinet, order a modem distribution panel (MDP) rack mounting hardware kit:						
C2792AZ for rear mounting up to 5 MDPs **or**	_____	× 6 =	_____			
J2084AZ for front mounting for up to 5 MDPs **or**	_____	× 7 =	_____			
J2087AZ for front/rear mounting for up to 10 MDPs	_____	× 7 =	_____			

For example, to configure 42 modem ports and 19 direct ports, order: One option 003 (provides 72 local ports), two option UG6 (provides 48 modem ports on six MDPs), one J2087AZ (provides racking for up to ten MDPs)

Option 1CW—Add X.25 card with RS-232 interface
Option 1CX—Add X.25 card with V.35 interface
Option 004—Add Telnet Access Card
Options 1CW, 1CX, and 004 each consume one slot in the DTC72MX. They do not require additional EIA units.

Note: The DTC72MX is available with three open slots. Option 001 consumes one slot, option 002 consumes two, and option 003 consumes all three. Options 1CW, 1CX, and 004 each take one slot. The maximum number of X.25 cards per DTC72MX is three. One Telnet Access Card is allowed per DTC72MX. Requires MPE 4.0 software update; may order P/N B3780AA.

HP-PB I/O Card Cage:

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
A1828AZ—Adds HP-PB I/O card cage with 14 single-high card slots, 10 meter HP-PB Dual Cable, and lower bus converter	_____	× 7 =	_____	_____ ×	_____ =	_____

II. Add-on Peripherals

Not factory racked. Filler panels and rackmount kits must be ordered for add-on products. See following page for details.

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
7980, 7980XC, 7980S[4], and 7980SX[4] tape drives[1,3]	_____	× 5 =	_____	_____ ×	_____ =	_____
Series 6000 SCSI DDS and disk	_____	× 4 =	_____	_____ ×	_____ =	_____
HP-FL disk arrays	_____	× 6 =	_____	_____ ×	_____ =	_____
4280[2]—Cartridge Tape Drive (with stacker)	_____	× 6 =	_____	_____ ×	_____ =	_____

III. Optional Power Protection

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
A2998A—3 kVA HP PowerTrust UPS	_____	× 12 =	_____			
IV. Total EIA Units (must be ≤ 32) If number of EIA units is greater than 32, then more than one cabinet is required.			= _____			
V. CS 995/991 SPU (use only with first HP PowerTrust UPS) CS 995/991 (see Table 2.7)				1	× _____ =	_____
VI. Total Power (must be ≤ 3 kVA for A2998A HP PowerTrust UPS) If Total Power Required is greater than 3 kVA, then more than one 3 kVA HP PowerTrust UPS and cabinet is required.					=	_____

[1] Refer to the Peripheral section for information on these devices.
[2] Stacker requires ten-inch clearance above and below tape drives; therefore devices racked above or below the 4280 must not have front panel accessibility.
[3] Three anti-tip ballasts (C2790A) are required for one or more 1/2-inch tape drive mechanisms.
[4] Available on 4.0 plus patches or 5.0.

HP 3000 900 Series Computer Systems Configuration Guide Addendum

Standalone Expansion Cabinet

A standalone expansion cabinet (C2786A) is available for customers who decide to order peripherals and HP-PB I/O Card Cages separately. When configuring an expansion cabinet, ensure that all appropriate components (filler panels and peripheral rack mounting kits) are ordered to successfully complete racking; that the configuration does not exceed the 16-amp current limit of the cabinet; and that the configuration does not exceed the Volt-Amperes provided by the HP PowerTrust UPS (if power protection is used). *Refer to Table 2.11 for a list of supported components.* The standalone cabinet arrives unracked and all peripherals are rack-mounted into the cabinet at the customer site by a Customer Engineer.

Standalone Cabinet Racking Configuration Worksheet

Use the racking configuration worksheet on the following page to determine supportability of the proposed peripheral and HP-PB I/O card cage configuration. Use the worksheet as follows:

1. After entering the proposed configuration in the quantity columns; multiply the quantity entered for each peripheral and card cage by the EIA number given for each component.

2. Sum all the components to ensure that the total EIA units are less than or equal to 32. If more than 32 EIA units, an additional expansion cabinet must be ordered.

3. Sum the current requirements of all components to ensure the 16-amp current limit is not exceeded. Refer to Table 2.8 for a list of components supported and their current consumption.

4. Multiply the quantity entered for each peripheral and card cage by the Power Required listed for each component (Table 2.8). If racking a component for which

there is no listed Power Required value, then follow these rules to compute a number:

a. If a wattage number is given on the component and is labeled "Power Factor Corrected," then use this number.

b. If a wattage number is given which is not labeled "Power Factor Corrected," then multiply this number by 1.4.

c. If no wattage number is given on the component, then multiply the volts by the amperage of the component.

5. Sum all of the Volt-Amperes of all components to ensure that the total Power Required is less than or equal to 3000 Volt-Amperes (if this cabinet is power protected by a 3 kVA HP PowerTrust UPS). Remember that up to two cabinets may be protected using a single 3 kVA HP PowerTrust UPS. If more than 3000 Volt-Amperes of power is consumed in the cabinet, an additional Expansion Cabinet with an HP PowerTrust UPS must be ordered.

The standalone expansion cabinet racking configuration worksheet illustrates the standalone cabinet products.

Table 2.10 Standalone Expansion Cabinet Product Structure

Product Number	Description
C2786A	1.6 meter cabinet (32 EIA units) same as for 9x7 family
Opt. ABA	200V–240V with U.S. power cord
Opt. ABB	200V–240V with European power cord
Opt. 1F9	Add six 1-unit filler panels
Opt. 1FC	Front door (can be locked for security purposes)

Table 2.11 Standalone Expansion Cabinet Racking Configuration Worksheet

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
I. C2786A 1.6 meter racking cabinet. The C2785A 1.1 meter cabinet is not available for the CS 995 and CS 991 systems. Filler panels to cover unused space must be ordered separately.						
Power Cords:						
ABA—Adds U.S. 200V - 240V power cord						
ABB—Adds European 200V - 240V power cord						
Disk Products:						
C3022R[3]—Adds 1.0 GB SCSI disk	_____ ×	4	= _____	____ ×	_____	= _____
C3023R[3]—Adds 2.0 GB SCSI disk	_____ ×	4	= _____	____ ×	_____	= _____
C3024R[3]—Adds two 2.0 GB SCSI disks	_____ ×	4	= _____	____ ×	_____	= _____
C3025R[3]—Adds three 2.0 GB SCSI disks	_____ ×	4	= _____	____ ×	_____	= _____
C2476R—Adds 600 MB CD-ROM	_____ ×	4	= _____	____ ×	_____	= _____
C2464R—Adds 2.0 GB DDS	_____ ×	4	= _____	____ ×	_____	= _____
C2465R—Adds two 2.0 GB DDS	_____ ×	4	= _____	____ ×	_____	= _____
C2466R—Adds up to 8 GB DDS	_____ ×	4	= _____	____ ×	_____	= _____
C2252HA/B—Adds 2.7 GB HP-FL array	_____ ×	6	= _____	____ ×	_____	= _____
C2254HA/B—Adds 5.4 GB HP-FL array	_____ ×	6	= _____	____ ×	_____	= _____
C2258HA/B—Adds 4.0 GB HP-FL array[4]	_____ ×	6	= _____	____ ×	_____	= _____
C2259HA/B—Adds 8.0 GB HP-FL array[4]	_____ ×	6	= _____	____ ×	_____	= _____

Add two EIA unit panels if HP-FL disk is the bottom-most racked device in cabinet. (Allows room for cables.) Racking hardware for ALL disks is included.

Tape Drives:[1]

| Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
7980A—Adds 1/2-inch HP-IB tape drive	_____ ×	6	= _____	____ ×	_____	= _____
7980S[5]—Adds 1/2-inch SCSI tape drive	_____ ×	6	= _____	____ ×	_____	= _____
7980XC—Adds 1/2-inch HP-IB tape drive data compression	_____ ×	6	= _____	____ ×	_____	= _____
7980SX[5]—Adds 1/2-inch SCSI tape drive data compression	_____ ×	6	= _____	____ ×	_____	= _____
Racking hardware for ALL 7980/7980XC tapes is 1A4.						
4280[2]—1/2-inch cartridge tape drive with stacker (racking hardware for 4280 is included)	_____ ×	6	= _____	____ ×	_____	= _____

DTC Products:

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
J2070A—Add DTC72MX	_____ ×	3	= _____	____ ×	_____	= _____
Option 001—Configure DTC72MX with 24 direct ports	_____ ×	1	= _____			
Option 002—Configure DTC72MX with 48 direct ports	_____ ×	2	= _____			
Option 003—Configure DTC72MX with 72 direct ports	_____ ×	3	= _____			
Option UG4—Configure DTC72MX with 24 RS-423 direct ports						
Option UG5—Replace eight RJ-45 direct ports with eight DB-25 modem ports on 1 modem distribution panel (MDP). Must order option 001, 002, or 003.						

(Continued)

Table 2.11 Standalone Expansion Cabinet Racking Configuration Worksheet (cont'd)

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
Option UG6—Replace 24 RJ-45 local ports with 24 DB-25 modem ports, on 3 modem distribution panels (MDPs). Must order option 001, 002, or 003, such that the number of total ports is at least equal to the number of modem ports ordered.						
To mount in a 1.1 or 1.6 meter expansion cabinet, order a modem distribution panel (MDP) rack mounting hardware kit:						
C2792A for rear mounting **or**	_____	× 6 =	_____	____ ×	_____ =	_____
J2084A for front mounting for up to 5 MDPs **or**	_____	× 7 =	_____	____ ×	_____ =	_____
J2087A for front/rear mounting for up to 10 MDPs	_____	× 7 =	_____	____ ×	_____ =	_____
For example, to configure 42 modem ports and 19 direct ports, order: One option 003 (provides 72 local ports), two option UG6 (provides 48 modem ports on six MDPs), one J2087A (provides racking for up to ten MDPs)						
Option 1CW—Add X.25 card with RS-232 interface Option 1CX—Add X.25 card with V.35 interface Option 004—Add Telnet Access Card Options 1CW, 1CX, and 004 each consume one slot in the DTC72MX. They do not require additional EIA units.						
Note: The DTC72MX is available with three open slots. Option 001 consumes one slot, option 002 consumes two, and option 003 consumes all three. Options 1CW, 1CX, and 004 each take one slot. The maximum number of X.25 cards per DTC72MX is three. One Telnet Access Card is allowed per DTC72MX. Requires MPE 4.0 software update; may order P/N B3780AA.						
HP-PB I/O Card Cage:						
A1828A—Adds HP-PB I/O Card Cage with 14 single-high card slots, 10 meter HP-PB dual cable, and lower bus converter. Racking hardware for HP-PB I/O card cage is included.	_____	× 7 =	_____	____ ×	_____ =	_____

(Continued)

Table 2.11 Standalone Expansion Cabinet Racking Configuration Worksheet (cont'd)

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 2.8)	Total Power Required (VA Units)
II. Optional Power Protection		× 12	=			
A2998A—3 kVA HP PowerTrust UPS						
III. Filler Panels						
1F9—Adds six 1 EIA unit filler panels						
A40101A–A40107A—Adds up to 7 filler panels						
Racking hardware for DDS is included.						
IV. Total EIA units (must be ≤32)						
If number of EIA Units is greater than 32, then more than one cabinet is required.			=			
V. Total Power (must be ≤ 3 kVA for A2998A HP PowerTrust UPS)				=		
If Total Power Required is greater than 3 kVA, then more than one 3 kVA HP PowerTrust UPS and cabinet is required.						

[1] Three anti-tip ballasts (C2790A) are required for one or more 1/2-inch tape drive mechanisms.
[2] Stacker requires ten-inch clearance above and below tape drive; therefore devices racked above or below the 4280 must not have front panel accessibility.
[3] All new disks require option 002 for HP 3000 to ensure correct firmware and option ODG for field service installation.
[4] Must order MPE/iX 4.0 patch or 5.0 for the C2258/59 disk arrays. This patch can be obtained through Powerpatch or by ordering C3300A.
[5] Available on 4.0 plus patches or 5.0.

Figure 2.6 1.6 Meter Factory Integrated Backup Expansion Cabinet Configuration Example
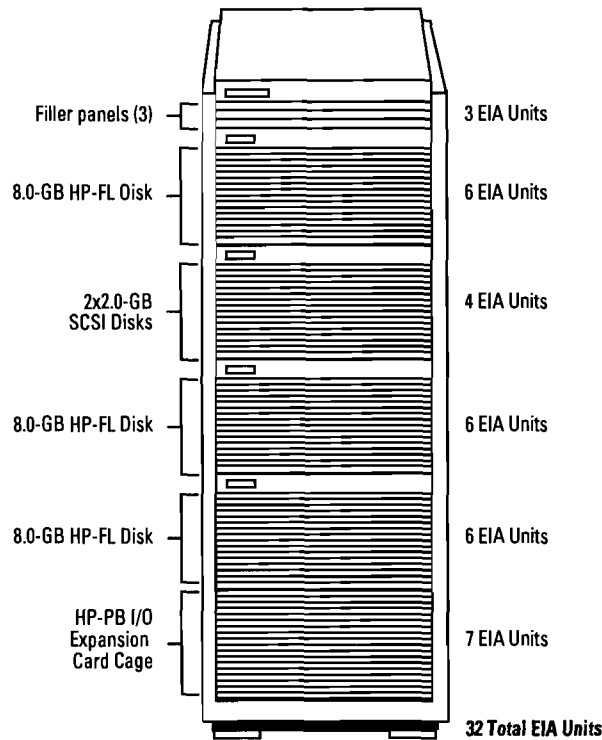
Qty	P/N	Description
1	A1884A	1.6-Meter Factory Integrated Expansion Cabinet
3	C2259HZ	8.0-GB HP-FL Disk
1	C3024RZ	2x2.0-GB SCSI Disks
1	A1828AZ	HP-PB I/O Card Cage

Note: Any cabinet containing an HP-PB I/O Card Cage must be
power protected by either an HP PowerTrust UPS or a
customer-provided power protection solution.

Figure 2.7 1.6 Meter Standalone Backup Expansion Cabinet Configuration Example
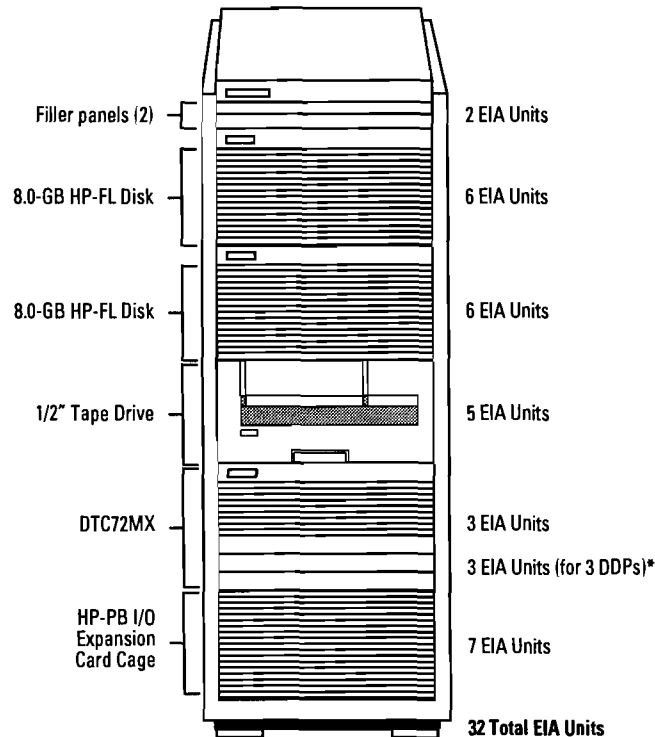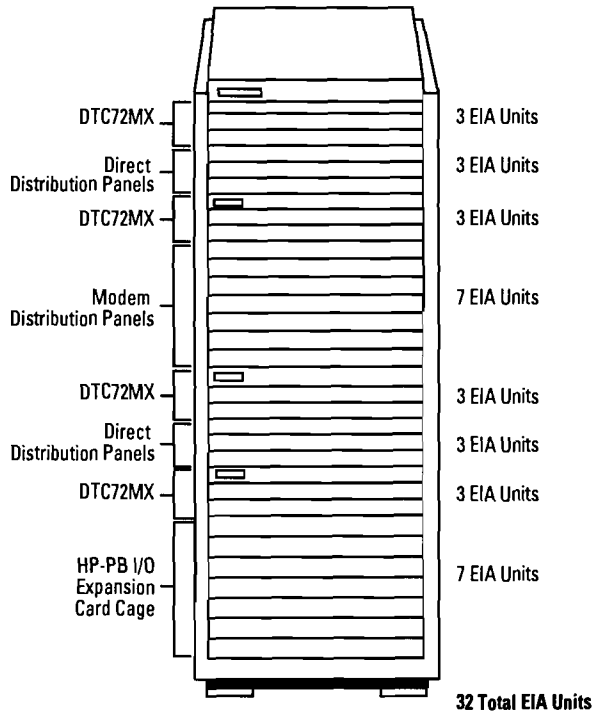

Qty	P/N	Description
1	C2786A	1.6-Meter Standalone Expansion Cabinet
2	C2259HA	8.0-GB HP-FL Disk
1	C7980SX	1/2" SCSI Tape Drive
1	J2070AZ	DTC72MX
1	Option 003	72 RJ45 Direct Ports (includes 3 DDPs)
1	A1828A	HP-PB I/O Card Cage

Note: This configuration requires the following racking hardware:
7980SX 1/2-inch SCSI tape drive option 1A4.
Any cabinet containing an HP-PB I/O Card Cage must be
power protected by either an HP PowerTrust UPS or a
customer-provided power protection solution.

*DDP = Direct Distribution Panel

Figure 2.8 1.6 Meter Factory Integrated Backup Expansion Cabinet Configuration Example

Qty	P/N	Description
1	J2070AZ	DTC72MX
1	Option 003	72 RJ45 Direct Ports
1	J2070AZ	DTC72MX
1	Option 003	72 RJ45 Direct Ports
1	J2070AZ	DTC72MX
1	Option 002	48 RJ45 Direct Ports
3	Option UG5	Replace 8 Direct Ports with 8 Modem Ports
1	J2070AZ	DTC72MX
1	Option 002	48 RJ45 Direct Ports
3	Option UG5	Replace 8 Direct Ports with 8 Modem Ports
1	J2087AZ	**Rack Mounting Kit (Supports 10 MDPs)**

Note: Any cabinet containing an HP PowerTrust UPS
or a customer-provided power protection solution.

Diagram labels (left to right):
- DTC72MX — 3 EIA Units
- Direct Distribution Panels — 3 EIA Units
- DTC72MX — 3 EIA Units
- Modem Distribution Panels — 7 EIA Units
- DTC72MX — 3 EIA Units
- Direct Distribution Panels — 3 EIA Units
- DTC72MX — 3 EIA Units
- HP-PB I/O Expansion Card Cage — 7 EIA Units

32 Total EIA Units

Cabling and Racking Configuration Guidelines

To ensure that peripheral devices and corresponding 1.6 meter expansion cabinets are configured correctly, interconnect cable length limits must be adhered to.

HP PowerTrust UPS to DTC Cabling

The RS-232C cable supplied with the A2998A HP PowerTrust UPS is 2 meters with a DB25 25-pin male RS-232C connector on one end (for connection to the DTC) and a DB9 9-pin male connector on the other end (for connection to the UPS). If the DTC is more than two meters from the HP PowerTrust UPS, then a 25 wire RS-232C extension cable can be used. The maximum RS-232C cable length is 50 feet.

CS Illustrated Racking Configuration Example

The illustrated configuration in Figure 2.9 is an example of a CS 995/991 system racking arrangement as dictated by cable length limits. The system consists of one SPU cabinet and one peripheral expansion cabinet for disk drives, DTCs, an HP PowerTrust UPS and two backup cabinets.

The SPU cabinet houses the HP-PB I/O Card Cage for the expansion cabinet to the left of the SPU in the illustration. The racked components in the cabinet are HP-FL 5.4 GB disks, DTC72MXs and the HP PowerTrust UPS required for the CS SPU power protection.
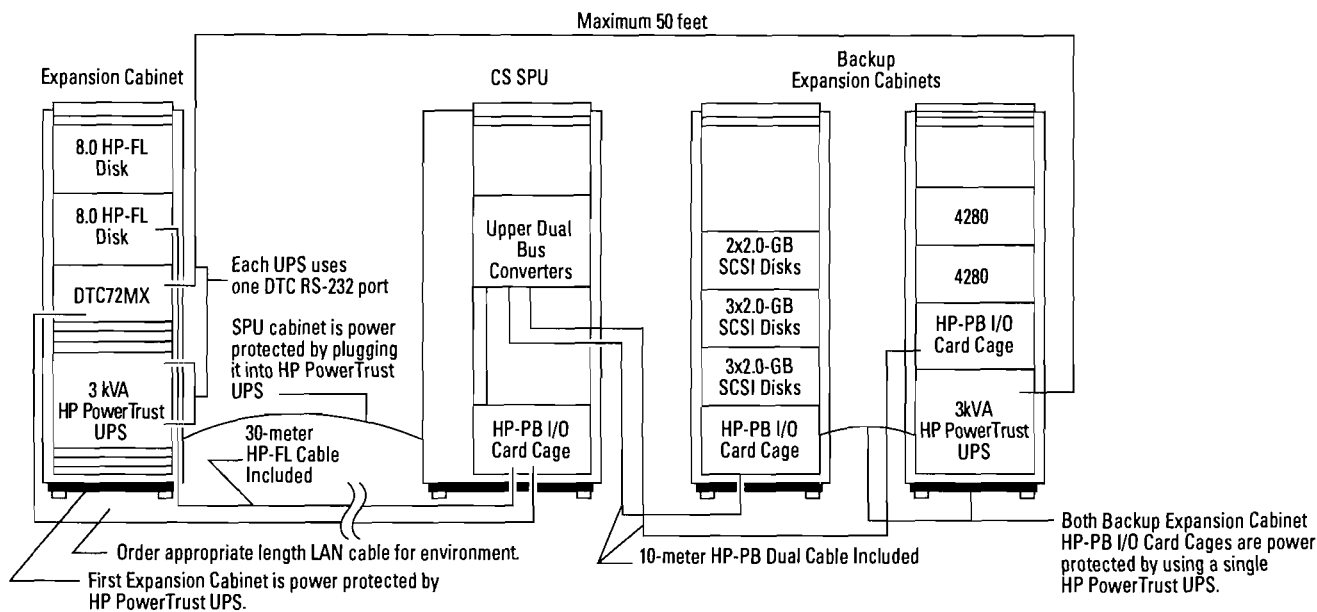
The Fiber Link interface card ships standard with a 30 meter cable. A custom length cable of up to 500 meters can be ordered if required. The cable for connection of the LAN card to the DTC ships standard with a length of 4 meters. A custom length DTC cable can be ordered for extended lengths. The custom length cables for the HP-FL and DTC mentioned above allow flexible racking configurations and distances between expansion cabinets. The HP PowerTrust UPS is shown connected to the DTC72MX to provide a communication path between the SPU and the HP PowerTrust UPS.

The two cabinets to the right of the SPU cabinet (each containing SCSI devices) house their own HP-PB I/O Card Cage. The card cages are racked in each expansion cabinet to bypass the limited cable length of 2.5 meters between the SCSI card and the first SCSI device. The SCSI cable provided with the base CS SPU is 2.5 meters. To resolve the distance restriction, an HP-PB I/O Card Cage can be mounted in each expansion cabinet (as shown in Figure 2.9) to allow the use of a 10 meter HP-PB Dual Cable.

Since the two cabinets to the right each has an HP-PB I/O Card Cage, an HP PowerTrust UPS is included in one cabinet to provide power protection to both cabinets. This HP PowerTrust UPS is connected to the DTC72MX to provide a communication path between the SPU and the HP PowerTrust UPS. When two cabinets are supported by a single HP PowerTrust UPS, the two cabinets must be positioned side-by-side to allow the second cabinet to be plugged into the HP PowerTrust UPS.

A SCSI Bus has a maximum supported cable length of 6 meters, including internal, interconnect, and external cables of SCSI devices. In order to connect a SCSI card housed in a separate expansion cabinet from the SCSI device, no more than a maximum of 2 Series 6000 Multi-Mechanism packages can be racked and still remain within the 6 meter length (each Series 6000 package utilizes 1.5 meters internal cable length and .5 meters of interconnect cabling for "daisy chaining" of SCSI packages). If a greater separation distance is required between the SPU and the expansion cabinet housing the SCSI devices, then the HP-PB I/O Card Cage containing the SCSI should be in the same cabinet as the SCSI device. Also see the DTC Cabling and Racking Guide (P/N 5961-6410) available from the LDC.

Figure 2.9 CS 995/991 Illustrated Racking Configuration Example

Maximum 50 feet

Expansion Cabinet		CS SPU	Backup Expansion Cabinets

8.0 HP-FL Disk

8.0 HP-FL Disk

DTC72MX

Each UPS uses one DTC RS-232 port

SPU cabinet is power protected by plugging it into HP PowerTrust UPS

3 kVA HP PowerTrust UPS

30-meter HP-FL Cable Included

Upper Dual Bus Converters

HP-PB I/O Card Cage

2x2.0-GB SCSI Disks

3x2.0-GB SCSI Disks

3x2.0-GB SCSI Disks

HP-PB I/O Card Cage

4280

4280

HP-PB I/O Card Cage

3kVA HP PowerTrust UPS

Order appropriate length LAN cable for environment.

First Expansion Cabinet is power protected by HP PowerTrust UPS.

10-meter HP-PB Dual Cable Included

Both Backup Expansion Cabinet HP-PB I/O Card Cages are power protected by using a single HP PowerTrust UPS.

Qty	P/N	Description
1	A1884A	1.6-meter Integrated Expansion Cabinet
2	C2259HZ	8.0-GB HP-FL Disk
1	J2070AZ	DTC72MX
1	Option 003	72 RJ45 Direct Ports
1	Option UG5	Replace 24 RJ45 direct ports with RS-232 DB-25 modem ports
1	J2084AZ	DTC MDP rackmount kit
1	A2998A	3 kVA HP PowerTrust UPS

Qty	P/N	Description
1	A1884A	1.6-meter Integrated Expansion Cabinet
1	C3024RZ	2 × 2.0-GB SCSI Disks
2	C3025RZ	3 × 2.0-GB SCSI Disks
1	A1828AZ	HP-PB I/O Card Cage

| Qty	P/N	Description
1	A1884A	1.6-meter Integrated Expansion Cabinet
1	A1828AZ	HP-PB I/O Card Cage
2	4280	Model A02 1/2" Cartrudge Tape
1	A2998A	3kVA HP PowerTrust UPS

SCSI Extender Guidelines

The SCSI extender (P/N 28643A) is only recommended for customers who must have greater cabling flexibility than the 6-meter SCSI cable length provides.

The SCSI extender is supported for use with the Rewritable Optical Autochangers, the CD-ROM, 1/2-inch tape, DDS devices, 1/2-inch cartridge tape, and the HP 5000 high end printers

only. The extender is available in 50-meter and 100-meter cable lengths. The SCSI extender has performance implications when used with SCSI devices that are asynchronous. The Optical Autochangers have asynchronous interfaces and therefore performance can be impacted by as much as 50%. The HP 5000 printers have a synchronous interface and therefore should see little performance degradation when connected to the extender.

Figure 2.10 SCSI Racking Examples

Using the expansion cabinet HP-PB I/O card cage at the bottom of the 1.6-meter expansion cabinet.

10-Meter HP-PB Dual Cable (Included)
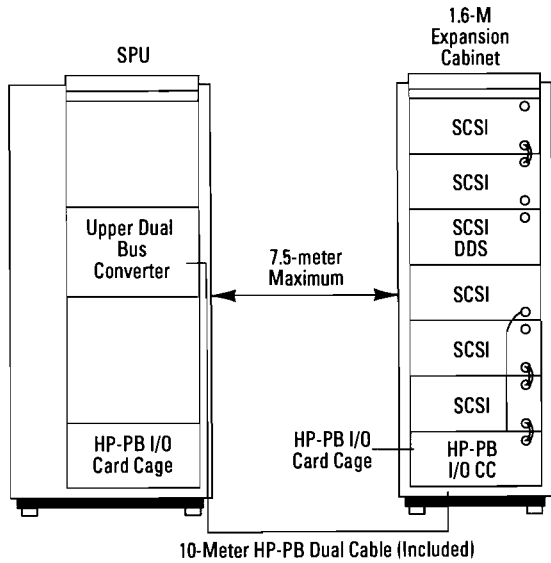
A maximum distance of 7.5 meters is allowable between the SPU and the 1.6-meter cabinet when using the HP-PB I/O card cage at the bottom of the 1.6-meter cabinet.

A 2.5-meter SCSI cable is provided standard with the base CS SPU. Add-on SCSI cards allow a choice of a 1.0- or 2.5-meter SCSI cable.

SCSI devices, such as ODS, should be racked higher in the 1.6-meter cabinet for convenient access. The second SCSI can then be "daisy chained" above or below the first SCSI device.

Multiple SCSI interface cards can be installed to connect up to 6 SCSI modules per expansion cabinet.

Internal SCSI cable length for each Series 6000 SCSI multi-mechanism package is equivalent to 1.5 meters.

Interconnecting cable length between Series 6000 SCSI multi-mechanism packages is 0.5 meters.

The SPU and 1.6 M Expansion Cabinet, with HP-PB I/O Card Cage for SCSI disks, must be power protected by either an HP PowerTrust UPS or by a customer-provided power protection solution.

Figure 2.11 HP-FL Racking Example

A 30-meter fiber-optic link is included with P/N 27115A. The 30-meter cable can be replaced by a custom fiber-optic cable, up to 500 meters long.

Use a 30-Meter Standard Cable (Included)
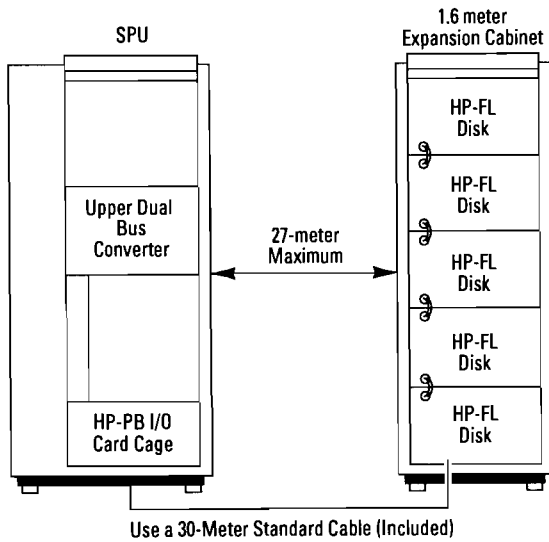
A maximum of five FL disks can be physically racked per 1.6-meter cabinet.

HP-FL Cable Lengths:
    A) Fiber Link cards are shipped with 30-meter cables.
    B) Custom length fiber Link Cable is orderable.
    C) The internal and external cable lengths for HP-FL device connections
        cannot exceed 500 meters.

A maximum distance of 27 meters is allowable between the SPU and the 1.6-meter cabinet with a 30-meter HP-FL cable.

2 filler panels must be at the bottom of the 1.6-meter cabinet if an HP-FL disk is the bottom-most racked device in the cabinet. This will allow ample space for cables coming into the bottom of the cabinet.

The SPU cabinet must be power protected by either an HP PowerTrust UPS or by a customer-provided power protection solution.

Section 3
HP 3000 Series 987/200
Computer System

General System Configuration Information

Maximum Supported Hardware Configuration

	Series 987/200	
Chassis configuration	987/200RX	987/200SX
MPE/iX Release Support	5.0	
User license: (UL=unlimited) – standard – optional	100 160/256/UL	100 160/256/UL
Typical users	170–650	
Maximum connected workstations/terminals	1700	1700
Performance relative to 917LX	6.0	6.0
HP-PB Slots	4	12
Memory (MB): Std/Max	64/768	64/768
Maximum disk storage (GB)	120	250
Maximum disks: Total –HP-FL –SCSI –HP-IB[2]	34 32 34 12	65 32 65 12
Maximum tape drives	8	8
Maximum CD-ROM drives[6]	1	1
Maximum printers –system –serial	8 96	8 96
Maximum DTCs	24	24
Max. # devices per I/O card –SCSI –PBA-IB (HP-IB)[2] –PB-FL (HP-FL) 28616A –PBA-FL (HP-FL) A1748A[3]	7 6 8 8	7 6 8 8
Maximum number of cards[7] –SCSI –PBA-IB[2] –PBA-FL[3,5] (A1748A) –PB-FL (28616A)	4 2 2 2	12 2 3 4
Maximum network links per system –802.3 LANIC[1] –802.5 Token Ring	2 1	2 1
Floating point coprocessor	std	std
Maximum PSI cards	4	5[4]

[1] First link standard on multi-function I/O card
[2] Six disks are physically supported per PBA-IB. Four disks per PBA-IB are recommended for optimum performance
[3] PBA-FL card is not supported on 9x7LX
[4] If three PBA-FL cards (A1784A) are installed, maximum PSI cards are four
[5] PBA-FL (A1748A) does not support the HP-FL disk arrays (C2252/54 and C2258/59). Must order PB-FL (28616A).
[6] Refer to the notes on pages 2-14 and 2-15 of the July 1993 Configuration Guide (P/N 5091-7438E) for CD-ROM supported configurations.
[7] For I/O card combinations on the 9x7SX systems use the electrical current budgeting worksheet (page 3-3) to determine supportability of proposed I/O cards and internal peripherals. The 9x7LX and 9x7RX do not require electrical current budgeting.

NOTE: Please refer to the July 1993 Configuration Guide (Pub. # 5091-7438E) for information common to all members of the 9x7 family of systems.

General Product Description

The HP 3000 Series 987/200 is a high-performance extension to the 9x7 family of systems. The 987/200 takes advantage of a two-way multiprocessor implementation of the PA 7100 RISC chip and 2 Mb of cache per processor. Standard features provided with this system include one multifunction I/O card, 64 Mb of memory, an integrated 1.0-Gb 3.5-inch disk mechanism, an integrated 3.5-inch 2.0-Gb digital data storage (DDS) cartridge tape drive, an operating system, and four I/O slots with an available 12-slot option.

As with the other 987 systems, the 987/200 comes standard with a 100-user license and an option to increase the license to 160, 256, or unlimited users. Field upgrade paths to the 987/200 have been provided from the 977, 987, and 987/150 systems. In addition, the 987/200 is also available in a plus configuration that provides an HP Vectra PC-based OpenView console, systems management and performance management software includes the 987/200.

On page 3-3 is an I/O Card and Internal Peripheral Current Budgeting Worksheet similar to the one found on page 2-21 of the July 1993 Configuration Guide (P/N 5091-7438E) but modified to account for the unique power requirements of the 987/200. Please use the worksheet with the power charts (Table 3.1) to ensure the 987/200 integrated system you propose is viable.

Determining Disk Storage Needs

Disk space requirements for the operating system are increasing for MPE/iX 5.0. As a result, use the modified disk space storage algorithm found on page 2-35 of the July 1993 Configuration Guide to ascertain a customer's disk storage needs. Use 500 MB for SLT and FOS or 930 MB for SLT, FOS and full Subsys. The following formula can be used as a general rule of thumb. However, remember that disk requirements will vary with the number of active users and the nature of the customer's application.

Disk Storage = 500 MB + (5 Mbytes × Number of concurrent Users) + Application Requirements + 200 Mbytes.

All other information pertaining to this system is common to the rest of the 9x7 family of systems and can be found in the July 1993 HP 3000 Series 900 Computer Systems Configuration Guide (P/N 5091-7438E).

Table 3.1 Series 987/200SX (12 single-high I/O slots)
I/O Card and Internal Peripheral Current Budgeting Worksheet

	Selection	I/O Slot/ Peripheral Position Number	Current (Amps) Required/Card Left Bank			Current (Amps) Required/Card Right Bank		
			+12V	+5V	-12V	+12V	+5V	-12V
I/O Cards		1						
		2						
		3						
		4						
		5						
		6						
		7						
		8						
		9						
		10						
		11						
		12						
	MFIO	13/14				.55	3.38	.03
Internal Peripherals	DDS tape drive (std)	1				.75	1.00	0.00
	CD-ROM[1] (opt)	2						
	2 half-height disks[1] or	3						
	1 full-height disk	4						
	1 full-height disk	5						
	1 full-height disk	6						
Total current used per voltage[2]								
Total current available for HP-PB I/O cards and peripherals in the 987/200SX system			6.27	6.80	1.50	6.27	31.00	1.50

NOTE: The processor, memory, and memory extender cards have been accounted for in total current available.
[1] If a CD-ROM is ordered with the standard DDS tape drive, only one half-height or one full-height disk drive is supported in positions 3 and 4.
[2] Total current used per voltage must not exceed total current listed by more than 5%.

NOTE: Do not use shaded areas.

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