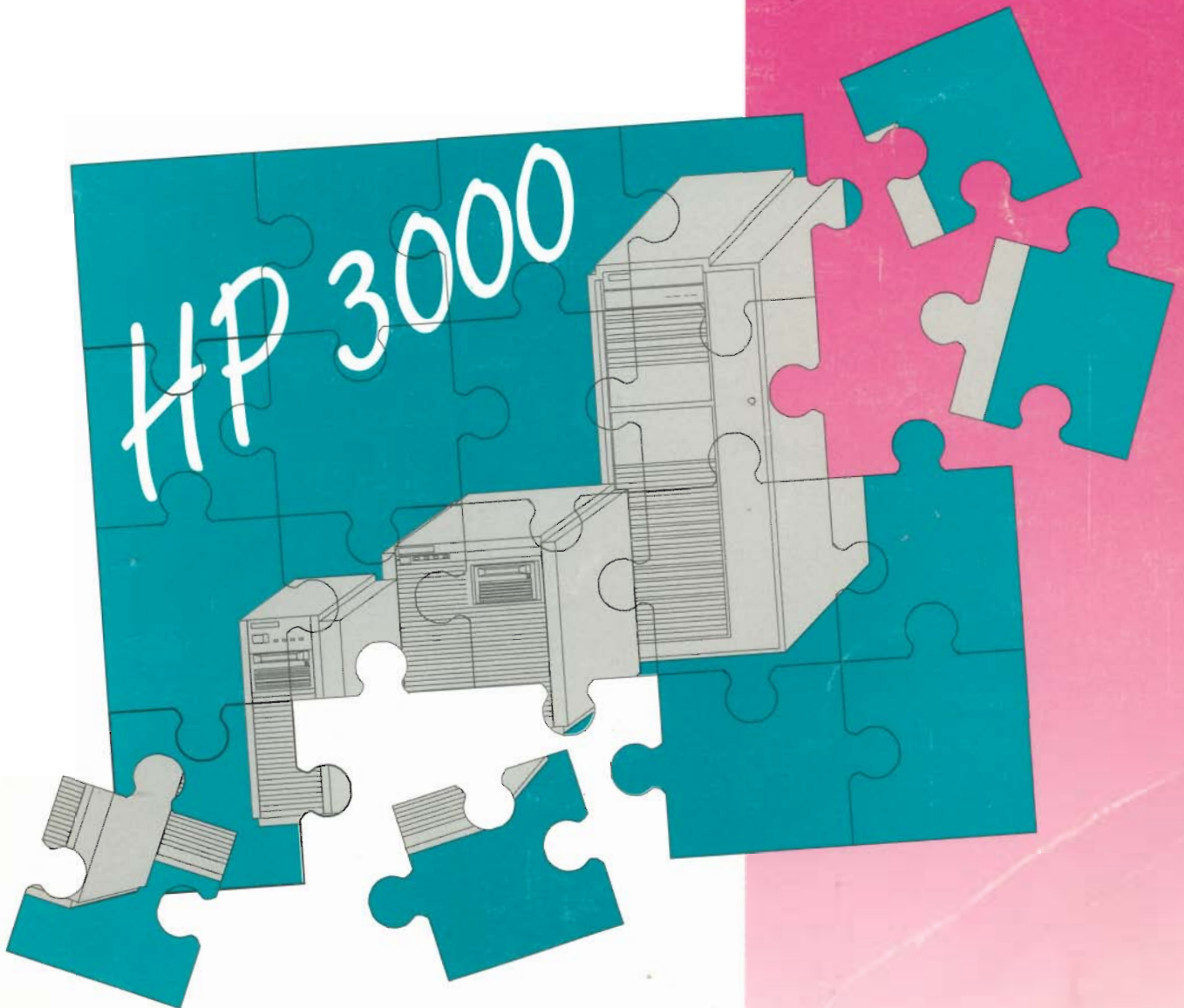


HP 3000 900 Series Computer Systems

Configuration Guide

Effective May 1994



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HP 3000 900 Series Computer Systems

Configuration Guide

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About This Guide

Configuring an HP 3000 System

This Configuration Guide is designed to help in the configuration of HP 3000 systems including:

- Series 9x7LX (917LX, 927LX, 937LX, and 947LX)
- Series 9x7RX (937RX, 947RX, 957RX, 967RX, 987RX, and 987/150RX)
- Series 9x7SX (937SX, 947SX, 957SX, 967SX, 987SX, and 987/150SX)
- Series 9x8LX (918LX, 928LX, 968LX, and 978LX)
- Series 9x8RX (918RX, 928RX, 968RX, and 978RX)
- HP 3000 Corporate Business Systems (CS) 990, 992, 991, and 995

The system configuration sections provide a review of the standard and required equipment comprising a minimum and maximum system configuration along with general configuration guidelines. Use the guidelines and information provided to check that a proposed configuration is valid and does not violate any of the system maximums or physical

limitations. The beginning of Section 1 contains a “Business Systems at-a-Glance” table of product information.

Printing History

The June 1988 edition of the *HP 3000 Configuration Guide* contains configuration information for many older MPE V/E systems. This information has been placed on the InfoROM CD internal support subscription service. We no longer print new configuration guidelines for these older systems. For information on MPE V/E systems, consult the June 1988 edition of the *Configuration Guide* or obtain an InfoROM subscription. For information or questions about ordering an InfoROM subscription, send an HPDESK message to INFOROM / HP4700/M2.

The August 1990 *Configuration Guide Update* (5954-9354) is the last revision to contain information on the MICRO family of systems and information on the MPE/iX Series 925LX, 925, 935 and 949. Please refer to that revision for configuration guidelines for those systems.

The June 1991 edition of the *HP 3000 Configuration Guide* (5091-1731E), is the last version to contain information on the following systems:

A1702A	Series 920
A1027A	Series 922LX
A1046A	Series 922RX
A1033A	Series 922
A1041B	Series 932
A1700A	Series 948
A1701A	Series 958
32490B	Series 950
A1109A	Series 955
A1130A	Series 960

Please refer to the June 1991 edition for configuration guidelines for these systems.

For information on the Series 980, please refer to the July 1993 *HP 3000 Configuration Guide* (5091-7438E).



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Section 1.

900 Series Business Computers

Business Systems at-a-Glance

SPU Model No.	SPU Product No.	S/W Tier	Slots per Box	Clock Speed MHz	Instr/Data Cache † (KB)	Performance Relative to 917LX	Ports Included on LAN-based MFIO Card			# Cards Sup'd IB/SCSI/FL/ FW SCSI
							SCSI	RS-232	LAN	
917LX	A1770B	1	2	32	32/64	1	1	2	1	1/2/1/1
927LX	A1771C	1	2	32	32/64	1	1	2	1	1/2/1/1
937LX	A1772B	1	2	32	32/64	1	1	2	1	1/2/1/1
937RX	A1772B	1	4	32	32/64	1	1	2	1	2/4/2/2
937SX	A1772B	1	12	32	32/64	1	1	2	1	3/10/4/5
947LX	A1708C	2	2	32	32/64	1	1	2	1	1/2/1/1
947RX	A1708C	3	4	32	32/64	1	1	2	1	2/4/2/2
947SX	A1708C	3	12	32	32/64	1	1	2	1	3/10/4/5
957RX	A1709B	4	4	48	64/64	1.6	1	2	1	2/4/2/2
957SX	A1709B	4	12	48	64/64	1.6	1	2	1	3/10/4/5
967RX	A1710B	5	4	48	256/256	2	1	2	1	2/4/2/2
967SX	A1710B	5	12	48	256/256	2	1	2	1	3/10/4/5
987RX	A2317B	6	4	96	256/256	3.2	1	2	1	2/4/2/2
987SX	A2317B	6	12	96	256/256	3.2	1	2	1	3/10/4/5
987/150RX	A3004A	6	4	96	1024/1024	4.5	1	2	1	2/4/2/2
987/150SX	A3004A	6	12	96	1024/1024	4.5	1	2	1	3/12/4/5
987/200RX	A3045A	6	4	96	1024/1024	6	1	2	1	2/4/2/2
987/200SX	A3045A	6	12	96	1024/1024	6	1	2	1	3/12/4/5
918LX	A3096AW	1	2	34	64	1	1	2	1	1/2/1/1
918RX	A3096AW	1	4	34	64	1	1	2	1	2/4/2/2
928LX	2934AW	3	2	48	64	1.4	1	2	1	1/2/1/1
928RX	2934AW	3	4	48	64	1.4	1	2	1	2/4/2/2
968LX	A2933AW	5	2	64	256	2.1	1	2	1	1/2/1/1
968RX	A2933AW	5	4	64	256	2.1	1	2	1	2/4/2/2
978LX	A3129AW	6	2	80	256	2.6	1	2	1	1/2/1/1
978RX	A3129AW	6	4	80	256	2.6	1	2	1	2/4/2/2
SPU Model No.	SPU or SSP Product No.	S/W Tier	Add'l Slots	Clock Speed MHz	Cache † Inst/Data	Performance Relative to 917LX				# Cards/ Card Cage IB/SCSI/FL/ FW SCSI
990	A1809A/A1811A	7	103	48	2MB/2MB	2.8				2/5/5/5*
992/100	A1809A/A1811A	7	103	60	2MB/2MB	3.5				2/5/5/5*
992/200	A1809A/A1811A	7	103	60	2MB/2MB	6				2/5/5/5*
992/300	A1809A/A1811A	7	103	60	2MB/2MB	8.1				2/5/5/5*
992/400	A1809A/A1811A	7	103	60	2MB/2MB	10				2/5/5/5*
991	A3080A/A3079A	7	105	72	1MB/1MB	3.3				2/5/5/5*
995/100	A3080A/A3079A	7	105	90	1MB/1MB	4.2				2/5/5/5*
995/200	A3080A/A3079A	7	105	90	1MB/1MB	7.1				2/5/5/5*
995/300	A3080A/A3079A	7	105	90	1MB/1MB	9.6				2/5/5/5*
995/400	A3080A/A3079A	7	105	90	1MB/1MB	11.8				2/5/5/5*
995/500	A3080A/A3079A	7	105	90	1MB/1MB	13.9				2/5/5/5*
995/600	A3080A/A3079A	7	105	90	1MB/1MB	16				2/5/5/5*
995/700	A3080A/A3079A	7	105	90	1MB/1MB	18				2/5/5/5*
995/800	A3080A/A3079A	7	105	90	1MB/1MB	20				2/5/5/5*

*Four for HP-PB internal card cage. Not supported until September 1994.

† Cache size is per CPU.

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)

SPU Model Number	Memory		STD Int. Disk (GB)	Max. Int. Disk (GB)	Max. Number of Disks			Max. Supported Disk (GB)	Int. Supported DDS	Max. Optical Disk	Max. System Printers	Max. Serial Printers
	Std MB	Max MB			SCSI SE/FW	HP-IB	HP-FL					
917LX	32	192	1	2	20/15	6	8	40	2GB	2	6	32
927LX	32	192	1	2	20/15	6	8	40	2GB	2	6	32
937LX	32	192	1	2	20/15	6	8	40	2GB	2	6	32
937RX	32	384	1	10	34/30	12	16	68	2GB	3	8	48
937SX	32	384	1	10	49/75	12	32	98	2GB	3	8	48
947LX	64	192	1	2	20/15	6	8	40	2GB	2	6	32
947RX	64	384	1	10	34/30	12	16	68	2GB	3	8	48
947SX	64	384	1	10	49/75	12	32	98	2GB	3	8	48
957RX	64	384	1	10	34/30	6	16	68	2GB	3	8	64
957SX	64	384	1	10	49/75	12	32	98	2GB	3	8	64
967RX	64	512	1	10	34/30	6	16	68	2GB	3	8	64
967SX	64	512	1	10	49/75	12	32	98	2GB	3	8	64
987RX	64	768	1	10	34/30	12	16	68	2GB	3	8	64
987SX	64	768	1	10	49/75	12	32	98	2GB	3	8	64
987/150RX	64	768	1	10	34/30	12	16	120	2GB	3	8	96
987/150SX	64	768	1	10	65/75	12	32	250	2GB	3	8	96
987/200RX	64	768	1	10	34/30	12	16	120	2GB	3	8	96
987/200SX	64	768	1	10	65/75	12	32	250	2GB	3	8	96
918LX	32	512*	1	4	20/15	6	8	76	2GB	2	6	64
918RX	32	512*	1	4	34/30	12	16	140	2GB	3	6	64
928LX	32	512*	1	4	20/15	6	8	76	2GB	2	6	64
928RX	32	512*	1	4	34/30	12	16	140	2GB	3	6	64
968LX	64	512*	1	4	20/15	6	8	76	2GB	2	6	64
968RX	64	512*	1	4	34/30	12	16	140	2GB	3	6	64
978LX	64	512*	1	4	20/15	6	8	76	2GB	2	6	64
978RX	64	512*	1	4	34/30	12	16	140	2GB	3	6	64
SPU Model Number	Memory		STD Int. Disk (GB)	Max. Int. Disk (GB)	Max. SCSI Cards SE	Max. PBA-IB Cards	Max. PB-FL Cards	Max.** Supported Disk (Gb)	Max. Supported DDS or 3480	Max. Optical Disk	Max. Sys. Printers SCSI/HP-IB	Max. Serial Printers
	Std MB	Max. MB										
990	128	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
992/100	128	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
992/200	128	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
992/300	128	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
992/400	128	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
991	256	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
995/100	256	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
995/200	256	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
995/300	256	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
995/400	256	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
995/500	256	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
995/600	256	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
995/700	256	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250
995/800	256	2048	n/a	n/a	40	16	40	2036	8	3	4/8	250

*Only 256 MB of memory is orderable until June 1994.

**Configurations greater than 128 spindles require factory approval.

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

SPU Model Number	SPU Product No.	Max. DTCs	Max. Token Ring	Max. PSI Cards	Max. 802.3 LAN Cards*	FDDI	Options for FL PT.	User-based License for All Systems	Typical # Users
917LX	A1770B	4	1	2	3	1	ODT	8	4 - 8
927LX	A1771C	4	1	2	3	1	ODT	20	16 - 20
937LX	A1772B	6	1	2	3	1	ODT	32/40/64	24 - 64
937RX	A1772B	6	1	4	3	1	ODT	32/40/64	24 - 64
937SX	A1772B	6	1	5	3	1	ODT	32/40/64	24 - 64
947LX	A1708C	12	1	2	3	1	ODT	100/160/256	64 - 100
947RX	A1708C	12	1	4	3	1	ODT	100/160/256	64 - 100
947SX	A1708C	12	1	5	3	1	ODT	100/160/256	64 - 100
957RX	A1709B	24	1	4	3	1	ODU	64/100/160/256/UL	64 - 160
957SX	A1709B	24	1	5	3	1	ODU	64/100/160/256/UL	64 - 160
967RX	A1710B	24	1	4	3	1	ODV	100/160/256/UL	96 - 250
967SX	A1710B	24	1	5	3	1	ODV	100/160/256/UL	96 - 250
987RX	A2317B	24	1	4	3	1	std	100/160/256/UL	96 - 380
987SX	A2317B	24	1	5	3	1	std	100/160/256/UL	96 - 380
987/150RX	A3004A	24	1	4	3	1	std	100/160/256/UL	128 - 500
987/150SX	A3004A	24	1	5	3	1	std	100/160/256/UL	128-500
987/200RX	A3045A	24	1	4	3	1	std	100/160/256/UL	170-650
987/200SX	A3045A	24	1	5	3	1	std	100/160/256/UL	170-650
918LX	A3096AW	6	1	2	3	1	std	8/20/32/40/64	24 - 64
918RX	A3096AW	6	1	4	3	1	std	8/20/32/40/64	24 - 64
928LX	A2934AW	12	1	2	3	1	std	64/100/160/256/UL	64 - 160
928RX	A2934AW	12	1	4	3	1	std	64/100/160/256/UL	64 - 160
968LX	A2933AW	24	1	2	3	1	std	100/160/256/UL	100-256
968RX	A2933AW	24	1	4	3	1	std	100/160/256/UL	100-256
978LX	A3129AW	24	1	2	3	1	std	100/160/256/UL	100-380
978RX	A3129AW	24	1	4	3	1	std	100/160/256/UL	100-380
SPU Model Number	SPU or SSP Product No.	Max. DTCs	Max. Token Ring	Max. PSI Cards	Max. 802.3 LAN Cards*	FDDI	Options for FL PT.	User-based License for All Systems	Typical # Users
990	A1809A/A1811A	120	1	8	3	1	std	100/160/256/384/UL	200 - 580
992/100	A1809A/A1811A	120	1	8	3	1	std	100/160/256/384/UL	200 - 580
992/200	A1809A/A1811A	120	1	8	3	1	std	100/160/256/384/UL	325 - 775
992/300	A1809A/A1811A	120	1	8	3	1	std	100/160/256/384/UL	425 - 945
992/400	A1809A/A1811A	120	1	8	3	1	std	100/160/256/384/UL	500 - 1000
991	A3080A/A3079A	120	1	8	3	1	std	100/160/256/384/UL	200 - 580
995/100	A3080A/A3079A	120	1	8	3	1	std	100/160/256/384/UL	200 - 580
995/200	A3080A/A3079A	120	1	8	3	1	std	100/160/256/384/UL	325 - 775
995/300	A3080A/A3079A	120	1	8	3	1	std	100/160/256/384/UL	425 - 945
995/400	A3080A/A3079A	120	1	8	3	1	std	100/160/256/384/UL	500 - 1050
995/500	A3080A/A3079A	120	1	8	3	1	std	100/160/256/384/UL	500 - 1050
995/600	A3080A/A3079A	120	1	8	3	1	std	100/160/256/384/UL	650 - 1200
995/700	A3080A/A3079A	120	1	8	3	1	std	100/160/256/384/UL	650 - 1200
995/800	A3080A/A3079A	120	1	8	3	1	std	100/160/256/384/UL	800 - 1300

*The first 802.3/Ethernet LAN card comes standard with each system as part of either the MFIO or LAN/Console card.

To have a total of three 802.3/Ethernet LAN cards, one for DTC communication and two for system-to-system communication, requires MPE/iX release 4.0 plus power patch or 5.0.

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

SPU	Height	Width	Depth	Weight	AC Power	Proc. Type	Frequency	Heat BTU/hour*	Int. Card Cages	Ext. Card Cages	Sup'd on MPE/IX
917LX	433mm (16.9")	222mm (8.7")	533mm(21")	31.8kg(70lb)	100-240 V	CMOS	50/60HZ	1383	1	0	3.1 & >
927LX	433mm (16.9")	222mm (8.7")	533mm(21")	31.8kg(70lb)	100-240 V	CMOS	50/60HZ	1383	1	0	3.1 & >
937LX	433mm (16.9")	222mm (8.7")	533mm(21")	31.8kg(70lb)	100-240 V	CMOS	50/60HZ	1383	1	0	3.1 & >
937RX	433mm (16.9")	222mm (8.7")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	3.1 & >
937SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	3.1 & >
947LX	433mm (16.9")	222mm (8.7")	533mm(21")	31.8kg(70lb)	100-240 V	CMOS	50/60HZ	1383	1	0	3.1 & >
947RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	3.1 & >
947SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	3.1 & >
957RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	3.1 & >
957SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	3.1 & >
967RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	3.1 & >
967SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	3.1 & >
987RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	4.0 & >
987SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	4.0 & >
987/150RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	4.0 & >
987/150SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	4.0 & >
987/200RX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	5.0
987/200SX	433mm (16.9")	444mm(17.4")	533mm(21")	50kg(110lb)	100-240 V	CMOS	50/60HZ	2766	1	0	5.0
918LX	430mm (16.9")	222mm(8.7")	533mm(21")	32kg(72.5lb)	100-240 V	CMOS	50/60HZ	1383	1	0	4.0 & >
918RX	430mm (16.9")	222mm(8.7")	533mm(21")	32kg(72.5lb)	100-240 V	CMOS	50/60HZ	1383	1	0	4.0 & >
928LX	430mm (16.9")	222mm(8.7")	533mm(21")	32kg(72.5lb)	100-240 V	CMOS	50/60HZ	1383	1	0	4.0 & >
928RX	430mm (16.9")	222mm(8.7")	533mm(21")	32kg(72.5lb)	100-240 V	CMOS	50/60HZ	1383	1	0	4.0 & >
968LX	430mm (16.9")	222mm(8.7")	533mm(21")	32kg(72.5lb)	100-240 V	CMOS	50/60HZ	1383	1	0	4.0 & >
968RX	430mm (16.9")	222mm(8.7")	533mm(21")	32kg(72.5lb)	100-240 V	CMOS	50/60HZ	1383	1	0	4.0 & >
978LX	430mm (16.9")	222mm(8.7")	533mm(21")	32kg(72.5lb)	100-240 V	CMOS	50/60HZ	1383	1	0	4.0 & >
978RX	430mm (16.9")	222mm(8.7")	533mm(21")	32kg(72.5lb)	100-240 V	CMOS	50/60HZ	1383	1	0	4.0 & >
992/990	1.62m	750mm	905mm	375kg	200-240 V	CMOS	50/60HZ	8600	1	7	4.0 & >
995/991	1.62m	750mm	905mm	375kg	200-240 V	CMOS	50/60HZ	8000	1	7	5.0

Who's who in the card game:			
27251A	SCSI	CIO card	only CIO systems
28642A	SCSI	NIO card	9x7, 9x8, and CS systems
27113A	HP-IB	CIO card	only CIO systems
A1747A	HP-IB	PBA NIO	9x7, 9x8, and CS systems
27115A	HP-FL	CIO card	only CIO systems
A1748A	HP-FL	PBA NIO	9x7 systems
28616A	PB-FL	NIO	9x7, 9x8, and CS systems
28696A	F/W SCSI	NIO	9x7, 9x8, and CS systems

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

*BTU (British Thermal Unit)

1 BTU/hr × 0.233 = __ Watt

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.

HP 3000/HP 9000 Comparison by Packaging

MHz	Package Cache	2 Slots		4 Slots		6 Slots	8 Slots	12 Slots	
		3000	9000	3000	9000	9000	9000	3000	9000
2*96	4096			987/200RX	G70		H70	987/200SX	I70
96	2048			987/150RX	G60		H60	987/150SX	I60
96	512			987RX	G50	887	H50	987SX	987/I50
64	512				G40	867	H40	977	877/I40
48	512		837/F30	967RX	G30	847	H30	967SX	857/I30
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							
80	256	978LX	E45	978RX	E45				
64	256	968LX	E35	968RX	E35				
48	64	928LX	E25	928RX	E25				
34*	64	918LX		918RX					

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.

*Effective with software

HP 3000 Performance Native Mode Matrix

Performance numbers are provided for relative positioning of HP 3000 systems. The numbers provided are not intended to be performance dependent. Some applications will not necessarily show the performance stated here. Please see the HP 3000 900 Series Business Systems and Servers Price Guide or your HP 3000 Sales Representative for authorized system upgrade paths.

Upgrade to -->	917	927	937	947	957	967	977SX	987	987/150	987/200	918	928	968	978
Series 37, 37XE	16.7	16.7	16.7	16.7	26.7	33.3	43.3	53.3	75.0	100.0	16.7	23.3	35.0	41.7
MICRO 3000LX, GX	7.7	7.7	7.7	7.7	12.3	15.4	20.0	24.6	34.6	46.2	7.7	10.8	16.2	19.2
Series 39, 40, 44	10.0	10.0	10.0	10.0	16.0	20.0	26.0	32.0	45.0	60.0	10.0	14.0	21.0	25.0
Series 42, 48	7.7	7.7	7.7	7.7	12.3	15.4	20.0	24.6	34.6	46.2	7.7	10.8	16.2	19.2
Series 42XP, 52, 58	5.9	5.9	5.9	5.9	9.4	11.8	15.3	18.8	26.5	35.3	5.9	8.2	12.4	14.7
Series 64	3.1	3.1	3.1	3.1	5.0	6.3	8.1	10.0	14.1	18.8	3.1	4.4	6.6	7.8
Series 68	2.5	2.5	2.5	2.5	4.0	5.0	6.5	8.0	11.3	15.0	2.5	3.5	5.3	6.3
Series 70	2.3	2.3	2.3	2.3	3.6	4.5	5.9	7.3	10.2	13.6	2.3	3.2	4.8	5.7
Series 920	5.2	5.2	5.2	5.2	8.3	10.3	13.4	16.5	23.3	31.0	5.2	7.2	10.9	12.9
Series 922	3.1	3.1	3.1	3.1	5.0	6.2	8.1	9.9	14.0	18.6	3.1	4.3	6.5	7.8
Series 932	2.0	2.0	2.0	2.0	3.2	4.0	5.2	6.4	9.0	12.0	2.0	2.8	4.2	5.0
Series 948					1.5	1.9	2.4	3.0	4.2	5.6		1.3	2.0	2.3
Series 958					1.2	1.5	2.0	2.4	3.4	4.5		1.1	1.6	1.9
Series 925	3.4	3.4	3.4	3.4	5.5	6.8	8.9	10.9	15.3	20.5	3.4	4.8	7.2	8.5
Series 935	1.7	1.7	1.7	1.7	2.7	3.4	4.4	5.5	7.7	10.2	1.7	2.4	3.6	4.3
Series 949					1.4	1.7	2.2	2.7	3.8	5.1		1.2	1.8	2.1
Series 950	1.5	1.5	1.5	1.5	2.5	3.1	4.0	5.0	7.0	9.3	1.5	2.2	3.3	3.9
Series 955	1.0	1.0	1.0	1.0	1.6	2.0	2.6	3.2	4.5	6.0	1.0	1.4	2.1	2.5
Series 960					1.1	1.4	1.8	2.2	3.1	4.1			1.4	1.7
Series 980/100							1.2	1.5	2.0	2.7				1.1
Series 980/200									1.2	1.6				
Series 980/300										1.2				
Series 980/400										1.0				
Series 917	1.0	1.0	1.0	1.0	1.6	2.0	2.6	3.2	4.5	6.0	1.0	1.4	2.1	2.5
Series 927	1.0	1.0	1.0	1.0	1.6	2.0	2.6	3.2	4.5	6.0	1.0	1.4	2.1	2.5
Series 937	1.0	1.0	1.0	1.0	1.6	2.0	2.6	3.2	4.5	6.0	1.0	1.4	2.1	2.5
Series 947	1.0	1.0	1.0	1.0	1.6	2.0	2.6	3.2	4.5	6.0	1.0	1.4	2.1	2.5
Series 957					1.0	1.3	1.6	2.0	2.8	3.8			1.3	1.6
Series 967						1.0	1.3	1.6	2.3	3.0			1.1	1.3
Series 977SX							1.0	1.2	1.7	2.3				
Series 987								1.0	1.4	1.9				
Series 987/150									1.0	1.3				
Series 987/200										1.0				
Series 918	1.0	1.0	1.0	1.0	1.6	2.0	2.6	3.2	4.5	6.0	1.0	1.4	2.1	2.5
Series 928					1.1	1.4	1.9	2.3	3.2	4.3		1.0	1.5	1.8
Series 968							1.2	1.5	2.1	2.9			1.0	1.2
Series 978							1.0	1.3	1.8	2.4				1.0
Series 990								1.1	1.6	2.1				
Series 992/100									1.3	1.7				
Series 992/200										1.0				
Series 992/300														
Series 992/400														
Series 991									1.4	1.8				
Series 995/100									1.1	1.4				
Series 995/200														
Series 995/300														
Series 995/400														
Series 995/500														
Series 995/600														
Series 995/700														
Series 995/800														

*Compatibility Mode performance will typically be 75%-85% of Native Mode.

**Comparisons above do not correlate to available upgrade paths.

HP 3000 Performance Native Mode Matrix (cont'd)

Performance numbers are provided for relative positioning of HP 3000 systems. The numbers provided are not intended to be performance dependent. Some applications will not necessarily show the performance stated here. Please see the HP 3000 900 Series Business Systems and Servers Price Guide or your HP 3000 Sales Representative for authorized system upgrade paths.

Upgrade to -->	990	992/100	992/200	992/300	992/400	991	995/100	995/200	995/300	995/400	995/500	995/600	995/700	995/800
Series 37, 37XE	46.7	58.3	100.0	135.0	166.7	55.0	70.0	118.3	160.0	196.7	231.7	266.7	300.0	333.3
MICRO 3000LX, GX	21.5	26.9	46.2	62.3	76.9	25.4	32.3	54.6	73.8	90.8	106.9	123.1	138.5	153.8
Series 39,40,44	28.0	35.0	60.0	81.0	100.0	33.0	42.0	71.0	96.0	118.0	139.0	160.0	180.0	200.0
Series 42, 48	21.5	26.9	46.2	62.3	76.9	25.4	32.3	54.6	73.8	90.8	106.9	123.1	138.5	153.8
Series 42XP, 52, 58	16.5	20.6	35.3	47.6	58.8	19.4	24.7	41.8	56.5	69.4	81.8	94.1	105.9	117.6
Series 64	8.8	10.9	18.8	25.3	31.3	10.3	13.1	22.2	30.0	36.9	43.4	50.0	56.3	62.5
Series 68	7.0	8.8	15.0	20.3	25.0	8.3	10.5	17.8	24.0	29.5	34.8	40.0	45.0	50.0
Series 70	6.4	8.0	13.6	18.4	22.7	7.5	9.5	16.1	21.8	26.8	31.6	36.4	40.9	45.5
Series 920	14.5	18.1	31.0	41.9	51.7	17.1	21.7	36.7	49.6	61.0	71.8	82.7	93.0	103.3
Series 922	8.7	10.9	18.6	25.1	31.0	10.2	13.0	22.0	29.8	36.6	43.1	49.6	55.8	62.0
Series 932	5.6	7.0	12.0	16.2	20.0	6.6	8.4	14.2	19.2	23.6	27.8	32.0	36.0	40.0
Series 948	2.6	3.3	5.6	7.6	9.4	3.1	3.9	6.7	9.0	11.1	13.0	15.0	16.9	18.8
Series 958	2.1	2.6	4.5	6.1	7.5	2.5	3.2	5.3	7.2	8.9	10.4	12.0	13.5	15.0
Series 925	9.5	11.9	20.5	27.6	34.1	11.3	14.3	24.2	32.7	40.2	47.4	54.5	61.4	68.2
Series 935	4.8	6.0	10.2	13.8	17.0	5.6	7.2	12.1	16.4	20.1	23.7	27.3	30.7	34.1
Series 949	2.4	3.0	5.1	6.9	8.5	2.8	3.6	6.1	8.2	10.1	11.8	13.6	15.3	17.0
Series 950	4.3	5.4	9.3	12.6	15.5	5.1	6.5	11.0	14.9	18.3	21.5	24.8	27.9	31.0
Series 955	2.8	3.5	6.0	8.1	10.0	3.3	4.2	7.1	9.6	11.8	13.9	16.0	18.0	20.0
Series 960	1.9	2.4	4.1	5.5	6.8	2.2	2.9	4.8	6.5	8.0	9.5	10.9	12.2	13.6
Series 980/100	1.3	1.6	2.7	3.7	4.5	1.5	1.9	3.2	4.4	5.4	6.3	7.3	8.2	9.1
Series 980/200			1.6	2.2	2.7		1.1	1.9	2.6	3.2	3.8	4.3	4.9	5.4
Series 980/300			1.2	1.7	2.0			1.4	2.0	2.4	2.8	3.3	3.7	4.1
Series 980/400			1.0	1.4	1.7			1.2	1.6	2.0	2.4	2.7	3.1	3.4
Series 917	2.8	3.5	6.0	8.1	10.0	3.3	4.2	7.1	9.6	11.8	13.9	16.0	18.0	20.0
Series 927	2.8	3.5	6.0	8.1	10.0	3.3	4.2	7.1	9.6	11.8	13.9	16.0	18.0	20.0
Series 937	2.8	3.5	6.0	8.1	10.0	3.3	4.2	7.1	9.6	11.8	13.9	16.0	18.0	20.0
Series 947	2.8	3.5	6.0	8.1	10.0	3.3	4.2	7.1	9.6	11.8	13.9	16.0	18.0	20.0
Series 957	1.8	2.2	3.8	5.1	6.3	2.1	2.6	4.4	6.0	7.4	8.7	10.0	11.3	12.5
Series 967	1.4	1.8	3.0	4.1	5.0	1.7	2.1	3.6	4.8	5.9	7.0	8.0	9.0	10.0
Series 977SX	1.1	1.3	2.3	3.1	3.8	1.3	1.6	2.7	3.7	4.5	5.3	6.2	6.9	7.7
Series 987		1.1	1.9	2.5	3.1	1.0	1.3	2.2	3.0	3.7	4.3	5.0	5.6	6.3
Series 987/150			1.3	1.8	2.2			1.6	2.1	2.6	3.1	3.6	4.0	4.4
Series 987/200			1.0	1.4	1.7			1.2	1.6	2.0	2.3	2.7	3.0	3.3
Series 918	2.8	3.5	6.0	8.1	10.0	3.3	4.2	7.1	9.6	11.8	13.9	16.0	18.0	20.0
Series 928	2.0	2.5	4.3	5.8	7.1	2.4	3.0	5.1	6.9	8.4	9.9	11.4	12.9	14.3
Series 968	1.3	1.7	2.9	3.9	4.8	1.6	2.0	3.4	4.6	5.6	6.6	7.6	8.6	9.5
Series 978	1.1	1.4	2.4	3.2	4.0	1.3	1.7	2.8	3.8	4.7	5.6	6.4	7.2	8.0
Series 990	1.0	1.3	2.1	2.9	3.6	1.2	1.5	2.5	3.4	4.2	5.0	5.7	6.4	7.1
Series 992/100		1.0	1.7	2.3	2.9		1.2	2.0	2.7	3.4	4.0	4.6	5.1	5.7
Series 992/200			1.0	1.4	1.7			1.2	1.6	2.0	2.3	2.7	3.0	3.3
Series 992/300				1.0	1.2				1.2	1.5	1.7	2.0	2.2	2.5
Series 992/400					1.0					1.2	1.4	1.6	1.8	2.0
Series 991		1.1	1.8	2.5	3.0	1.0	1.3	2.2	2.9	3.6	4.2	4.8	5.5	6.1
Series 995/100			1.4	1.9	2.4		1.0	1.7	2.3	2.8	3.3	3.8	4.3	4.8
Series 995/200				1.1	1.4			1.0	1.4	1.7	2.0	2.3	2.5	2.8
Series 995/300					1.0				1.0	1.2	1.4	1.7	1.9	2.1
Series 995/400										1.0	1.2	1.4	1.5	1.7
Series 995/500											1.0	1.2	1.3	1.4
Series 995/600												1.0	1.1	1.3
Series 995/700													1.0	1.1
Series 995/800														1.0

*Compatibility Mode performance will typically be 75%-85% of Native Mode.

**Comparisons above do not correlate to available upgrade paths.

General System Configuration Information

The following information is common to all MPE/iX 900 Series systems.

Supplied Hardware

- Central processing unit
- Error correcting memory with controllers
- One 802.3 LAN Interface Channel (LANIC) plus a 2-meter 802.3 ThinLAN cable and terminators for network and Datacommunications and Terminal Controller (DTC) communication
- Console attachment hardware
- Power supply
- Manual set
- Battery backup unit or HP PowerTrust Uninterruptible Power Supply (UPS)
- System cabinet includes card cages and power supply supporting the CPU, memory, and I/O card slots and additional mass storage (seven of eight CS card cages are external—not in the system cabinet)

Supplied Software

The following software is included as part of the preconfigured systems and includes all the required software for an HP supported system:

- Multiprogramming Executive operating system (MPE/iX)
- MPE V/E V-MIT compatibility mode software
- Database management systems including network model (IMAGE/SQL) and relational model (ALLBASE/SQL) databases

- Keyed sequential access method software (KSAM/XL)
- IMAGE/SQL Database inquiry language (QUERY/V)
- Data entry and forms management (VPLUS/XL)
- Sort and merge software (SORT-MERGE/XL)
- File copying utility (FCOPY/XL)
- Text editor (EDIT/XL)
- System debug utility (DEBUG/XL)

Standard Integrated Hardware

For ordering convenience and economy, standard integrated hardware is included with each of the SPUs in **Table 1.1**. Refer to the individual product chapters for detail.

Table 1.1

9x8LX/RX Systems			
(2-slot) 9x8LX	(4-slot) 9x8RX		System Part Number
918LX	918RX		A3096AW
928LX	928RX		A2934AW
968LX	968RX		A2933AW
978LX	978RX		A3129AW
9x7LX/RX/SX Systems			
(2-slot) 9x7LX	(4-slot) 9x7RX	(12-slot) 9x7SX	Part Number
917LX*			A1770B
927LX*			A1771C
937LX*	937RX	937SX	A1772B
947LX*	947RX	947SX	A1708C
	957RX	957SX	A1709B
	967RX	967SX	A1710B
	987RX	987SX	A2317B
	987/150RX	987/150SX	A3004A
	987/200RX	987/200SX	A3045A
		947SX Plus	A2900A
		957SX Plus	A2905A
		967SX Plus	A2910A
		987SX Plus	A2920A
		987/150SX Plus	A3015A
		987/200SX Plus	A3052A
Corporate Business Systems			Part Number
995/991 DX Systems			SSP A3080A
• CS 991 DX			
• CS 995/100–800 DX			
995/991 CX Systems			SSP A3079A
• CS 991 CX			
• CS 995/100–800 CX			
992/990 DX Systems			A1809A
• CS 990 DX			
• CS 992/100–400 DX			
992/990 CX Systems			A1811A
• CS 990 CX			
• CS 992/100–400 CX			

*The 9x7LX systems will be removed from the Corporate Price List on July 1, 1994.

Preloaded Software

- MPE/iX FOS software
- Database management systems, including ALLBASE/SQL and IMAGE/SQL (if ordered)
- The 9x7 Plus and Corporate Business DX systems also include Systems Management Software:
 - OpenView Console
 - ThinLAN 3000/iX
 - TurboSTORE/iX II with online backup for rewritable optical disk, 1/2-inch tape or DDS
 - AutoRestart/iX
 - Security Monitor/iX
- The 9x7 Plus and Corporate Business DX Systems also include Performance Management Software:
 - GlancePlus (LaserRX/MPE and RXForecast PC software applications are supplied separately)

On the DX version of the Corporate Business System, you may delete either the Systems Management Software group or the Performance Management Software group.

On the 9x7 Plus systems, you may only delete the Performance Management Software group.

MPE Media Products

One MPE media product (51453B or 51454B) **MUST** be ordered with each system. Corporate Business Systems and Series 9x7 Plus systems require media P/N 51454B, all other HP 3000 systems require P/N 51453B. See Section 10, Software Media and FOS Learning Products, for specific options to order.

The MPE/iX operating system will be installed at the factory, and the software support tape and license will ship with Series 9x7LX, 9x7RX, and 9x7SX systems. Subsystem software products can also be installed at the factory and require that option OD1 be ordered on the MPE media product (51453B).

To have software preloaded on the Corporate Business System, order the SPU cabinet with the appropriate disk option and media product 51454B with option OD1 on the same section of the order.

User License

The HP 3000 User License sets a legal limit to the number of concurrent users allowed to access the system. Once the license limit is reached, MPE/iX will prevent any further users from accessing the system. The user license applies to the number of users rather than the actual number of sessions, processes, or physical workstation connections. The MPE/iX users license is consistent with user-based licenses supported in the industry.

Required Hardware Ordered Separately

In addition to the standard integrated hardware system, the following items are required for an HP supported system:

- At least one modem connect is required for each system for remote support purposes. Series 9x7LX/RX/SX, 9x8LX/RX, and Corporate Business Systems (Series 99x) come standard with one modem-capable port.

- 802.3 cabling: All HP 3000 NIO systems come with an 802.3 LAN interface card, a 2-meter 802.3 ThinLAN cable and terminators. The Datacommunication and Terminal Controller (DTC) has options for ThinLAN, ThickLAN, or EtherTwist connections. For ThickLAN or EtherTwist, cables must be ordered separately.

For the Corporate Business Systems 990, 991, 992, and 995, the following are also required:

- One system disk: C2201A,* C2204A,* or C2252HA/B, C302x, C3040x
- One user disk: C2201A,* C2204A,* C2252HA/B, C2254HA/B, C2258HA/B, or C2259HA/B, C302x, C3040x
- One tape drive for system backup and boot: 7979A, 7980A, 7980XC, 7980S, 7980SX, C2464F/R, C2465F/R
- One system console:
 - Series 9x7 and 9x8—ships with a 700/96 Console as standard
 - Corporate Business System—ships with a 700/96 console as standard
 - Corporate Business System DX—ships with an OpenView console PC as standard

*NOTE: 500 Mbytes of disk space **must** be allocated for exclusive use of the operating system.*

*Discontinued

HP-PB Versus CIB Systems

There are two types of I/O bus structures supported on the HP 3000 systems. The first is the Channel I/O Bus (CIB) which was used on the Series 925, 935, 949, 950, 955, 960, and 980 systems.

Figure 1.1 is an example of this architecture. The second is the Hewlett-Packard Precision Bus (HP-PB (NIO)) which is supported on the Series 9x7LX/RX/SX, 9x8LX/RX, and Corporate Business Systems. See **Figures 1.2, 1.3, and 1.4.**

NOTE: The HP 3000 Series 9x8LX/RX does not include the older CIO HP 3000 systems, the Series 948 and 958.

Figure 1.1 Series 980 Bus Structure

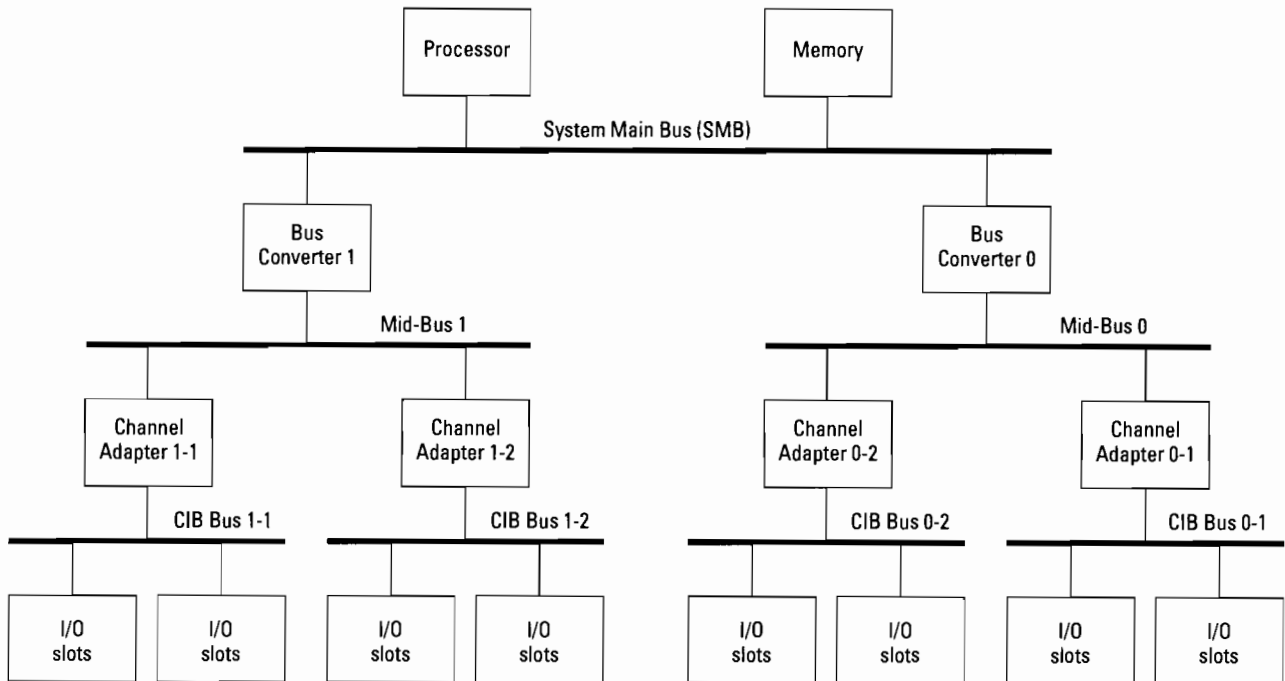


Figure 1.2 Series 9x7LX/RX/SX Bus Structure

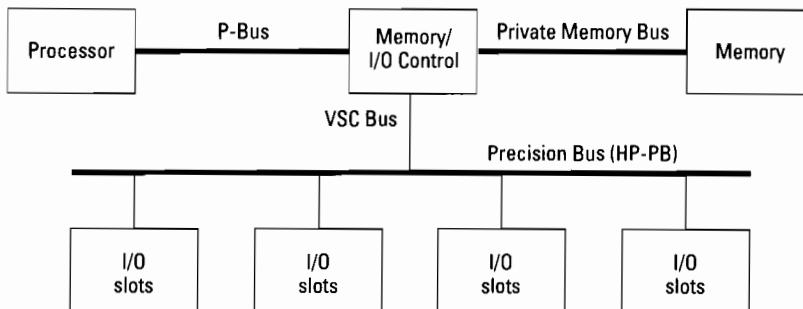


Figure 1.3 Series 9x8LX/RX Bus Structure

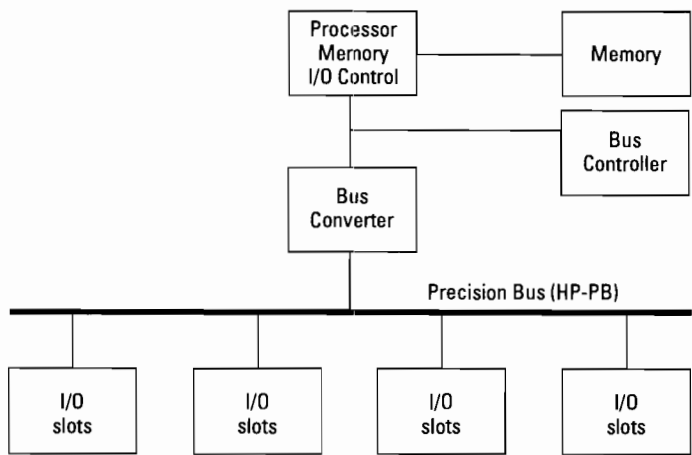
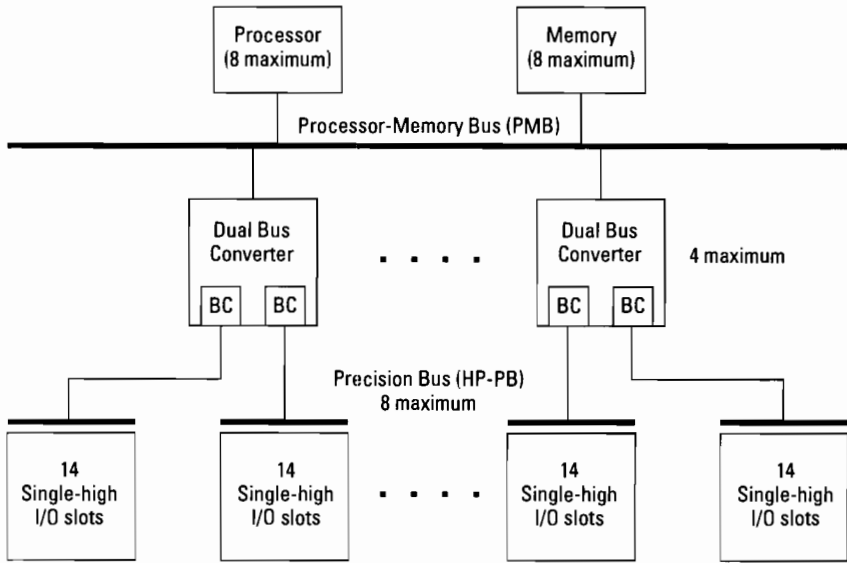


Figure 1.4 CS 995, 991, 992, 990 Bus Structure



System Console

One hardwired point-to-point 700/96 terminal must be used as the system console for all systems except the Series 9x7 Plus systems and the Corporate Business System DX. The console connects directly to the system. It has no direct connection to the DTC. Each preconfigured 9x8LX/RX and 9x7LX/RX/SX system is shipped with the required console and hardware. Console printing is accomplished via a terminal attached serial printer. The Corporate Business System includes the 700/96 (C1064G) console and the Corporate Business System DX includes an OpenView console PC. A console localization option must be ordered with each HP 3000 system.

Table 1.2 900 Series Localized Console Options

Option Number	Description
ABA	English localized display
ABB	English/Europe localized display
ABC ¹	Canada—French localized display
ABD	German localized display
ABE	Spanish localized display
ABF	French localized display
ABG	Australia localized display (US keyboard and manual; local power cord)
ABH	Dutch localized display
ABL ¹	Canada—English localized display
ABM	Spanish/Latin American localized display
ABN	Norwegian localized display
ABP	Swiss/German localized display
ABQ	Swiss/French localized display
ABR ¹	Republic of South Africa (US keyboard and manual; local power cord)
ABS	Swedish localized display
ABU	English (UK) localized display
ABW	Flemish localized display
ABX	Finnish localized display
ABY	Danish localized display
ABZ	Italian localized display
ACC ¹	UK/Ireland localized display (US keyboard and manual; local power cord)
ACD ¹	Switzerland localized display (US keyboard and manual; local power cord)
ACE ¹	Denmark localized display (US keyboard and manual; local power cord)
ACF ¹	Japan localized display (US keyboard and manual; local power cord)

¹Not available on the DX version of the Corporate Business System

Section 2.

Series 918LX/RX, 928LX/RX, 968LX/RX, and 978LX/RX

Maximum Supported Hardware Configuration

Table 2.1 Maximum Supported Hardware Configuration

Series	918		928		968		978	
Chassis configuration	918LX	918RX	928LX	928RX	968LX	968RX	978LX	978RX
MPE/iX Release Support	4.0 and 5.0							
User license: (UL = unlimited)	8		64		100		100	
Standard	20/32/40/64		100/160/256/UL		160/256/UL		160/256/UL	
Optional								
Typical users	24–64		64–160		100–256		100–380	
Maximum connected workstations/terminals	152		400		600		900	
Performance relative to 917LX	1.0		1.4		2.1		2.6	
HP-PB Slots	2	4	2	4	2	4	2	4
Memory (MB): Std/Max	32/512	32/512	32/512	32/512	64/512	64/512	64/512 ⁴	64/512 ⁴
Maximum disk storage (GB)	76	140	76	140	76	140	76	140
Maximum disks: Total	20	34	20	34	20	34	20	34
HP-FL	8	16	8	16	8	16	8	16
SCSI	20	34	20	34	20	34	20	34
Fast/Wide SCSI ⁵	15	30	15	30	15	30	15	30
HP-IB ²	6	12	6	12	6	12	6	12
Maximum tape drives	6	6	6	6	6	6	6	6
Maximum CD-ROM drives	1	1	1	1	1	1	1	1
Maximum printers								
System	6	6	6	6	6	6	6	6
Serial	64	64	64	64	64	64	64	64
Maximum DTCs	6	6	12	12	24	24	24	24
Max. no. devices per I/O card								
SCSI	7	7	7	7	7	7	7	7
Fast/Wide SCSI ⁵	15	15	15	15	15	15	15	15
PBA-IB (HP-IB) ²	6	6	6	6	6	6	6	6
PB-FL (HP-FL)	8	8	8	8	8	8	8	8
Maximum number of cards ³								
SCSI, 1 slot	2	4	2	4	2	4	2	4
Fast/Wide SCSI ⁵ , 2 slots	1	2	1	2	1	2	1	2
PBA-IB (HP-IB) ² , 2 slots	1	2	1	2	1	2	1	2
PB-FL (HP-FL), 2 slots	1	2	1	2	1	2	1	2
Max. network links per system								
802.3 LANIC ¹	2	2	2	2	2	2	2	2
802.5 Token Ring	1	1	1	1	1	1	1	1
FDDI	1	1	1	1	1	1	1	1
Floating point coprocessor	std	std	std	std	std	std	std	std
Maximum PSI cards	2	4	2	4	2	4	2	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 For I/O card combinations, use the electrical current budgeting worksheet (Table 2.7) to determine supportability of proposed I/O cards and internal peripherals.

⁴ Only 256 MB of memory is orderable until June 1994.

⁵ Supported September 1994.

Product Description

The HP 3000 Series 9x8LX/RX are high performance entry level systems that take advantage of the HP Precision Architecture-RISC (PA-RISC) to provide low cost solutions with competitive price/performance. All of these systems come standard with one processor with on-chip floating point, a standard amount of memory, one multifunction I/O card, an integrated 3.5-inch 1.0 GB disk mechanism, an integrated 3.5-inch 2.0 GB digital data storage (DDS) cartridge tape drive, an HP PowerTrust uninterruptible power supply (UPS) for power protection and the MPE/iX operating system. The Series 9x8LX/RX systems offer a range of performance points, user license options, and two chassis I/O slot capabilities. This range of capability allows for economical growth as system performance requirements increase.

The chassis I/O slot selection denotes the specific model number suffix (9x8LX or 9x8RX). For example, if you select a Series 928 with 100 or fewer users, you have the option of selecting the 2-slot 928LX or the 4-slot 928RX, both of which run at a processor speed of 48 MHz. Alternately, for the same number of users, you could select a Series 968 with a higher processor speed of 64 MHz either as the 2-slot 968LX or the 4-slot 968RX.

NOTE: The HP 3000 Series 9x8LX/RX does not include the older HP 3000 systems, the Series 948 and 958.

Figure 2.1 HP 3000 Series 9x8LX/RX Product Offering

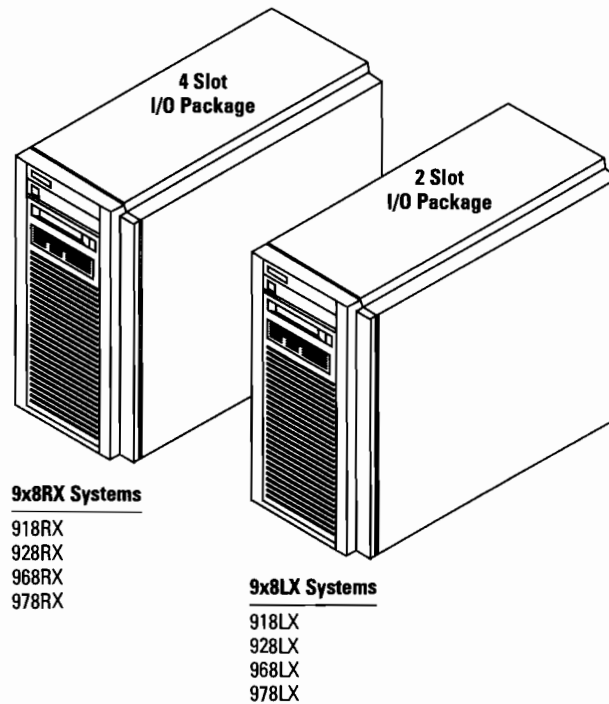
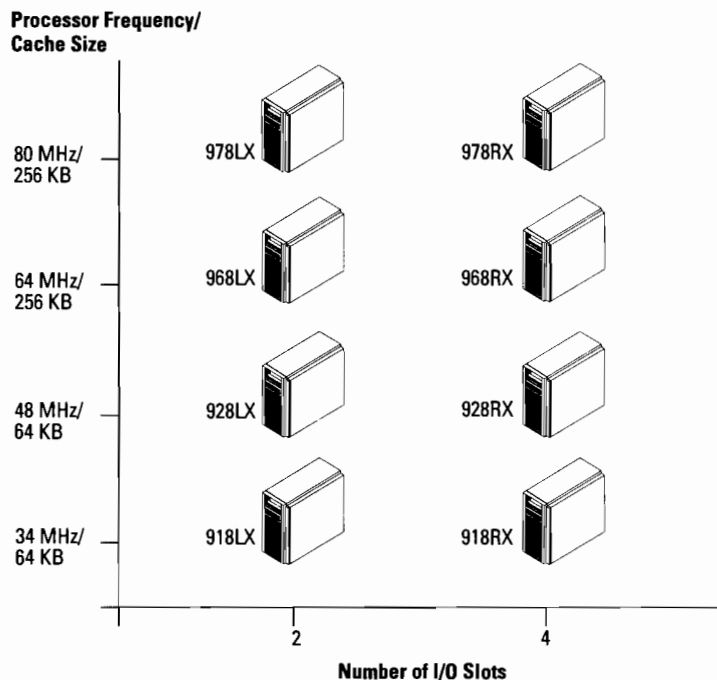


Figure 2.2 Series 9x8LX/RX Systems



The performance levels of the HP 3000 Series 9x8LX/RX are available in eight solution choices, each of which has its own product number (see **Figure 2.2**, "Series 9x8LX/RX Systems"). Each hardware and software component (user license, software bundle, I/O slot, model number, etc.) is designated by its own order number. Refer to the end of this chapter for a detailed ordering menu.

Packaging

The Series 9x8LX/RX systems are integrated desktide systems and come in two chassis configurations (see **Figure 2.1**, "Series 9x8LX/RX Product Offering"). The 9x8LX comes with 2 chassis I/O slots and the 9x8RX comes with 4 chassis I/O slots. Refer to **Figure 2.3**, "Series 9x8LX HP-PB I/O Slots/Card Cage (2 I/O Slots)" and **Figure 2.4**, "Series 9x8RX HP-PB I/O Slots/Card Cage (4 I/O Slots)." The system package, along with external peripherals, can be rackmounted in a compact 1.1 meter or 1.6 meter cabinet. Refer to Section 6 for cabinet information.

Factory Preloading of Operating System and Subsystem Software

Factory preloading of HP 3000 MPE/iX FOS and standard subsystem software is available with all HP 3000 9x8LX/RX systems. This software will be factory installed on the standard integrated disk selected with each system. In order to have all HP subsystem software pre-installed at the factory, order the MPE/iX media product (51453B) from the ordering menus and specify option 0D1.

Figure 2.3 Series 9x8LX HP-PB I/O Slots/Card Cage (2 I/O Slots)

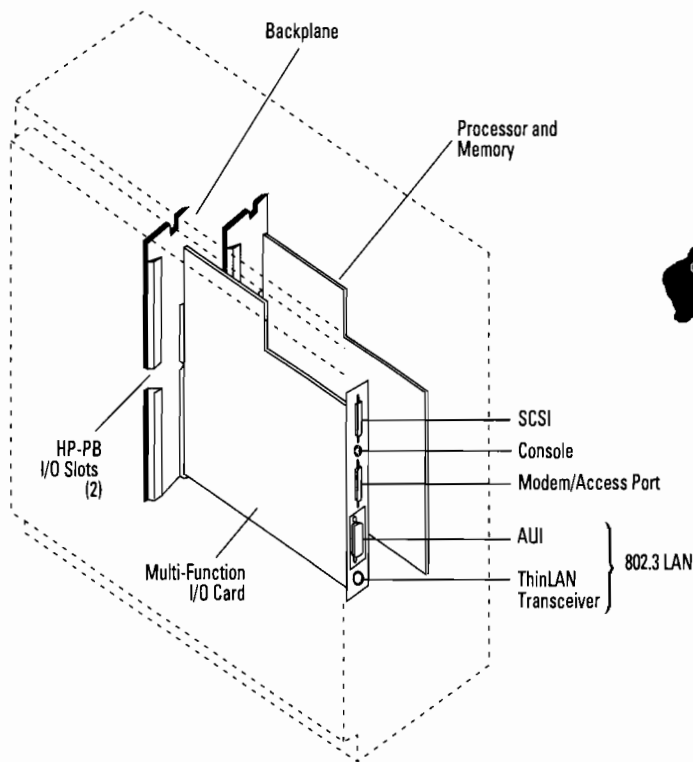
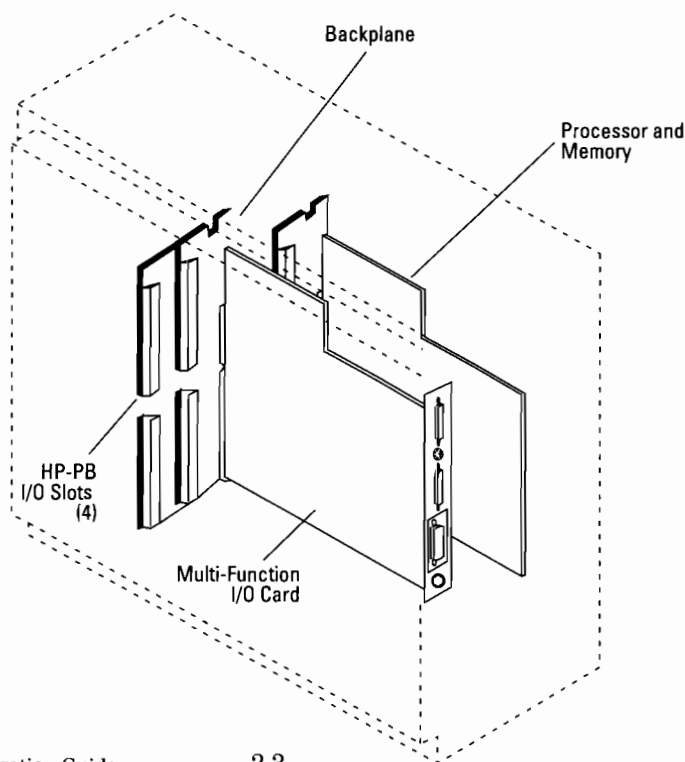


Figure 2.4 Series 9x8RX HP-PB I/O Slots/Card Cage (4 I/O Slots)



User Licenses

All Series 9x8LX/RX systems are supplied with a software class/concurrent license specifying the maximum number of users. The practical number of concurrent users is dependent on the application mix and response time/throughput requirements.

Memory Expansion

The Series 9x8LX/RX uses industry-standard memory SIMMs that plug directly into the processor board (see **Figure 2.5**). See **Table 2.4** for the Series 9x8LX/RX systems memory product offerings. The Series 918 and 928 systems come with base memory of 32 MB while the Series 968 and 978 systems come with base memory of 64 MB. See **Table 2.2** for sample memory configurations.

When ordering the initial system, consideration should be given to the maximum memory one might want to eventually order. For systems which may add more memory, optional base memory modules of 64 (two 32 MB SIMMs) and 128 MB (two 64 MB SIMMs) are offered which maximize the number of memory slots left for future memory upgrades. Refer to **Table 2.3**, "Series 9x8LX/RX Maximum Memory," for further discussion.

Table 2.2 Sample Memory Configurations

MB	16 MB Module A2946A	64 MB Module A2948A	128 MB* Module A3131A	Memory Slots Consumed	Memory Slots Remaining
32	2			4	4
48	3			6	2
64		1		2	6
96	2	1		6	2
128		2		4	4
192		1	1	4	4
256			2	4	4
384			3	6	2
512			4	8	0

*Orderable after June 1994.

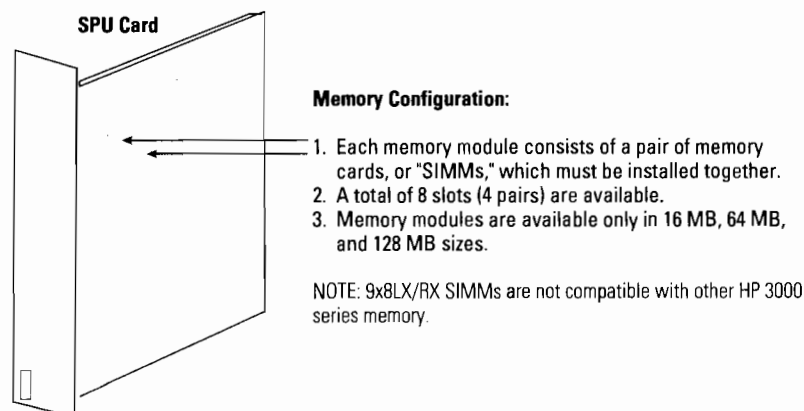
NOTE: 9x8 SIMMs are not compatible with other HP 3000 series memory.

Table 2.3 Series 9x8LX/RX Maximum Memory

Series	Base Memory	Optional Base Memory	Memory Slots Used	Memory Slots Available	Maximum Memory* (Using 128 MB Modules or 64 MB SIMMs)
918/928	32 MB		4	4	288 MB (2 × 128 MB)
		64 MB	2	6	448 MB (3 × 128 MB)
		128 MB	2	6	512 MB (3 × 128 MB)
968/978	64 MB		2	6	448 MB (3 × 128 MB)
		128 MB	2	6	512 MB (3 × 128 MB)

*128 MB module not available until June 1994.

Figure 2.5



I/O Channel Configuration Information

I/O and Internal Peripheral Checklist

Care must be taken to insure that there is a proper match between the 9x8LX/RX chassis ordered and the I/O cards and internal peripherals (peripherals residing within the chassis) which have been ordered.

1. Ensure that you have ordered the correct I/O chassis (2 or 4 I/O slots) for the number of I/O cards selected. Some I/O cards require two I/O slots (see **Table 2.5**, "Series 9x8LX/RX HP-PB I/O Cards and Current Requirements").

2. Ensure that you have not exceeded the power supply capabilities of the 9x8LX/RX SPU packages. (Refer to **Table 2.7**, "Series 9x8LX/RX Current Budgeting Worksheet").

HP Precision Bus (HP-PB)

The HP Precision-Bus (HP-PB) interfaces the processor with I/O cards. The Series 9x8LX and 9x8RX provide 2 or 4 single-high HP Precision Bus I/O slots respectively. In compliance with the Eurocard standard, the HP Precision Bus supports both single-high and double-high I/O cards. Single-high I/O cards use one HP Precision Bus slot each while double-high I/O cards use two slots each. **Table 2.5** illustrates the slot usage for the various I/O cards supported on the Series 9x8LX/RX systems.

Multi-Function I/O Card (MFIO)

One MFIO card is supplied standard with each Series 9x8LX/RX SPU package. This card provides:

- 802.3 LAN connection for use with both DTC and system-to-system LAN traffic (integrated ThinLAN Transceiver and AUI connector)
- Three RS-232-C ports for console, remote support and HP PowerTrust UPS connections
- One SCSI interface which provides connection for seven Single-Ended SCSI devices

The MFIO card is not orderable as a separate product. If a second 802.3 LAN or additional SCSI cards are needed, the HP-PB 802.3 LAN card (36923A option 002) or SCSI card (28642A) must be ordered.

This MFIO card is used in both 9x7 and 9x8 systems.

The MFIO card can support a combination of internal and external SCSI devices, not to exceed a maximum of seven devices (five devices per SCSI are recommended for best performance results). The devices can be a combination of full- and half-height. Internal SCSI peripherals use 1.5 meters of SCSI cabling.

The MFIO card does not utilize any Precision Bus I/O slots, it has its own dedicated slot. Note that the physical connection for the UPS RS-232 cable resides on the system card and is connected to the MFIO port via the backplane.

No additional cables or terminators are required for the internal disks.

NOTE: External 2.0 GB DDS tape drives are supported on the integrated SCSI interface of the MFIO card, but 1.3 GB DDS drives are not. An add-on SCSI interface card is required to support external 1.3 GB DDS tape drives. Optical Libraries are not supported on the MFIO card since Optical Libraries require a dedicated SCSI card.

SPU Internal Peripherals

The Series 9x8LX/RX SPU packages come standard with two integrated SCSI peripherals:

- One 1.0 GB capacity 3.5 inch disk mechanism (half-height)
- One 2.0 GB DDS format tape drive (half-height)

Customers may replace the integrated 1.0 GB disk with an optional 2.0 GB capacity 3.5 inch disk mechanism (half-height). Customers may order a second integrated 1.0 or 2.0 GB disk mechanism for a maximum of two 3.5 inch, half-height disk mechanisms resulting in a maximum of 4 GB of integrated disk storage. For more disk storage, external SCSI or HP-FL disks must be ordered.

Customers may order a second integrated 2.0 GB DDS tape drive (half-height). The maximum combined number of integrated DDS tape drives and CD-ROM drives is two. Additional DDS tape drives can be ordered as external devices.

There are a total of 4 power connections (unlike the 9x7LX which has 3).

The 4- to 8-GB DDS data compressed format tape drive is **not** supported as an integrated device into the SPU.

Refer to **Figure 2.6**, "Series 9x8LX/RX SPU Package Layout," for a diagram of the SPU package layout and to Section 8 for peripheral information.

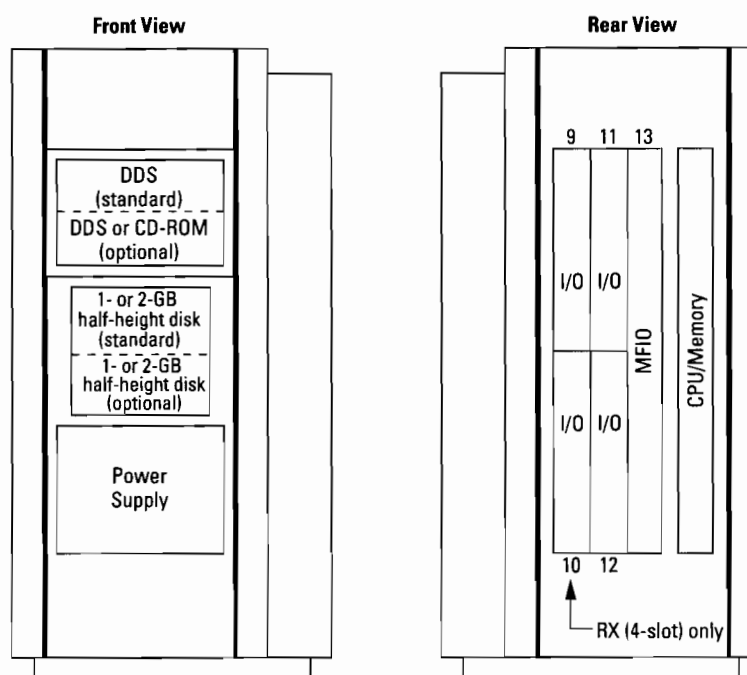
Series 9x8LX/RX SPU Package (Memory, I/O and Internal Peripherals) Current Budgeting

Since the 9x8LX/RX systems support a number of different memory cards, I/O cards and internal peripherals, the "Series 9x8LX/RX Current Budgeting Worksheet," **Table 2.7**, needs to be used to determine if a particular combination of memory, I/O cards and internal peripherals can be supported. This worksheet should be used to determine if the proposed total current consumed does not exceed the total current available.

Guidelines:

1. Memory modules can use either two or four memory SIMM slots; however, only enter the current requirement in one of the slot positions. See **Table 2.4**, "Series 9x8LX/RX Memory Modules and Current Requirements," for the current requirements of the various memory modules.

Figure 2.6 Series 9x8LX/RX Package Layout



2. The worksheet can be used for both the 9x8LX (two I/O slots) systems and the 9x8RX (four I/O slots) systems.

3. When using double-high I/O cards, two single-high I/O slots are utilized; however, only enter the current requirement in one of the slot positions. See **Table 2.5**, "Series 9x8LX/RX HP-PB I/O Cards and Current Requirements," for the current requirements for the various I/O cards.

4. The internal peripherals are housed in the peripheral positions shown in **Figure 2.6**, "Series 9x8LX/RX Package Layout." See **Table 2.6** for the current requirements for the various internal peripherals.

5. The current requirements for the processor board and MFIO card have already been taken into account in the worksheet calculations.

Use the current tables and worksheet as follows:

1. Enter the current (amps) for each row corresponding to the memory module, I/O card or internal peripheral selected. Be sure and enter current values for all three voltages.

2. Sum each current column and compare the results with the current limits at the bottom of the worksheet. The total current shown already contains a 5% margin over the total current

Table 2.4 Series 9x8LX/RX Memory Modules and Current Requirements

Integrated Memory Module	Product Number	SIMM Slot/ Module	Current Req./Module (Amps)		
			+12V	+5V	-12V
16 MB memory (2 × 8 MB SIMMs)	A2946AZ	2	0.00	0.30	0.00
32 MB memory (4 × 8 MB SIMMs)	A2947AZ	4	0.00	0.60	0.00
64 MB memory (2 × 32 MB SIMMs)	A2948AZ	2	0.00	0.30	0.00
128 MB memory (2 × 64 MB SIMMs)	A3131AZ	2	0.00	0.60	0.00

Table 2.5 Series 9x8LX/RX HP-PB I/O Cards and Current Requirements

I/O Cards	Product/Opt.		Slot/ Card	Current Req./Card (Amps)		
	Number	Size		+12V	+5V	-12V
SCSI	28642A	Single-High	1	0.00	0.90	0.00
Fast/Wide SCSI	28696A	Double-High	2	0.12	4.72	0.00
PB-FL (HP-FL)	28616A	Double-High	2	0.04	3.93	0.05
PBA-IB (HP-IB)	A1747A opt.002	Double-High	2	0.09	5.46	0.07
802.3 LAN	36923A opt.002	Single-High	1	0.50	2.13	0.00
802.5 Token Ring LAN	J2167A	Single-High	1	0.00	1.66	0.00
PSI (NS pt.-to-pt.)	36922A opt.002	Single-High	1	0.08	2.36	0.09
PSI (SNA/SDLC)	30291A opt.002	Single-High	1	0.08	2.36	0.09
PSI (BSC)	32007A opt.002	Single-High	1	0.08	2.36	0.09
FDDI	J2157A	Double-High	2	0.00	3.7	0.00

Table 2.6 Series 9x8LX/RX Internal Peripherals and Current Requirements

Internal Peripheral	Product Number	Peripheral Size	Current Req./Peripheral (Amps)		
			+12V	+5V	-12V
1 GB, 3.5-inch Disk	A2445A	Half-Height	0.85	1.03	0.00
2 GB, 3.5-inch Disk	A3087A	Half-Height	1.02	1.30	0.00
2 GB DDS Tape	C2477S	Half-Height	0.58	0.90	0.00
CD-ROM	A3086A	Half-Height	0.40	0.79	0.00

available. If the configuration exceeds the available current shown, then the configuration must be modified to be supported.

3. Combinations that should be carefully considered are large memories, at least one PBA-IB (HP-IB) I/O card, and one additional I/O card. Some of these combinations exceed the current available on the +5V supply.

Table 2.7 Series 9x8LX/RX Current Budgeting Worksheet

	Selection	Position	Current (Amps) Required		
			+12V	+5V	-12V
Memory SIMMs		0A			
		0B			
		1A			
		1B			
		2A			
		2B			
		3A			
		3B			
I/O Cards		11			
		12			
		9 (RX only)			
		10 (RX only)			
Internal	DDS tape (standard)	1			
Peripherals	Optional DDS tape or CD-ROM	2			
	Half-height disk (standard)	3			
	Optional half-height disk	4			
Total Current Used Per Voltage					
Total Current Available ¹			6.45	16.34	1.54

¹The total current shown per voltage already contains a 5% margin over the maximum current available.

Power Protection

The HP 3000 Series 9x8LX/RX system comes standard with one deskside 600 VA HP PowerTrust Uninterruptible Power Supply (UPS), product A2941AZ. Optionally, the HP 3000 Series 9x8LX/RX can be ordered with a deskside 1300 VA UPS, a rackmounted 1.3 kVA UPS, a rackmounted 1.8 kVA UPS, or a rackmounted 3.0 kVA UPS. See Section 6, "Cabinets and Uninterruptible Power Supply" for more information. The UPS

provides power protection to the SPU cabinet which includes the CPU board, all internal peripherals, memory, and the Series 700 system console (the DTC is not protected by the standard UPS). The HP PowerTrust UPS provides a minimum of 15 minutes of uninterrupted power after normal AC power has been interrupted for the HP 3000 Series 9x8LX/RX systems. This is similar to the battery backup unit on other HP 3000 systems.

The HP PowerTrust UPS will work properly with the HP 3000 Series 9x8LX/RX systems and MPE/iX Release 4.0; however, MPE/iX Release 5.0 adds the HP PowerTrust UPS Monitor/iX for the management of HP PowerTrust UPSs on the HP 3000 Series 9x8LX/RX systems. The HP PowerTrust UPS Monitor/iX detects all incoming AC power failures on the HP 3000 Series 9x8LX/RX system and reports all power failure events to the HP 3000 system logs and to the system operator (HP PowerTrust UPS Monitor/iX does not manage "non-HP UPSs"). The HP PowerTrust UPS Monitor/iX maintains communication with the HP PowerTrust UPS via an RS-232 connection to the Series 9x8LX/RX processor card. If all components of the HP 3000 Series 9x8LX/RX system are power protected, then normal operation and/or system shutdown can be accomplished during the 15 minutes of power protection.

UPS technology is superior to battery backup solutions included in previous platforms because it can protect everything in the SPU bay plus the system console.

NOTE: The standard 600 VA HP PowerTrust UPS cannot be rack-mounted in the 1.1-m or the 1.6-m cabinets.

9x8LX/RX Configuration Worksheet

Table 2.8 will help in configuring a basic HP 3000 Series 9x8LX/RX system. Use it as a guideline, but note that particular customer needs (performance, etc.) may dictate different configuration choices.

STEP 1—Select a system

Select the HP 3000 that best fits the customer's performance and user needs.

STEP 2—Determine memory requirements

Memory requirements will vary depending on the specific applications running on the system. If there is not information available on the memory requirements of the customer's applications, the following rule of thumb may be used:

$$\text{Memory} = 16 \text{ MB} + \text{Application Requirements} + (0.5 \text{ to } 1.0 \text{ MB} \times \text{number of concurrent users})$$

1 MB per user should be used at the low end of the Series 9x8LX/RX family.

The memory sizing algorithm above was designed for systems configured with relatively more memory than our current low-end

Table 2.8

Product Number	Description*	Chassis I/O Model Number		Standard	
		2-Slot	4-Slot	Memory	User License
A3096AW	Series 918	918LX	918RX	32 MB	8, 20, 32, 40, 64, 100
A2934AW	Series 928	928LX	928RX	32 MB	64, 100, 160, 256, UL
A2933AW	Series 968	968LX	968RX	64 MB	100, 160, 256, UL
A3129AW	Series 978	978LX	978RX	64 MB	100, 160, 256, UL

* All systems include 2.0 Gbytes DDS format tape drive, 1.0 Gbyte SCSI disk, standard memory, user license, and a choice of MPE/iX FOS, IMAGE/SQL, and/or ALLBASE/SQL.

systems (918LX/RX and 928LX/RX). The benchmark is still a good measurement for configuring these workloads. It is in "other" environments that the memory guidelines should be viewed critically. Systems with small amounts of memory (standard 918LX/RX and 928LX/RX configurations) are very susceptible to memory shortages caused by quick changes in workload demands. These "other" environments are:

- OLTP mixed with batch
- Application development
- Heavy serial/batch-like access of data
- Heterogeneous workloads

For these "other" environments, performance can be improved by ordering an additional 32 or 64 Mbytes of memory.

The maximum supported memory is 512 Mbytes for all Series 9x8LX/RX systems. When ordering the

initial system, consideration should be given to the maximum memory one might want to eventually order. For systems which may eventually add more memory, optional base memory modules of 64 (two 32 MB SIMMs) and 128 MB (two 64 MB SIMMs) are offered which maximize the number of memory slots left for future memory upgrades. Refer to **Table 2.3**, "Series 9x8LX/RX Maximum Memory," for further information.

STEP 3—Determine disk storage needs

Disk requirements will vary with the number of active users and the nature of the customer's application. As a general rule of thumb the following formula can be used:

$$\begin{aligned} \text{Disk Storage} = & 500 \text{ Mbytes}^1 \\ & + (5 \text{ Mbytes} \times \text{Number of} \\ & \text{Concurrent Users}) + ((\text{Applica-} \\ & \text{tion Requirements} \times .25)^2 + \\ & \text{Application Requirements}) \\ & + 200 \text{ Mbytes}^3 \end{aligned}$$

¹500 MB = SLT and FOS or 930 MB = SLT, FOS, and full subsys

²User files—For growth and dynamic space requirements. It is suggested that 25% of the application requirement be set aside for future growth.

³200 MB free space should be reserved for future installation of power patch tapes.

For disk storage beyond what is supported internal to the system package, external disks will need to be ordered as standalone products.

Enter the number of internal SCSI disks required _____

Enter the number of external SCSI disks required _____

Enter the number of external HP-FL disks required _____

Enter the number of external Fast/Wide SCSI disks required _____

Table 2.9 Determine Disk Storage Needs

System	Standard Disk (SCSI)	Maximum Internal Disk (SCSI only)	Maximum External Disk
9x8LX	1.0 GB	4.0 GB	76 GB (using HP-FL)
9x8RX	1.0 GB	4.0 GB	140 GB (using HP-FL)

STEP 4—Choose a tape backup solution

Every Series 9x8LX/RX system comes standard with a 2.0 GB DDS format tape drive. A second internal DDS tape drive can be ordered along with external DDS tape drives or other backup devices. See Section 8 for more detailed information on back-up solutions.

Enter the number of SCSI DDS drives required (including internal) _____

STEP 5—Select a printer

SCSI, HP-IB and serial printers are supported on the 9x8LX/RX systems. Consult Section 8 for supported printers.

Note that HP-IB system printers require a PBA-IB card (A1747A) which uses two HP-PB slots (Series 9x8LX systems have only two slots). Consequently, having an HP-IB printer may require the purchase of a Series 9x8RX system with its expanded number of slots.

Record the number of SCSI printers required _____

Record the number of serial printers required _____

Record the number of HP-IB printers required _____

STEP 6—Network link products

For MPE/iX systems, NS 3000 Point-to-point and IBM (SNA, BSC) communications require a PSI card. A second 802.3 LAN card and a 802.5 Token Ring LAN card may also be added.

Record the number of PSI cards required (1 HP-PB slot each) _____

Record if a second 802.3 LAN card is required (1 HP-PB slot) _____

Record if a 802.5 Token Ring LAN card is required (1 HP-PB slot) _____

Record if an FDDI card is required (2 HP-PB slots) _____

STEP 7—I/O interface cards

I/O interface cards allow the system to communicate with peripheral devices. The number of cards required depends on the number and type of peripheral devices that will be connected to the system. Use the configuration rules in Section 7 to determine the number of SCSI, PB-FL, and PBA-IB (HP-IB) interfaces required. Also use the "Series 9x8LX/RX Current Budgeting Worksheet" (Table 2.7) earlier in this chapter to identify card current consumption limitations.

To verify that the number of cards required does not exceed the capacity of the system package enter the quantity of each type of interface card required in the worksheet shown in **Table 2.10**.

STEP 8—Terminal connect (DTC16, DTC16iX, DTC16MX, and DTC72MX)

DTCs are used to connect Series 9x8LX/RX systems to local terminals, remote terminals (via modems), serial printers, and provide access to X.25 and ARPA networks. The number of DTCs required will depend on the number of ports needed to connect users, printers, etc. and the mode of network distribution.

Table 2.11 illustrates the recommended solution for various port configurations. For further detail on DTC16, DTC16iX, DTC16MX, or DTC72MX or information on X.25 or Telnet connections, see Section 9.

STEP 9—LAN cabling

A 2-meter 802.3 LAN cable is included with each Series 9x8LX/RX system for attaching the DTC. Distributed DTC configurations will need longer cables which can be ordered from HP.

STEP 10—Console

Each Series 9x8LX/RX system is supplied with one 700/96 terminal as the system console. All necessary console attachment hardware is included.

Table 2.10 I/O Interface Cards

I/O Interface Cards	Quantity	Slots Required	Number of Slots Used
Enter number of additional SCSI interfaces (not including integrated SCSI on MF10)	_____ ×	1	= _____
Enter number of Fast/Wide SCSI interfaces	_____ ×	2	= _____
Enter number of PB-FL (HP-FL) interfaces	_____ ×	2	= _____
Enter number of PBA-IB (HP-IB) interfaces	_____ ×	2	= _____
Enter number of additional one-slot network link cards (from step 6)	_____ ×	1	= _____
Enter number of additional two-slot network link cards (from step 6)	_____ ×	2	= _____
Total slots required (9x8LX maximum = 2) (9x8RX maximum = 4)			= _____

Table 2.11 Port Configurations

	Number of DTC Ports Required	
	1-32	> than 32
9x8LX/RX		
– Unracked	2340A, J2062A, J2063A	J2070A
– Racked*	A1883A, A1884A, J2062AZ, or J2063AZ	A1883A/A1884A and J2070AZ

* Provides a factory integrated solution with SPU and external disks racked in a 1.1 or a 1.6 meter cabinet. See discussion on "Factory Integrated Expansion Cabinets" for more details on these integrated solutions.

Step 11—System support options

Systems support options offer basic hardware and software for systems, peripherals, and stand-alone software applications. See Section 11 for a description of support options.

HP 3000 Series 9x8LX/RX Field Upgrades

Refer to the HP 3000 900 Series Price Guides for ordering information. All 9x8LX/RX field upgrades are in a menu product structure. Therefore, in order to upgrade the chassis, you need to order both the menu product number as well as the chassis upgrade product number with the appropriate option. Similarly, to upgrade the processor along with the base user license, you must order the menu product number as well as the appropriate user license product number with the right option.

Table 2.12 HP 3000 Series 9x8 Field Upgrades At-a-Glance

Summary of I/O and/or processor upgrades supported.

From/To	918LX	928LX	968LX	978LX	918RX	928RX	968RX	978RX
918LX		X	X		X	X	X	
928LX			X	X		X	X	X
968LX				X			X	X
978LX								X
918RX						X	X	
928RX							X	X
968RX								X

Section 3.

Series 917, 927, 937, 947, 957, 967, 987, 987/150, and 987/200

General System Configuration Information

Table 3.1 Maximum Supported Hardware Configuration

Series	917	927	937			947		
Chassis configuration	917LX	927LX	937LX	937RX	937SX	947LX	947RX	947SX
MPE/iX Release Support	4.0/4.5/5.0							
User license: (UL = unlimited)								
Standard	8	20	32	32	32	100		
Optional			40/64	40/64	40/64	160/256/UL		
Typical users	4-8	16-20	24-64	24-64	24-64	64-100		
Maximum connected workstations/terminals	64	64	152	152	152	530	530	530
Performance relative to 917LX	1.0							
HP-PB Slots	2	2	2	4	12	2	4	12
Memory (MB): Std/Max	32/192	32/192	32/192	32/384	32/384	64/192	64/384	64/384
Maximum disk storage (GB)	76	76	76	140	328	76	140	328
Maximum disks: Total	20	20	20	34	49	20	34	49
HP-FL	8	8	8	16	32	8	16	32
SCSI	20	20	20	34	49	20	34	49
Fast/Wide SCSI ⁸	15	15	15	30	75	15	30	75
HP-IB ²	6	6	6	12	12	6	12	12
Maximum tape drives	6	6	6	8	8	6	8	8
Maximum CD-ROM drives ⁶	1	1	1	1	1	1	1	1
Maximum printers								
System	6	6	6	8	8	6	8	8
Serial	32	32	32	48	48	32	48	48
Maximum DTCs	4	4	6	6	6	12	12	12
Max. no. devices per I/O card								
SCSI	7	7	7	7	7	7	7	7
Fast/Wide SCSI ⁸	15	15	15	15	15	15	15	15
PBA-IB (HP-IB) ²	6	6	6	6	6	6	6	6
PB-FL (HP-FL) 28616A	8	8	8	8	8	8	8	8
PBA-FL (HP-FL) A1748A ³	NA	NA	NA	8	8	NA	8	8
Maximum number of cards ⁷								
SCSI	2	2	2	4	10	2	4	10
Fast/Wide SCSI ⁸	1	1	1	2	5	1	2	5
PBA-IB ²	1	1	1	2	2	1	2	2
PBA-FL ^{3,5} (A1748A)	0	0	0	2	3	0	2	3
PB-FL (28616A)	1	1	1	2	4	1	2	4
Max. network links per system								
802.3 LANIC ¹	3	3	3	3	3	3	3	3
802.5 Token Ring	1	1	1	1	1	1	1	1
FDDI	1	1	1	1	1	1	1	1
Floating point coprocessor	opt	opt	opt	opt	opt	opt	opt	opt
Maximum PSI cards	2	2	2	4	5 ⁴	2	4	5 ⁴

¹ First 802.3 LANIC 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 not supported on 9x7LX.

⁴ If three PBA-FL cards (A1748A) are installed, maximum PSI cards are four.

⁵ PBA-FL (A1748A) does not support the HP-FL disk arrays (C2252/54 and C2268/59). Must order PB-FL (28616A).

⁶ Refer to the notes in **Figures 3.7, 3.8, and 3.9** for CD-ROM supported configurations.

⁷ For I/O card combinations on the 9x7SX systems use the electrical current budgeting worksheet (**Table 3.6**) to determine supportability of proposed I/O cards and internal peripherals. The 9x7LX and 9x7RX do not require electrical current budgeting.

⁸ Supported September 1994.

Table 3.1 Maximum Supported Hardware Configuration (cont'd)

Series	957		967		987		987/150		987/200	
Chassis configuration	957RX	957SX	967RX	967SX	987RX	987SX	987/150RX	987/150SX	987/200RX	987/200SX
MPE/IX Release Support	4.0/4.5/5.0						4.0 w/power patch/5.0		5.0	
User license: (UL = unlimited)	64		100		100		160/256/UL		160/256/UL	
Standard	100/160/256/UL									
Optional										
Typical users	64–160		96–250		96–380		128–500		170–650	
Maximum connected workstations/terminals	850		900		1200	1500	1700		1700	
Performance relative to 917LX	1.6		2.0		3.2		4.5		6.0	
HP-PB Slots	4	12	4	12	4	12	4	12	4	12
Memory (MB): Std/Max	64/384		64/512		64/768		64/768		64/768	
Maximum disk storage (GB)	140	328	140	328	140	328	140	328	140	328
Maximum disks: Total	34	49	34	49	34	49	34	65	34	65
HP-FL	16	32	16	32	16	32	32	16	16	32
SCSI	34	49	34	49	34	49	34	65	34	65
Fast/Wide SCSI ⁸	30	75	30	75	30	75	30	75	30	75
HP-IB ²	12	12	12	12	12	12	12	12	12	12
Maximum tape drives	8	8	8	8	8	8	8	8	8	8
Maximum CD-ROM drives ⁵	1	1	1	1	1	1	1	1	1	1
Maximum printers										
System	8	8	8	8	8	8	8	8	8	8
Serial	64	64	64	64	64	64	96	96	96	96
Maximum DTCs	24	24	24	24	24	24	24	24	24	24
Max. no. devices per I/O card										
SCSI	7	7	7	7	7	7	7	7	7	7
Fast/Wide SCSI ⁸	15	15	15	15	15	15	15	15	15	15
PBA-IB (HP-IB) ²	6	6	6	6	6	6	6	6	6	6
PB-FL (HP-FL) 28616A	8	8	8	8	8	8	8	8	8	8
PBA-FL (HP-FL) A1748A ³	8	8	8	8	8	8	8	8	8	8
Maximum number of cards ⁷										
SCSI	4	10	4	10	4	10	4	12	4	12
Fast/Wide SCSI ⁸	2	5	2	5	2	5	2	5	2	5
PBA-IB ²	2	2	2	2	2	2	2	2	2	2
PBA-FL ^{3,5} (A1748A)	2	3	2	3	2	3	2	3	2	3
PB-FL (28616A)	2	4	2	4	2	4	2	4	2	4
Max. network links per system										
802.3 LANIC ¹	3	3	3	3	3	3	3	3	3	3
802.5 Token Ring	1	1	1	1	1	1	1	1	1	1
FDDI	1	1	1	1	1	1	1	1	1	1
Floating point coprocessor	opt	opt	opt	opt	std	std	std	std	std	std
Maximum PSI cards	4	5 ⁴	4	5 ⁴	4	5 ⁴	4	5 ⁴	4	5 ⁴

¹ First 802.3 LANIC 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 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 C2268/59). Must order PB-FL (28616A).

⁶ Refer to the notes on **Figures 3.7, 3.8, and 3.9** for CD-ROM supported configurations.

⁷ For I/O card combinations on the 9x7SX systems use the electrical current budgeting worksheet (**Table 3.6**) to determine supportability of proposed I/O cards and internal peripherals. The 9x7LX and 9x7RX do not require electrical current budgeting.

⁸ Supported September 1994.

General Product Description

The HP 3000 Series 917 through 987/200 are high performance entry to midrange systems. These systems take advantage of the HP Precision Architecture-RISC (PA-RISC) to provide low cost solutions with competitive price/performance. All of these systems come standard with one processor, a standard amount of memory, one multi-function I/O card, 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, and operating system. Every 9x7 is a uniprocessor system except the 987/200 which is a 2-way multiprocessor solution. The 987, 987/150, and 987/200 all use the PA-RISC 7100 chip. The Series 917 through 987/200 offer a range of processor frequencies, user license options, and three chassis I/O slot capabilities. This range of capability allows for economical growth as system performance requirements increase.

The chassis I/O slot selection denotes the specific model number suffix (9x7LX, 9x7RX, 9x7SX). For example, if you select a Series 947 with 100 or less users, you have the option of selecting the 2-slot 947LX, the 4-slot 947RX, or the 12-slot 947SX, all of which run at a processor speed of 32 MHz. Alternately, for the same number of users, you could select a Series 957 with a higher processor speed of 48 MHz. This selection allows the option of the 4-slot 957RX or the 12-slot 957SX.

Figure 3.1 HP 3000 Series 9x7LX, 9x7RX, and 9x7SX Systems

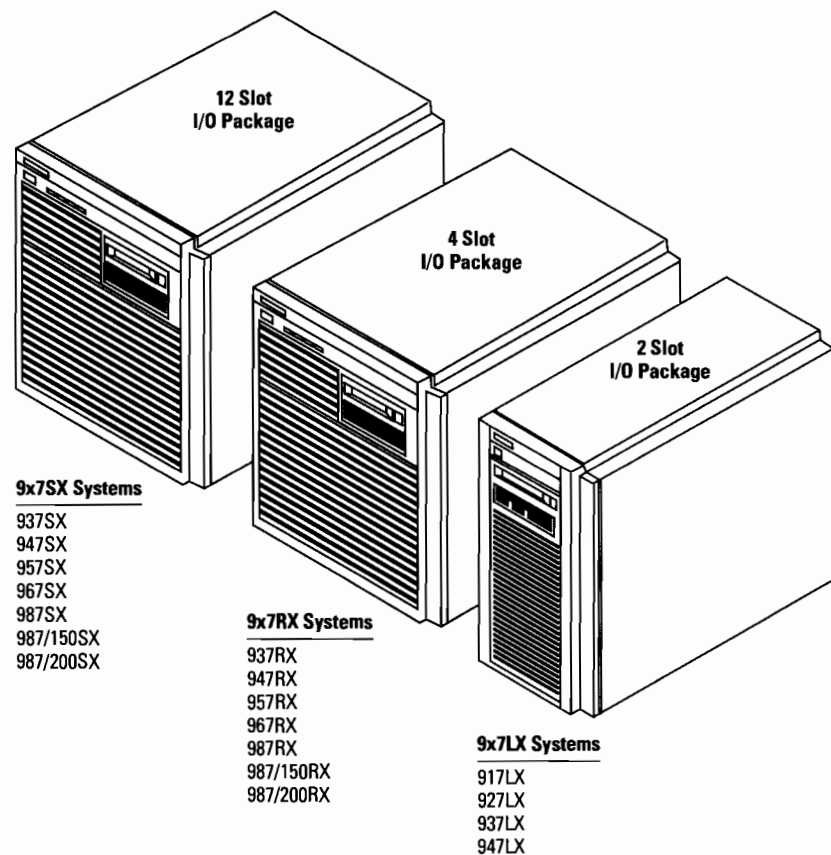


Table 3.2

System Type	User License	Chassis I/O Slot Model Number			Processor Frequency
		9x7LX (2-slot)	9x7RX (4-slot)	9x7SX (12-slot)	
917	8	X			32 MHz
927	20	X			32 MHz
937	32, 40, 64	X	X	X	32 MHz
947	100, 160, 256, UL	X	X	X	32 MHz
957	64, 100, 160, 256, UL		X	X	48 MHz ¹
967	100, 160, 256, UL		X	X	48 MHz ¹
987	100, 160, 256, UL		X	X	96 MHz ²
987/150	100, 160, 256, UL		X	X	96 MHz ²
987/200	100, 160, 256, UL		X	X	96 MHz ²

¹ The difference between the 48 MHz processors are:

Series 957—64 KB data cache, 64 KB instruction cache

Series 967—256 KB data cache, 256 KB instruction cache

² The difference between the 96 MHz processors are:

Series 987—256 KB data cache, 256 KB instruction cache

Series 987/150—1 MB data cache, 1 MB instruction cache

Series 987/200—2 sets of (1 MB data cache, 1 MB instruction cache)

The performance levels of the HP 3000 Series 917 through 987/200 are available in eight solution choices, each of which has its own product number. Each hardware and software component (user license, software bundle, I/O slot, model number, etc.) is designated by its own order number. Refer to the end of this section for a detailed ordering menu.

Packaging

The HP 3000 Series 9x7LX, 9x7RX, and 9x7SX systems are housed in an integrated deskside package (see **Figure 3.1**).

The Series 9x7 systems come in three chassis configurations. The 9x7LX comes with 2 chassis I/O slots, the 9x7RX comes with 4 chassis I/O slots, and the 9x7SX

comes with 12 chassis I/O slots. Refer to **Figures 3.2, 3.3, and 3.4**. The system package, along with external peripherals, can be rackmounted in a compact 1.1 meter or 1.6 meter cabinet. Refer to the "Cabinets" section later in this section for cabinet information.

Figure 3.2 Series 917LX, 927LX, 937LX, 947LX HP-PB I/O Slots/Card Cage (2 I/O Slots)

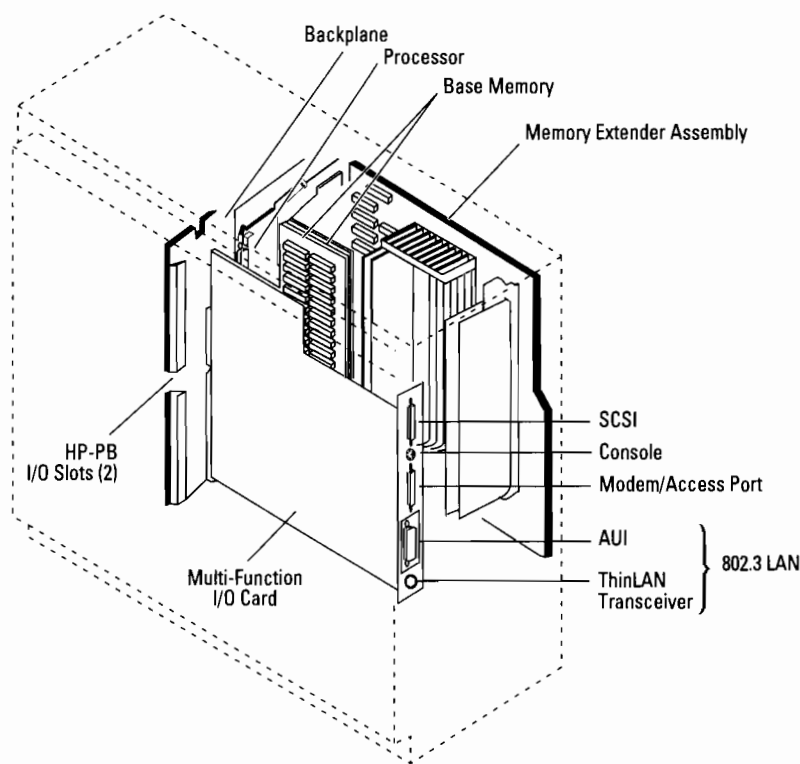


Figure 3.3 Series 937RX, 947RX, 957RX, 967RX, 987RX, 987/150RX, 987/200RX HP-IB I/O Slots/Card Cage (4 I/O Slots)

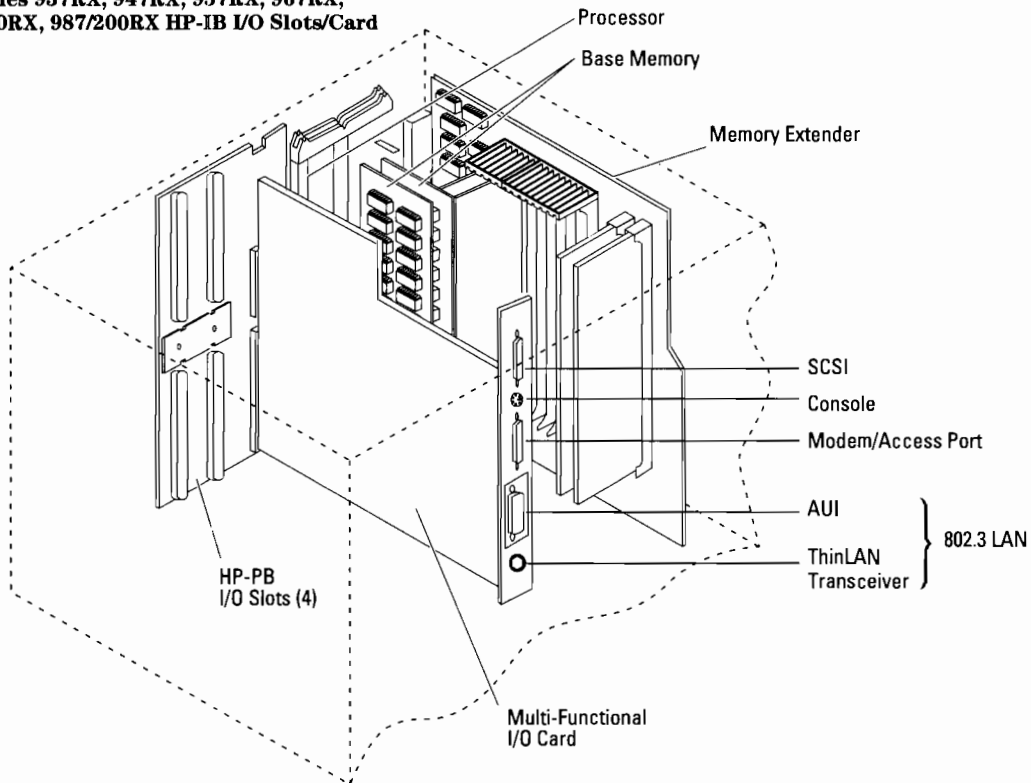
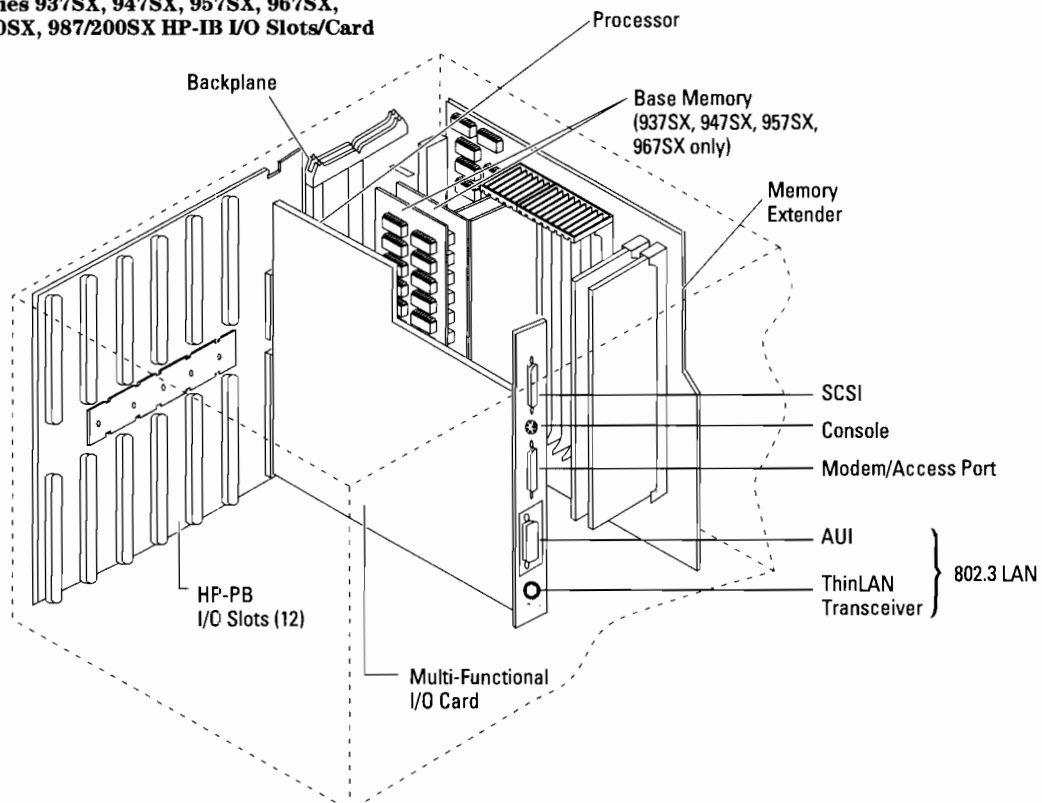


Figure 3.4 Series 937SX, 947SX, 957SX, 967SX, 987SX, 987/150SX, 987/200SX HP-IB I/O Slots/Card Cage (12 I/O Slots)



Factory Preloading of Operating System

Factory preloading of HP 3000 FOS and standard subsystem software is available with all HP 3000 9x7LX, 9x7RX, and 9x7SX systems. This software will be factory installed on the standard integrated disk selected with each system. In order to have all HP subsystem software pre-installed at the factory, order MPE/iX media product from the ordering menus and specify a coordinated shipment.

9x7SX Plus Systems

The 9x7SX Plus systems are available for the Series 947, 957, 967, 987, 987/150 models. This value-added bundle combines selected system management and performance management software with a color, windows-based HP Vectra PC as the system console.

Unique Supplied Software for the 9x7SX Plus Systems

In addition to the MPE/iX Fundamental Operating Software standard with every HP 3000 system, all 9x7SX Plus systems come with the additional software listed below. (IMAGE/SQL and ALLBASE/SQL are also available.)

Systems Management Software Group

- OpenView Console. PC is included. OpenView Console provides full OpenView System Manager functionality (36936A) for the 9x7SX Plus systems. See **Table 3.3** 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)

Performance Management Software Group

- GlancePLUS
- LaserRX/MPE
- RXForecast

NOTE: Of the unique supplied 9x7SX Plus system software, only the Performance Management Software Group can be deleted. Individual pieces of software can not be deleted.

OpenView Console

9x7SX Plus systems are shipped standard with an HP OpenView Console as the system console. The OpenView Console is an HP Vectra 486/20-based OpenView Workstation that supplies full HP OpenView System Manager (36936A) functionality to the 9x7SX Plus systems, 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 9x7SX Plus 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.

Table 3.3 OpenView Console

HP Vectra 486/33XM PC with:	OpenView Windows Workstation Software
• 8 Mbytes memory • 160 Mbyte hard disk • 3.5-inch floppy drive • 17-inch color monitor • Integrated color monitor UVGA • Integrated ThinLAN adapter card	• 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 9x7 Plus systems 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.

The 9x7 systems are shipped with a 700/96 terminal and do not require a continuous power source for the 700/96 terminal.

User Licenses

All Series 9x7LX, 9x7RX, and 9x7SX systems are supplied with a software class/concurrent license specifying the maximum number of users. Some systems are not available with options to increase the maximum number of users. The practical number of concurrent users is dependent on the application mix and response time/throughput requirements.

Memory Expansion

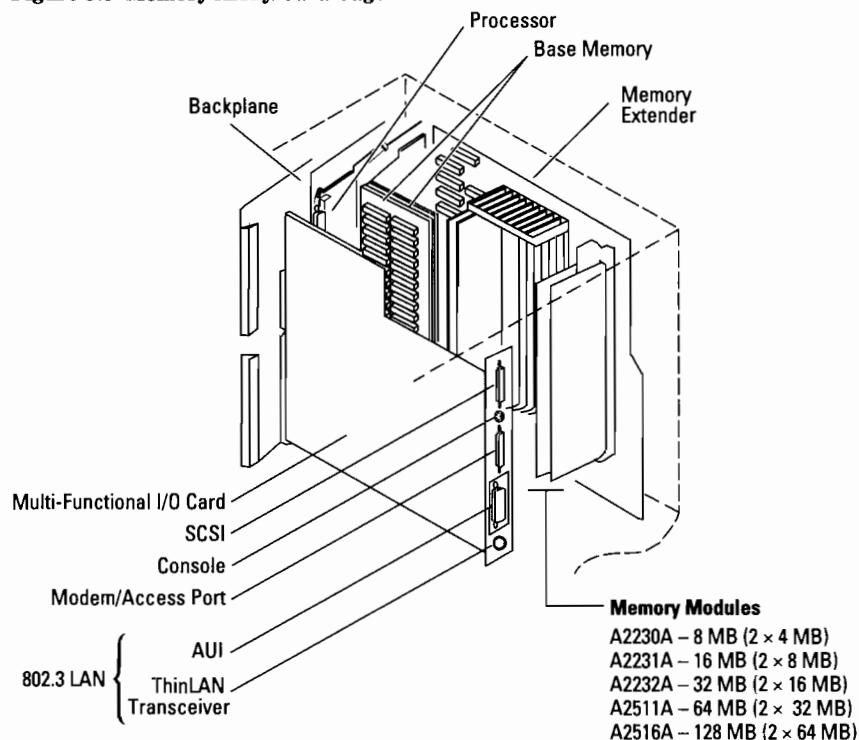
The Series 9x7LX, 937RX, 937SX, 947SX, 957SX, and 967SX have a total of 12 memory slots. The first two memory slots are referred to as the base memory slots and are located on the backplane. The 10 remaining memory slots are located on the memory extender board (included with the system). Refer to the memory array card and extender illustrations in **Figures 3.5 and 3.6**.

The Series 987RX, 987SX, 987/150RX, 987/150SX, 987/200RX, and 987/200SX also have a total of 12 memory slots all located on the memory extender card (included

with the system). The two base memory slots are not on the backplane because of the extra space taken by the higher performance processors.

Memory modules are available in 8, 16, 32, 64, and 128 MB increments which are each made up of a pair of memory boards. Each pair contains two identical boards which **must** be installed together (see **Figure 3.5**). All 9x7LX, 9x7RX, and 9x7SX systems have the capacity to support a total of six memory modules. On all 9x7LX systems, maximum memory of 192 Mbytes can be achieved through the use of six pairs of 16 Mbyte memory cards.

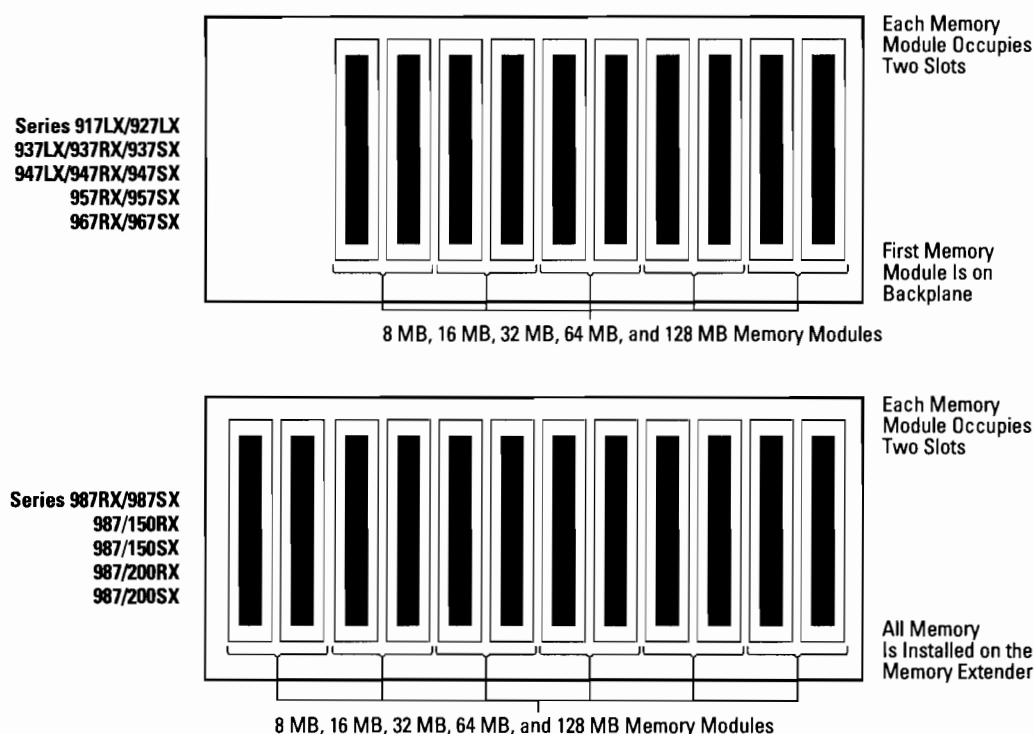
Figure 3.5 Memory Array/Card Cage



Notes:

1. Each memory module consists of 2 memory cards.
2. Memory cards must be installed in pairs.
3. Each memory module fills 2 of the 12 memory slots.
4. The first pair of memory cards is installed on the backplane of Series 9x7LX, 9x7RX, 937SX, 947SX, 957SX, and 967SX.
5. All memory is installed on the memory extender of Series 987RX, 987/150RX, 987/150SX, 987/200RX, 987/200SX.

Figure 3.6 Memory Extender Board Layouts (10 and 12 Slots)



Floating Point Coprocessor

An IEEE floating point coprocessor can be ordered as an option to 9x7LX, 9x7RX, 937SX, 947SX, 957SX, and 967SX systems for high performance in numerical applications. The coprocessor is built into the SPU. Floating point is standard on the 987RX, 987SX, 987/150RX, 987/150SX, 987/200RX, and 987/200SX with the CPU and floating point coprocessor on one chip.

NOTE: Several HP 3000 third-party applications and tools require the floating point coprocessor for optimal performance. Consult your third-party software supplier for the floating point requirements of their specific application.

Table 3.4 Memory (Standard/Maximum)

	Standard Memory	Maximum Memory
917LX, 927LX, 937LX	32 Mbytes	192 Mbytes
937RX, 937SX	32 Mbytes	384 Mbytes
947LX	64 Mbytes	192 Mbytes
947RX, 947SX, 957RX, 957SX	64 Mbytes	384 Mbytes
967RX, 967SX	64 Mbytes	512 Mbytes
987RX, 987SX, 987/150RX, 987/150SX	64 Mbytes	768 Mbytes
987/200RX, 987/200SX	64 Mbytes	768 Mbytes

Note: Adding memory in smaller increments will reduce the maximum amount of memory possible.

I/O Channel Configuration Information

I/O and Internal Peripheral* Checklist

1. Ensure that you have ordered the correct I/O chassis (2, 4, or 12 I/O slots) for the number of I/O cards selected.

2. Ensure that you have not exceeded the power supply capabilities of the 9x7SX SPU packages. (Refer to **Table 3.6**, the Series 9x7SX I/O Card and Internal Peripheral Current Budgeting Worksheet.) The 9x7LX and 9x7RX SPU packages **do not require** I/O card or internal peripheral current budgeting.

HP Precision Bus (HP-PB)

The HP Precision-Bus (HP-PB) interfaces the processor with I/O cards. The Series 9x7LX, 9x7RX, and 9x7SX provide 2, 4, or 12

Table 3.5 I/O Cards

I/O Cards	Product Number	Size	HP-PB Slots Used per Card
SCSI	28642A	Single-high	1
Fast/Wide SCSI	28696A	Double-high	2
802.3 LANIC	36923A, opt. 002	Single-high	1
802.5 Token Ring	J2167A	Single-high	1
FDDI	J2157A	Double-high	2
PSI	36922A, opt. 002	Single-high	1
PBA-IB (HP-IB)	A1747A, opt. 002	Double-high	2
PBA-FL ¹	A1748A	Double-high	2
PB-FL (HP-FL) ²	28616A	Double-high	2

¹ Not supported on 9x7LX systems.

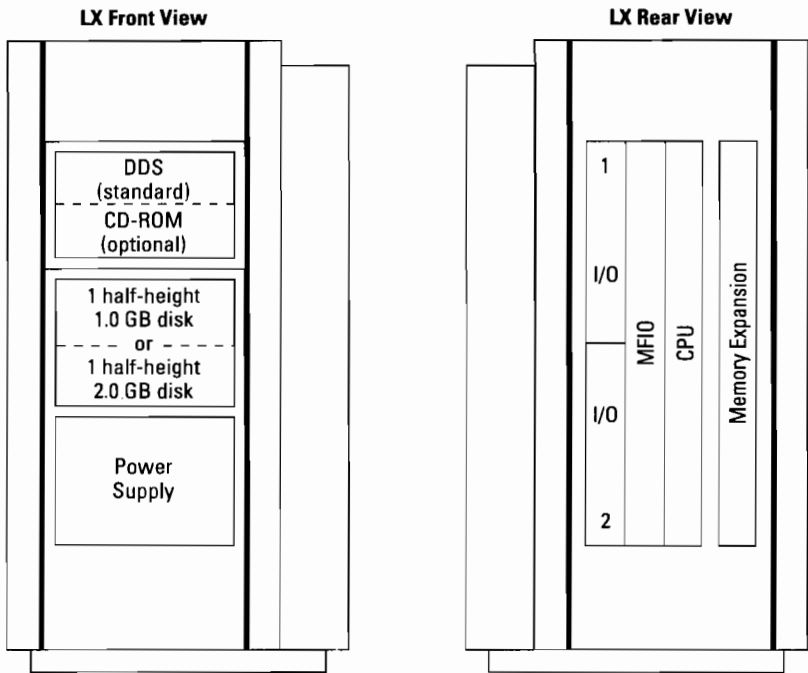
² The PB-FL card is supported on Release 4.0 and later (the PBA-FL is supported on Release 3.1 and 4.0). The PB-FL card replaces the PBA-FL.

single-high precision bus I/O slots respectively. In compliance with the Eurocard standard, the HP Precision Bus supports both single-high and double-high I/O cards. Single-high I/O cards use one Precision Bus slot each and double-high I/O cards use two slots each. Single-high Precision Bus cards include SCSI, PSI, second 802.3 LANIC, and 802.5 Token Ring cards. Double-high Precision Bus cards include

PBA-IB, PBA-FL and PB-FL interfaces. **Table 3.5** illustrates the slot usage for the various I/O cards supported on the Series 9x7LX, 9x7RX, and 9x7SX systems. Refer to SPU package layout diagrams in **Figures 3.7, 3.8, and 3.9**.

*Internal peripherals are those residing in the 9x7 SPU packages.

Figure 3.7 Series 9x7LX SPU Package Layout



NOTE: For the 9x7LX SPU package, a combination of PBA-IB and CD-ROM is supported only with the 1.0 Gbyte or 2.0 Gbyte disk. Also, two PSI cards plus a CD-ROM are supported only with the 1.0 Gbyte and 2.0 Gbyte disks. The previous 1.3 Gbyte and 677 Mbyte disks are not supported in either of these configuration combinations. These rules apply to the 9x7LX SPU package due to power limitations.

Figure 3.8 Series 9x7 SPU Package Layout—Rear View

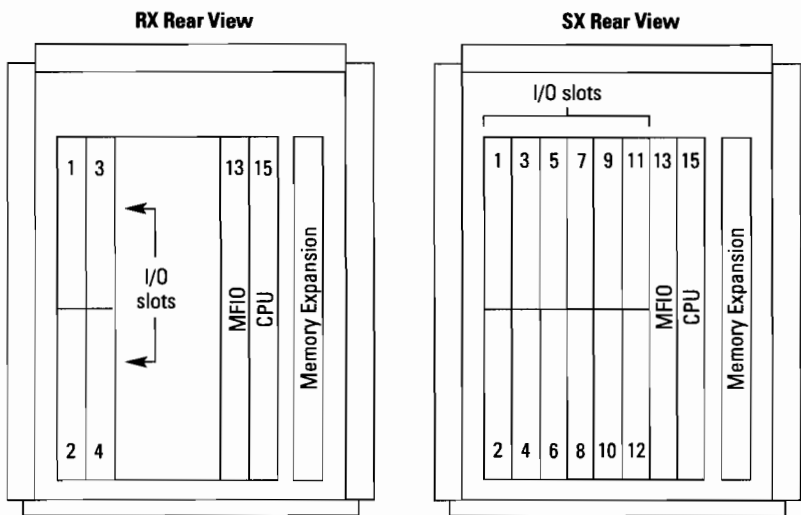
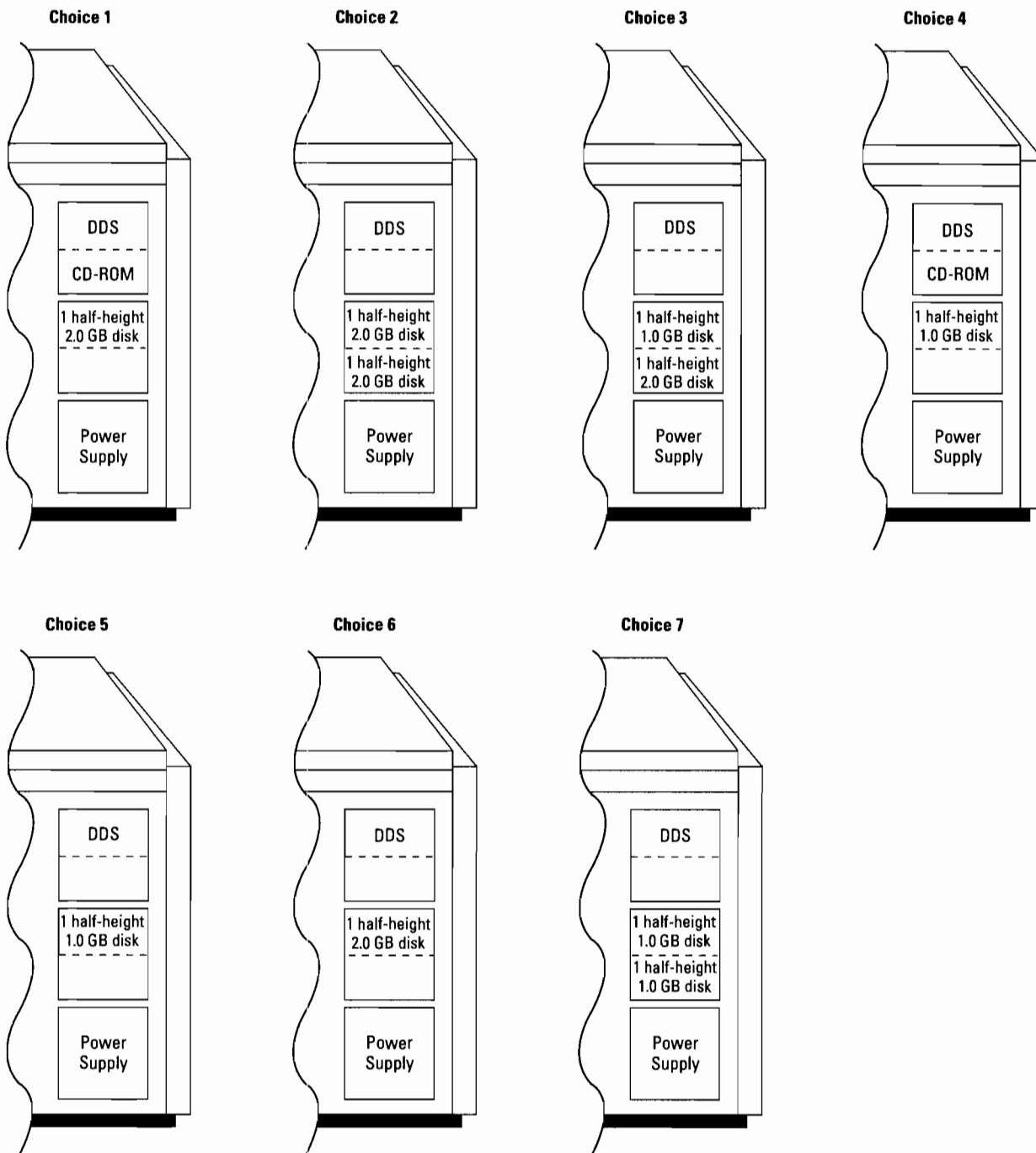


Figure 3.9 Series 9x7 RX/SX Front View Right Side Configuration Choices (Up to 3 devices supported)



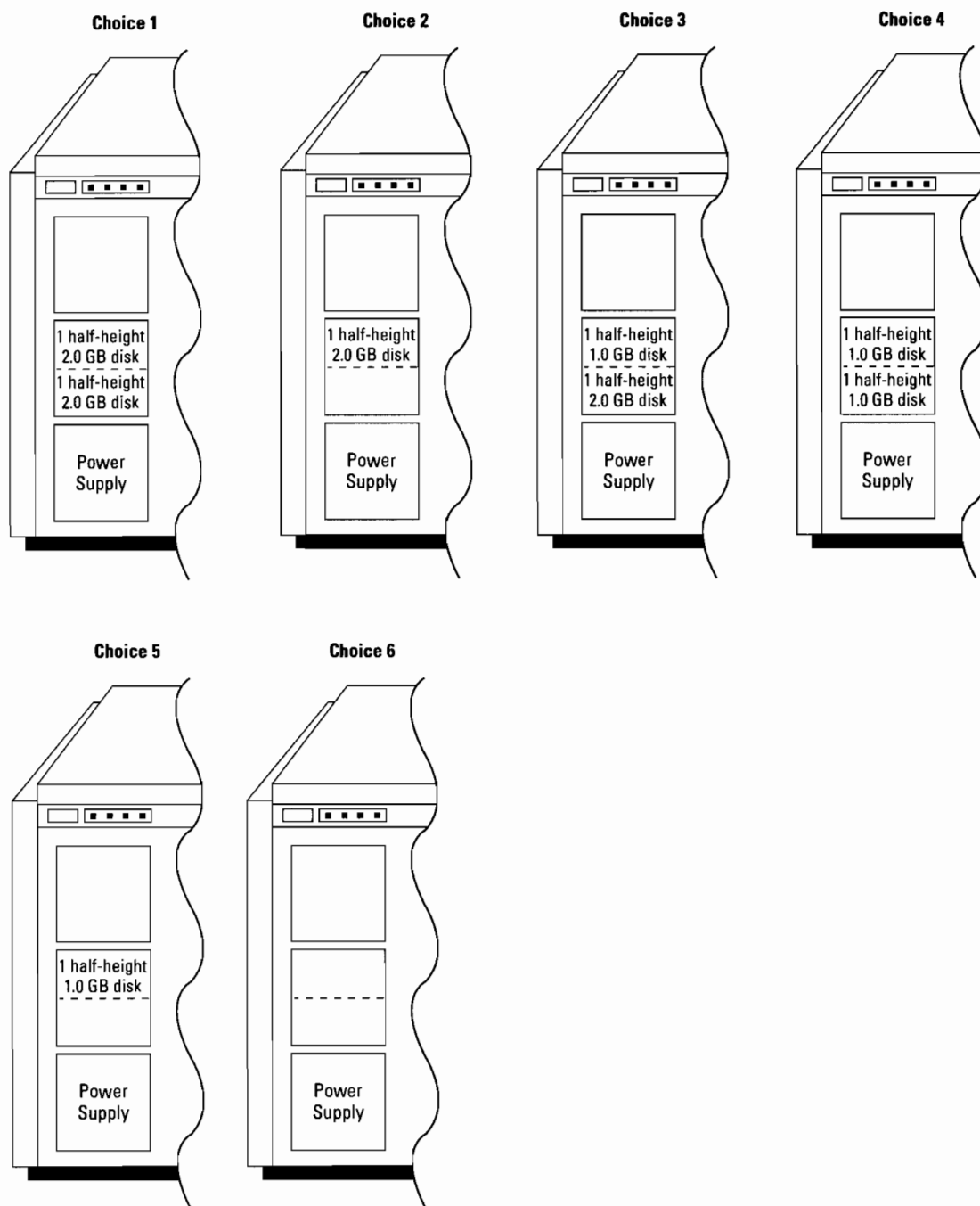
NOTES:

Full height drives are no longer available as new products; however, 9x7 systems do support the previously offered 2.0 GB full height drives.

Internal integration of more than one DDS drive is not supported in the Series 9x7 systems.

Three power connections are available on both the right- and left-hand side.

Figure 3.10 Series 9x7 RX/SX Front View Left Side Configuration Choices (Up to 3 devices supported)



NOTES:

Full height drives are no longer available as new products; however, 9x7 systems do support the previously offered 2.0 GB full height drives.

Internal integration of more than one DDS drive is not supported in the Series 9x7 systems.

Three power connections are available on both the right- and left-hand side.

Multi-Function I/O Card (MFIO)

One MFIO card is supplied standard with each Series 9x7LX, 9x7RX, and 9x7SX SPU package. This card provides:

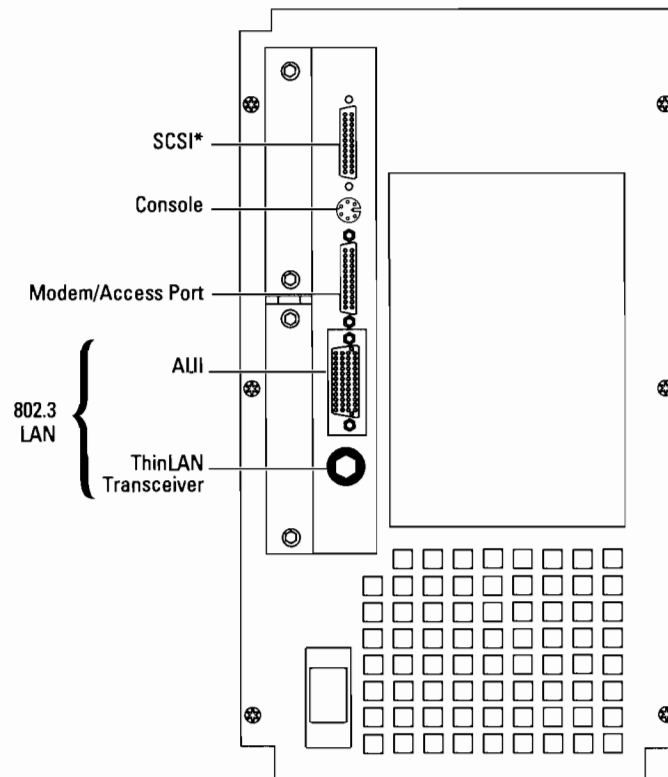
- 802.3 LAN connection for use with both DTC and system-to-system LAN traffic (integrated ThinLAN Transceiver and AUI connector)
- Two RS-232-C ports for console and remote support connections
- One SCSI interface which provides connection for seven SCSI devices

The MFIO card is not orderable as a separate product. If additional 802.3 LANIC or SCSI cards are needed, the HP-PB 802.3 LAN card (36923A option 002) or SCSI card (28642A) must be ordered.

The MFIO card can support a combination of internal and external SCSI devices, not to exceed a maximum of seven devices (five devices per SCSI are recommended for best performance results). The devices can be a combination of full- and half-height. Internal devices are those residing in the SPU package.

NOTE: The MFIO card does not utilize any Precision Bus I/O slots, it has its own dedicated slot.

Figure 3.11 Rear View with Multi-Function I/O Card



* Maximum of seven internal and external devices can be connected on the integrated SCSI bus.

External 2.0 GB DDS tape drives are supported on the integrated SCSI interface, but 1.3 GB DDS drives are not. An add-on SCSI interface card is required to support external 1.3 GB DDS tape drives. We do not advise placing a 4–8 GB DAT drive on the MFIO card. Optical Libraries are not supported on the MFIO card since Optical Libraries require a dedicated SCSI card.

SPU Internal Peripherals

The Series 9x7LX SPU packages come standard with two embedded SCSI peripherals:

- One 2.0 Gbyte DDS format tape drive (half-height)
- One 1.0 GB capacity 3.5-inch disk mechanism (half-height)

See **Figures 3.9 and 3.10** for configuration choices.

Customer may replace the 1.0 GB disk with an optional 5.25 inch 2.0 GB disk mechanism (half height). However, if a combination of PBA-IB and CD-ROM is selected, the 2.0 Gbyte disk is not supported due to power allocation.

For additional disk storage or tape backup, external peripherals are required. (External peripherals are those not residing in the SPU package.)

The Series 9x7RX and 9x7SX SPU packages come standard with two embedded SCSI peripherals:

- One 2.0 Gbyte DDS format tape drive (half-height)
- One 1.0 Gbyte capacity 3.5 inch disk mechanism (half-height)

Customers may order a second 1.0 GB disk mechanism. However, if a CD-ROM is ordered with the standard DDS tape drive, only one half-height is supported. The standard 1.0 GB drive can be replaced with an optional 2.0 GB disk mechanism which prevents the second 1.0 GB drive from being ordered. In addition, up to two 2.0 GB disk drives may be ordered providing up to ten GB of internal SPU disk storage.

Refer to **Figures 3.7 and 3.8** for diagrams of the SPU package layouts and to **Section 7** for peripheral information.

Series 9x7SX I/O and Internal Peripheral Electric Current Budgeting

Due to the large number of slots in the 9x7SX SPU packages which allow for a range of configurations, 9x7SX systems cannot support all combinations of I/O cards and internal peripherals. Internal peripherals are those residing in the 9x7 SPU package. I/O current budgeting is NOT required for the 9x7LX and 9x7RX systems.

The Series 9x7SX I/O and Internal Peripheral Current Budgeting Worksheets (**Tables 3.6 and 3.7**) will determine the supportability of a proposed I/O and internal peripheral configuration.

Table 3.7 should be used for the 987/200SX, and **Table 3.6** should be used for all other 9x7SX models. The worksheet will ensure that the proposed total current consumption of all I/O cards and internal peripherals does not exceed the total current available.

Guidelines:

1. The worksheet consists of 12 single-high I/O slot spaces and six peripheral positions. Refer to **Table 3.6**.

2. The internal peripherals (in the 12 slot chassis package) are housed in the peripheral positions shown in the Series 9x7SX Internal Peripheral Layout illustration with corresponding current requirements. Refer to **Figures 3.12 and 3.13**.

3. The 9x7SX systems have two power supplies, we term power as coming from the Left (L) bank and

the Right (R) bank. All I/O cards draw current from the +12V, +5V, and -12V from either the (L) bank, (R) bank, or both. All peripherals draw current from +12V, +5V, and -12V from either the (L) bank or the (R) bank but not both.

4. When using a double-high card, two single-high I/O slots are physically taken but power is consumed only from a single slot position.

While most customers will find their configurations can be supported without modification, some unusual configurations exist which exceed the available power of the systems. Therefore, the following rules must be checked to verify the system is supported and that it will operate reliably.

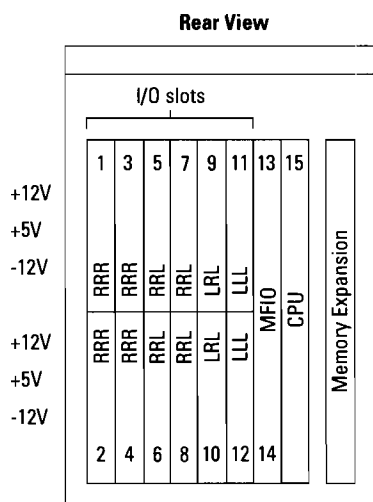
Use the power tables and worksheet as follows:

1. Enter the current (amps) for each row corresponding to the I/O card or internal peripheral selected. When using double-high cards enter the currents (amps) in only one row. Refer to the example configuration worksheet (**Table 3.8**).

2. Each row corresponding to an I/O slot has 3 open spaces to input the 3 current requirements corresponding to the +12V, +5V, and -12V available.

3. Sum each column and compare the results with the power limits at the bottom of the current budgeting worksheet. The computed totals must not exceed the maximum currents listed by more than 5%. If the configuration exceeds the available current by more than 5%, it must be modified to be supported.

Figure 3.12 9x7SX SPU I/O Slot Layout



Series 9x7 HP-PB I/O Cards and Current Requirements

I/O Cards	Product/Opt. Number	Size	Slot/ Card	Current Req./Card (Amps)		
				+12V	+5V	-12V
SCSI	28642A	Single-High	1	0.00	0.90	0.00
Fast/Wide SCSI	28696A	Double-High	2	0.12	4.72	0.00
PB-FL (HP-FL)	28616A	Double-High	2	0.04	3.93	0.05
PBA-IB (HP-IB)	A1747A opt.002	Double-High	2	0.09	5.46	0.07
802.3 LAN	36923A opt.002	Single-High	1	0.50	2.13	0.00
802.5 Token Ring LAN	J2167A	Single-High	1	0.00	1.66	0.00
PSI (NS pt.-to-pt.)	36922A opt.002	Single-High	1	0.08	2.36	0.09
PSI (SNA/SDLC)	30291A opt.002	Single-High	1	0.08	2.36	0.09
PSI (BSC)	32007A opt.002	Single-High	1	0.08	2.36	0.09
FDDI	J2157A	Double-High	2	0.00	3.7	0.00

Figure 3.13 HP 3000 Series 9x7 Field Upgrades At-a-Glance

Front View		Internal Peripheral Power Table Current (Amps) Requirements			
		Internal Peripherals	Current Req./Int. Periph.		
			+12V	+5V	-12V
5*	1*	DDS (standard)			
	2*	CD-ROM (optional)			
6*	3*	2 half-height 1.0 GB			
	4*	2 half height 2.0 GB disk			
		Power Supply			
		Left Bank			
		Right Bank			

*Peripheral position

**Table 3.6 Series 9x7SX Uniprocessor (12 single-high I/O slots)¹
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 ² (opt)	2						
	1 half-height disk ²	3						
	1 half-height disk	4						
	1 half-height disk	5						
	1 half-height disk	6						
Total current used per voltage ³								
Total current available for HP-PB I/O cards and peripherals in the 987/200SX system			6.27	6.80	1.50	6.27	27.00	1.50

NOTE: The processor, memory, and memory extender cards have been accounted for in total current available.

¹ Use **Table 3.7** for Series 987/200SX.

² 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.

³ Total current used per voltage must not exceed total current listed by more than 5%.

NOTE: Do not use shaded areas.

Table 3.7 Series 987/200SX Multiprocessor (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						
	1 half-height disk ¹	3						
	1 half-height disk	4						
	1 half-height disk	5						
	1 half-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.

¹If 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.

²Total current used per voltage must not exceed total current listed by more than 5%.

NOTE: Do not use shaded areas.

Table 3.8 Example Configuration Worksheet

I/O Card Configuration	Internal SPU Peripheral Configuration
One 802.3 LAN card (single-high)	One DDS tape
One 802.5 Token Ring card (single-high)	Two 1.0 GB disks (half-height)
One PBA-IB card (double-high)	Two 2.0 GB disks (full height)
One add-on PB-FL card (double high)	
Two SCSI cards (single-high)	
Three add-on SCSI cards (single-high)	
One add-on PSI card (single-high)	

**Table 3.9 Series 9x7SX Uniprocessor (12 single-high I/O slots)
I/O Card and Internal Peripheral Current Budgeting Worksheet Example**

	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	802.3 LAN	1				.50	2.13	.00
	802.5 Token Ring LAN	2				.00	1.66	.00
	PBA-FL	3				.09	5.46	.06
		4						
	PB-FL	5			.05	.04	3.93	
		6						
	SCSI	7			.00	.00	.90	
	SCSI	8			.00	.00	.90	
	SCSI	9	.00		.00		.90	
	SCSI	10	.00		.00		.90	
	SCSI	11	.00	.90	.00			
	Ring LAN	12	.08	2.36	.09			
	MFIO	13/14				.55	3.38	.03
Internal Peripherals	DDS tape drive (std)	1				.75	1.00	0.00
	CD-ROM ¹ (opt)	2						
	1 half-height disk, ¹ 1.0 GB	3				.82	1.00	.00
	1 half-height disk, 1.0 GB	4				.82	1.00	.00
	1 half-height disk, 2.0 GB	5	1.02	1.06	.00			
	1 half-height disk, 2.0 GB	6	1.02	1.06	.00			
Total current used per voltage ²			2.12	5.38	.14	3.57	23.16	.09
Total current available for HP-PB I/O cards and peripherals in the 987/200SX system			6.27	6.80	1.50	6.27	27.00	1.50

NOTE: The processor, memory, and memory extender cards have been accounted for in total current available.

¹If 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.

²Total current used per voltage must not exceed total current listed by more than 5%.

Table 3.10 Summary of Chassis and/or Processor Upgrades Supported

From/to	917 LX	927 LX	937 LX	947 LX	937 RX	947 RX	957 RX	967 RX	987 RX	987/150 RX	987/200 RX	937 SX	947 SX	957 SX	967 SX	987 SX	987/150 SX	987/200 SX
Series 917LX		X	X		X							X						
Series 927LX			X	X	X	X						X	X					
Series 937LX				X	X	X	X					X	X	X				
Series 947LX						X	X	X	X				X	X	X	X		
Series 957LX							X	X	X					X	X	X		
Series 967LX								X	X	X					X	X	X	
Series 937RX						X	X					X	X	X				
Series 947RX							X	X	X				X	X	X	X		
Series 957RX								X	X					X	X	X		
Series 967RX									X	X					X	X	X	
Series 987RX										X						X	X	X
Series 987/150RX											X						X	X
Series 987/200RX																		X
Series 937, 937SX													X	X				
Series 947, 947SX														X	X	X		
Series 957, 957SX															X	X		
Series 967, 967SX																X	X	
Series 987, 987SX																	X	X
Series 987/150SX																		X

NOTE: Refer to the Price Guide for ordering information. All 9x7 field upgrades are in a menu product structure. Therefore, in order to upgrade the chassis, you need to order both the menu product number as well as the chassis upgrade product number with the appropriate option. Similarly, to upgrade the processor along with the base user license, you must order the menu product number as well as the appropriate user license product number with the right option.

Configuration Worksheet

Table 3.11 will help in configuring a basic multiuser Series 9x7LX, 9x7RX, or 9x7SX system. Use it as a guideline, but note that particular customer needs (performance, etc.) may dictate different configuration choices.

STEP 1—Select a System

Select the HP 3000 that best fits the customer's performance and user needs.

STEP 2—Determine Memory Requirements

Memory requirements will vary depending on the specific applications running on the system. If there is not information available on the memory requirements of the customer's applications, the following rule of thumb may be used:

- Memory = 16 Mbytes + (0.5 to 1.0 × number of concurrent users) + Application Requirements

NOTE: 1 MB per user should be used at the low end of the 9x7LX, 9x7RX, and 9x7SX family.

Note that the maximum supported memory is 192 Mbytes for all 9x7LX systems and 384 Mbytes for the 937RX, 947RX,

Table 3.11 Product Structure

Product Number	Description*	User License	Chassis I/O Model Number			Standard Memory
			2-slot	4-slot	12-slot	
A1770B	Series 917	8	917LX			32 Mbyte
A1771C	Series 927	20	927LX			32 Mbyte
A1772B	Series 937	32, 40, 64	937LX	937RX	937SX	32 Mbyte
A1708C	Series 947	100, 160, 256, UL	947LX	947RX	947SX	64 Mbyte
A1709B	Series 957	64, 100, 160, 256, UL		957RX	957SX	64 Mbyte
A1710B	Series 967	100, 160, 256, UL		967RX	967SX	64 Mbyte
A2317B	Series 987	100, 160, 256, UL			987SX	64 Mbyte
A3004A	Series 987/150	100, 160, 256, UL		987/150RX	987/150SX	64 Mbyte
A3045A	Series 987/200	100, 160, 256, UL		987/200RX	987/200SX	64 Mbyte

* All systems include 2.0 Gbytes DDS format tape drive, 1.0 Gbyte SCSI disk, standard memory, user license, and a choice of MPE/iX FOS, IMAGE/SQL, and/or ALLBASE/SQL.

957RX, 937SX, 947SX, and 957SX systems. The 967RX and 967SX have a maximum memory of 512 Mbytes and the 987RX, 987SX, 987/150RX, 987/150SX, 987/200RX, and 987/200SX have a maximum memory of 768 Mbytes.

The memory sizing algorithm above was designed in the Series 950 through Series 960 days and was intended for systems configured with relatively more memory than our current low-end systems (917LX and 927LX). The benchmark is still a good measurement for configuring these workloads. However, in some environments, systems with small amounts of memory (standard 917LX configuration) are very susceptible to memory shortages caused by

quick changes in workload demands. These "other" environments include:

- OLTP mixed with batch
- Application development
- Heavy serial/batch-like access of data
- Heterogeneous workloads

In these environments, performance can be improved by ordering an additional 8 Mbytes of memory.

STEP 3—Determine Disk Storage Needs

Disk requirements will vary with the number of active users and the nature of the customer's application. As a general rule of thumb the following formula can be used:

$$\text{Disk Storage} = 500 \text{ Mbytes}^1 + (5 \text{ Mbytes} \times \text{Number of Concurrent Users}^2) + (\text{Application Requirements}^3 \times .25) + 200 \text{ Mbytes}^4$$

¹500 MB = SLT and FOS or 930 MB = SLT, FOS, and full subsys

²Transient + Space

³User files—For growth and dynamic space requirements. It is suggested that 25% of the application requirement be set aside for future growth.

⁴200 MB free space denotes space required to install power patch tape.

For disk storage beyond what is supported internal to the system package, external disks will need to be ordered as standalone products. Refer to Section 8 for more information on external add-on SCSI, HP-FL, and HP-IB disk drives.

Enter the number of SCSI disks required (including internal) _____

Enter the number of Fast/Wide SCSI disks _____

Enter the number of HP-IB disks required _____

Enter the number of HP-FL disks required _____

Table 3.12 Determine Disk Storage Needs

System	Standard Disk (SCSI)	Internal Disk Options (SCSI Only)	Maximum SCSI Disk (Internal and External)	
			Using 1.0 GB Disks	Using 2.0 GB Disks
9x7LX	1.0 Gbyte	1.0 Gbyte or 2.0 Gbyte	20 Gbyte	40 Gbyte
9x7RX/9x7SX	1.0 Gbyte	1.0 Gbyte or 2.0 Gbyte	34/49 Gbyte	68/98 Gbyte

Note: Disk Arrays will increase maximum disks allowed.

STEP 4—Choose a Tape Backup Solution

Every Series 9x7LX, 9x7RX, and 9x7SX system comes standard with a 2.0 GB DDS format tape drive capable of backing up data at 11 MB/minute. See Section 8 for backup recommendations on the HP 3000.

Enter the number of SCSI DDS drives required (including internal) _____

Enter the number of 1/2-inch cartridge tapes _____

Enter the number of 1/2-inch magnetic tapes _____

STEP 5—Select a Printer

Both system and serial printers are supported on the 9x7LX, 9x7RX, and 9x7SX systems. Consult Section 8 for supported printers.

NOTE: HP-IB system printers require a PBA-IB card (A1747A) which uses two HP-PB slots (Series 9x7LX systems have only two slots). Consequently, having

an HP-IB printer or HP-IB back-up device may require the purchase of a Series 9x7RX or 9x7SX package with its expanded number of slots.

Record the number of HP-IB printers required _____

Record the number of serial printers required _____

STEP 6—Network Link Products

For MPE/iX systems, NS 3000 Point-to-point and IBM (SNA, BSC) communications require a PSI card. Each PSI card occupies one HP-PB slot.

Record the number of PSI cards required _____

802.3 HP-PB LANIC card occupies one HP-PB slot _____

802.5 Token Ring LAN card occupies one HP-PB slot _____

FDDI card occupies two HP-IB slots _____

STEP 7—I/O Interface Cards

I/O interface cards allow the system to communicate with peripheral devices. The number of cards required depends on the number and type of peripheral devices that will be connected to the system. Use the configuration rules in Section 5 to determine the number of SCSI, Fast/Wide SCSI PBA-IB, and PB-FL interfaces required.

To verify that the number of cards required do not exceed the capacity of the system package, enter the quantity of each interface card required in the worksheet (Table 3.13).

STEP 8—Terminal Connect (DTC16, DTC16iX and DTC72MX)

DTCs are used to connect HP 3000s to local terminals, remote terminals (via modems), serial printers, and provide access to X.25 and ARPA networks. The number of DTCs required will depend on the number of ports needed to connect users, printers, etcetera and the mode of network distribution.

Table 3.14 illustrates the recommended solution for various port configurations. For further detail on DTC16, DTC16iX or DTC72MX or information on X.25 or Telnet connections, consult Section 9.

Table 3.13

I/O Interface Cards	Quantity		Number of Slots	
Enter number of SCSI interfaces (not including integrated SCSI on MF10) (9x7LX maximum = 2) (9x7RX maximum = 4) (987SX maximum = 10) (987/150 maximum = 12) (987/200 maximum = 12)	_____	× 1 = _____		
Enter number of Fast/Wide SCSI interfaces	_____	× 2 = _____		
Enter number of PBA-IB interfaces (9x7LX maximum = 1) (9x7RX maximum = 2) (9x7SX maximum = 2)	_____	× 2 = _____		
Enter number of PB-FL interfaces¹ (9x7LX maximum = 1) (9x7RX maximum = 2) (9x7SX maximum = 4)	_____	× 2 = _____		
Enter number of network link cards (from Step 6) (9x7LX maximum = 2) (9x7RX maximum = 4) (9x7SX maximum = 5) <i>NOTE: If 3 PBA-FL cards selected on 9x7SX, maximum network link cards = 4.</i>	_____	× 1 = _____		
	_____	× 2 = _____		
Total slots required (9x7LX maximum 2) (9x7RX maximum 4) (9x7SX maximum 12)			= _____	

¹ PBA-FL is obsolete—use PB-FL.

Table 3.14 DTC Recommendations

	Number of Ports Required	
	1–32	> than 32
9x7LX, 9x7RX, or 9x7SX		
Unracked	2340A, J2062A	J2070A
Racked	J2062AZ	A1883A/A1884A and J2070AZ

STEP 9—LAN Cabling

A 2 meter 802.3 LAN cable is included with each Series 9x7LX, 9x7RX, and 9x7SX system for attaching the DTC. Distributed DTC configurations will need longer cables which are orderable from CPO.

STEP 10—Console/Terminals

Each Series 9x7LX, 9x7RX, and 9x7SX system is supplied with one 700/96 terminal as the system console. All necessary console attachment hardware is included.

Several high-quality terminals are available for the HP 3000 (see **Table 3.15**).

STEP 11—System Support Options

Systems support options offer basic hardware and software for systems, peripherals, and stand-alone software applications. Consult Section 11 for a description of support options.

Table 3.15 Terminals Available on the HP 3000

Product	Description	Memory	Additional Features
700/43	Multipersonality ASCII	4 pages	Supports 12 popular compatibility modes
700/60	ASCII/ANSI/PC Term	Wyse-60/DEC VT320	Wyse-60, DEC VT320, and PC Term modes
700/60ES	ASCII/ANSI/PC Term	Wyse-60/DEC VT320	Meets Swedish MPR 1990:10 guidelines
700/96	Blockmode VPLUS	8 pages	High-quality display; EC 92 regulations (EN 55022B)
700/98	High performance blockmode VPLUS	16 pages	High-quality display local forms cache, edit checks, modified data tag; EC 92 regulations (EN 55022B)
700/96ES	Blockmode VPLUS	8 pages	Compliant with Swedish MPR 1990:10 guidelines
700/98ES	High performance blockmode VPLUS	16 pages	Compliant with Swedish MPR 1990:10 guidelines

NOTE: VPLUS requires a 700/96 or 700/98 terminal. Oracle's SQL*Forms, INGRES forms, and JAM will run on any 700 series terminal. JAM also runs on a block mode terminal, giving the user optimal performance.

Section 4. HP 3000 Corporate Business Systems 992 and 990



Maximum Supported Hardware Configuration

Table 4.1 Maximum Supported Hardware Configuration*

	990 DX, 992/100 DX 990, 992/100	992/200 DX, 992/200	992/300 DX, 992/300	992/400 DX, 992/400
MPE/iX release support	4.0/4.5/5.0	4.0/4.5/5.0	4.0/4.5/5.0	4.0/4.5/5.0
User license: (UL=unlimited) std/opt	100/160, 256, 384, UL			
Typical users	200–580	325–775	425–945	500–1000
Maximum connected workstations/terminals¹	2700	2700	2700	2700
Maximum memory card per SPU²	8	8	8	8
Maximum dual bus-converter cards	4	4	4	4
HP-PB I/O card cages²: 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	128/2048	128/2048	128/2048	128/2048
Maximum disk storage: Total = 2036 GB PB-FL ³ –255 ⁴ spindles × 8 GB	2036	2036	2036	2036
Maximum disks: Total = 255⁴				
PB-FL ⁵	255	255	255	255
SCSI	255	255	255	255
Fast/Wide SCSI ⁶	255	255	255	255
PBA-IB ⁶	48	48	48	48
Maximum backup devices				
SCSI (DDS)	8	8	8	8
PBA-IB (HP-IB)/SCSI (tape drive)	8	8	8	8
Optical SCSI Jukeboxes	3	3	3	3
1/2-inch cartridge (3480 compatible)	7	7	7	7
Maximum printers				
System PBA-IB (HP-IB)	8	8	8	8
Serial	250	250	250	250
System SCSI	4	4	4	4
Line	16	16	16	16
Maximum number of devices per I/O card				
PBA-IB (PBA with CIO HP-IB)	6	6	6	6
PB-FL	8	8	8	8
SCSI	7	7	7	7
Fast/Wide SCSI ⁶	15	15	15	15
Maximum DTCs	120	120	120	120
Maximum cards per HP-PB I/O card cage				
PBA-IB (HP-IB) cards	2	2	2	2
PB-FL (HP-FL) cards	5	5	5	5
SCSI cards	5	5	5	5
Fast/Wide SCSI cards ⁸	5 ⁷	5 ⁷	5 ⁷	5 ⁷
Maximum network links per system				
802.3 LANIC ¹	3	3	3	3
802.5 Token Ring	1	1	1	1
FDDI⁸	1	1	1	1
Maximum PSI cards per system	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, P/N 28616A, nct PBA-FL P/N A1748A.

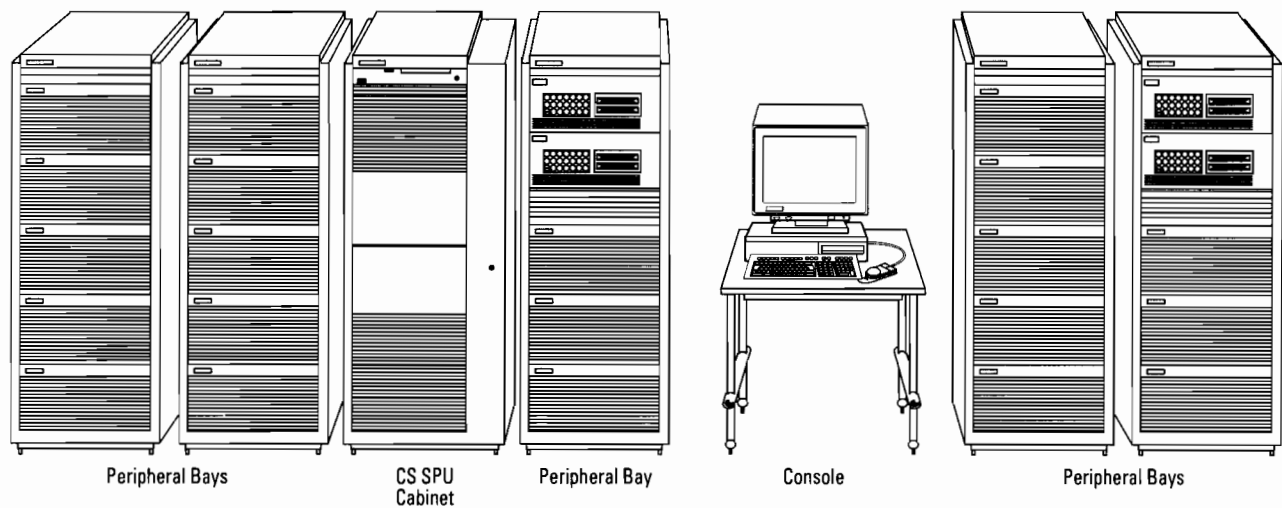
⁶ Not supported as LDEV 1.

⁷ Four for the HP-PB internal card cage.

⁸ Supported with MPE/iX 5.0 in September 1994.

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

Figure 4.1 HP 3000 Corporate Business System



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 four processors allows for economical modular growth as system performance requirements increase. The CS can be configured with up to 2 Gigabytes of main memory, 2036 Gigabytes of online disk storage, and support of up to 2700 online users (with MPE/iX 5.0) in an OLTP environment. The base configuration consists of one CPU, 128 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. All rack-mounted peripherals are

separately installed in one or more 1.6 meter expansion cabinets.

The five performance levels of the HP 3000 Corporate Business System are available in two solution choices, each of which has its own product number. The customers' desired performance and/or multiprocessor level, and database management choice are then designated via the option selected within that product number. Product number A1809A (signified by "DX") offers standard software for systems and performance management, and an OpenView console PC. The A1811A product does not include the systems and performance

management software, and comes with a terminal console instead of a PC.

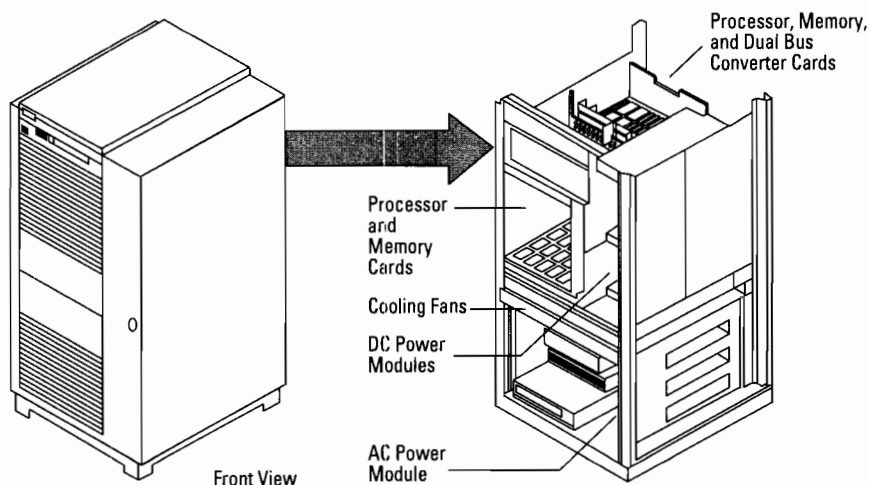
Choosing the 990/992 vs the 991/995

The Corporate Business System 991 and 995, described in Section 5, are newer and higher performing systems than the Corporate Business System 990 and 992. CS 990 and 992 should only be selected in lieu of the 991 and 995 systems if the customer chooses not to run on MPE/iX release 5.0. The 990 and 992 will no longer be orderable as of January 1, 1995. CS 990 and 992 can be board upgraded to the 991 or 995.

Table 4.2

A1809A	A1811A
CS 990 DX (uniprocessor)	CS 990 (uniprocessor)
CS 992/100 DX (uniprocessor)	CS 992/100 (uniprocessor)
CS 992/200 DX (2-way multiprocessor)	CS 992/200 (2-way multiprocessor)
CS 992/300 DX (3-way multiprocessor)	CS 992/300 (3-way multiprocessor)
CS 992/400 DX (4-way multiprocessor)	CS 992/400 (4-way multiprocessor)

Figure 4.2 SPU Frame, Cards, and Power Module Locations



Base Configuration

The base CS 990 and 992/100 SPU configuration contains the following hardware components:

- one processor card with floating-point coprocessor
- service processor (SP) card
- one 128 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:
 - 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 PBA-IB card
 - one Bus Converter (lower)
- modular power supply subsystem and integrated powerfail battery backup system
- OpenView PC console (included only with the Corporate Business System DX)
- HP 700/96 console terminal and interconnect cable (not included with the Corporate Business System DX)
- Each Corporate Business System base configuration includes a class/concurrent license to use MPE/iX Fundamental Operating Software for 1–100 users.

Unique Supplied Software for the CS DX

In addition to the MPE/iX Fundamental Operating Software standard with every HP 3000 system, all CS DX systems come with the additional software listed below. (IMAGE/SQL and ALLBASE/SQL are available in any combination and are selected by the 8xx processor options.)

Systems Management Software Group

- OpenView Console. PC is included. OpenView Console provides full OpenView System Manager functionality (36936A) for the CS DX. See **Table 4.3** 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)

Performance Management Software Group

- GlancePLUS
- LaserRX/MPE
- RXForecast

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

OpenView Console

HP 3000 Corporate Business System DX systems are shipped standard with HP OpenView Console as the system console. The OpenView Console is an HP Vectra 486 based OpenView Workstation that supplies full HP OpenView System Manager (36936A) functionality to the CS 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 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 in **Table 4.3**, 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

Table 4.3

HP Vectra 486/33XM PC with:	OpenView Windows Workstation Software
• 8 Mbytes memory • 160 Mbyte hard disk • 3.5-inch floppy drive • 17-inch color monitor • Integrated color monitor UVGA • Integrated ThinLAN adapter card	• 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

NOTE: HP OpenView DTC Manager cannot run on the same PC as OpenView Console.

in **Table 4.3** 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.

Required Hardware Ordered Separately

HP 3000 3-way and 4-way multi-processor systems require a minimum of 256 Mbytes of main memory for optimum functionality. Base memory is 128 Mbytes.

HP 3000 Corporate Business System DX systems (A1809A) 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.

The HP 3000 Corporate Business Systems (A1811A) are shipped with a 700/96 terminal and do not require a continuous power source for the 700/96 terminal.

Factory Software Preloading

Factory preloading of HP 3000 FOS, standard subsystem software, customized subsystem software, GlancePLUS* and Systems Management Software* is available with HP 3000 Corporate Business Systems. Software will be factory installed on disk drives contained within add-on 1.6 meter Integrated Expansion Cabinets (A1884A). Only Corporate Business Systems ordered with this cabinet are eligible to have FOS and subsystem software installed at the factory prior to shipment.

The steps below should be followed when ordering a Corporate Business System to ensure pre-installation of software:

1. On the same section of the order as the SPU, also order the following:
 - a. One Integrated Expansion Cabinet (A1884A) with at least one disk option (HP-FL or SCSI)
 - b. MPE/iX media product 51454B with option 0D1

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

2. Specify a coordinated shipment

3. 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 drive that can be used for factory software installation is 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 and CS DX 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.
- Amount of time for implementation and system performance assistance

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

Refer to Section 11 for details regarding the Premier Account Support.

Expansion Capabilities

Expansion of the CS 990 and 992 SPU is done by adding processor, memory, 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 990 and 992/100 contains one processor card. Up to three additional processor cards can be added as options or as a field upgrade.

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 card; therefore any size memory card can be configured without having to consider memory interleaving rules. Each memory array contains its own on-board memory controller chip, which eliminates the need to balance memory arrays per memory controller.

The maximum memory supported is 2 GB. To achieve this memory capacity, all eight cards must be 256 MB cards. The base configuration memory supplied with the CS 990 and CS 992 is 128 MB (supplied as one 128 MB card). HP 3000 3-way and 4-way multiprocessor systems require a minimum of 256 Mbytes of main memory for optimum functionality.

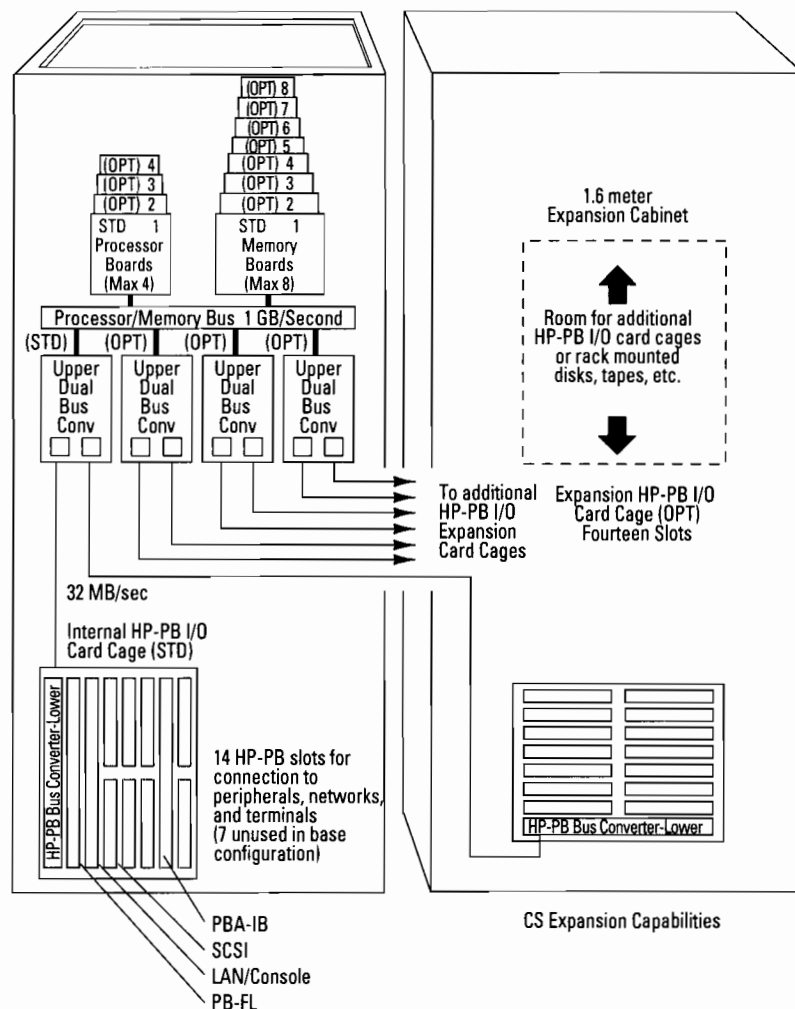
I/O Expansion

The bus converter is a communication link between the processor/memory bus (PMB) and the HP-PB (HP Precision Bus) I/O card cages. The bus converter 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 990 and 992 can be expanded to 112 I/O slots (eight card cages × 14 slots per card cage = 112 single-high slots).

The base SPU configuration has one HP-PB I/O card cage located at the bottom of the SPU cabinet. Seven slots are already used for base configuration I/O cards, leaving seven 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

Figure 4.3 CS Expansion Capabilities



AUI ports, serial link for console terminal, and modem link for remote access)

- one PB-FL card
- one SCSI card
- one PBA-IB 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 place-

ment 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 Boards 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).

Table 4.4 Required Dual Bus Converters

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	

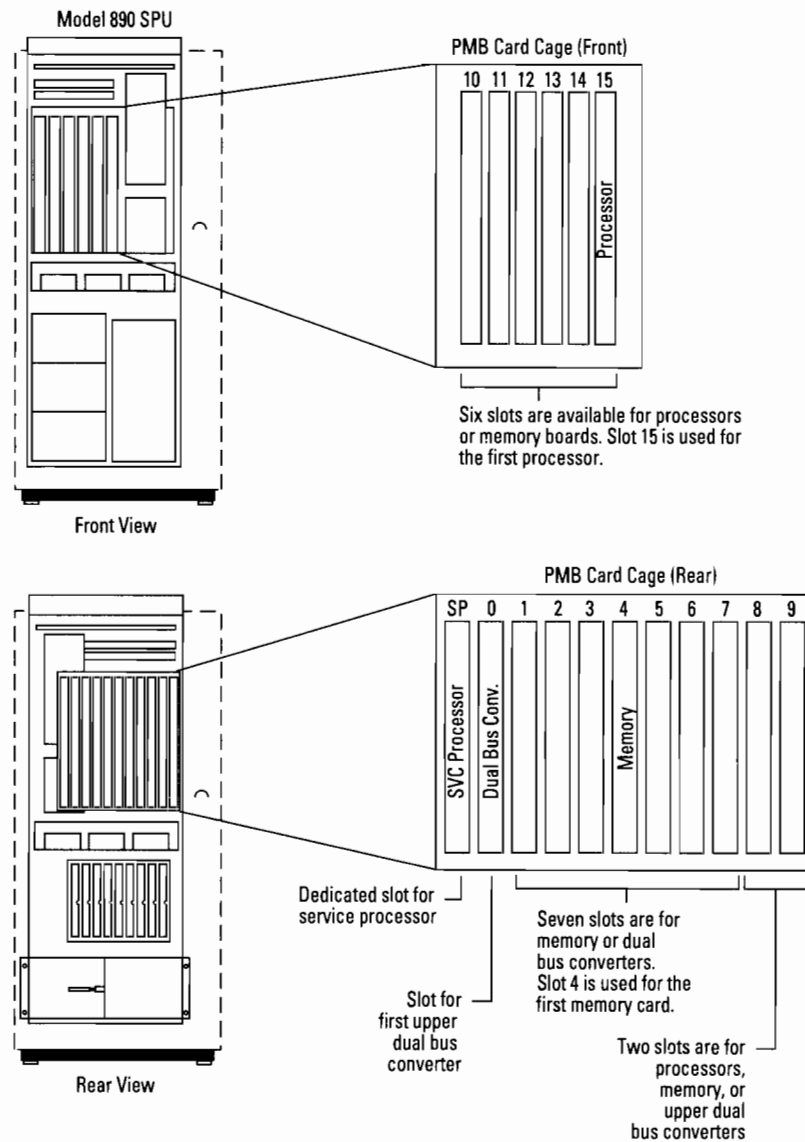
Slot Availability

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 in **Figure 4.4**. The processor, memory, 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. The rear PMB card cage contains a dedicated service processor (SP) slot, and ten slots (0 through 9) are available for memory, Dual Bus Converters, or Processors. The first Memory Card is installed in slot 4 and the first Dual Bus Converter Card is in slot 0. The following maximum PMB cards are supported:

- Four Processor Cards
- Eight Memory Cards
- Four Dual Bus Converter Cards

Figure 4.4 Processor/Memory Bus (PMB) Card Cage Slots

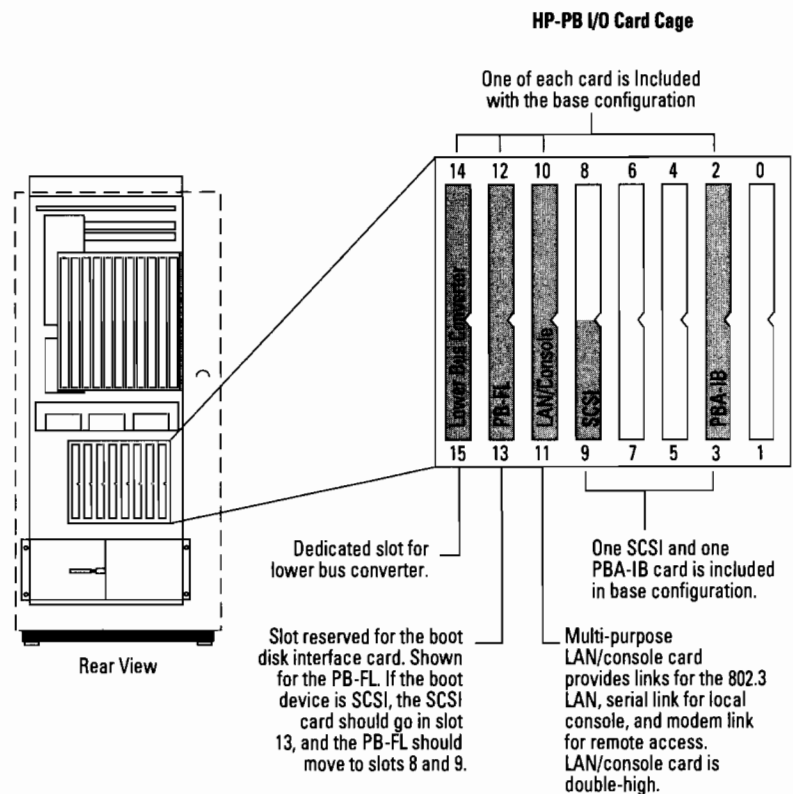


HP-PB I/O Card Slot

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. Four I/O cards included in the base configuration occupy 7 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 and PBA-IB cards are also included in the base configuration in slot 9 and in slots 3 and 2. The higher the slot number, the higher the priority on the HP Precision Bus.

Figure 4.5 HP-PB I/O Card Cage Slots



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 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
- Integrated 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 additional 802.3 LANIC cards are needed, the HP-PB 802.3 LAN card (36923A Option 002) must be ordered.

HP Precision Bus and Adapter

The Precision Bus (HP-PB) is used in the CS 990 and 992 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 990, 992 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 990, 992 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

Table 4.5

HP-PB Cards	Product Number
PB-FL	28616A
Fast/Wide SCSI	28696A
SCSI	28642A
802.5 Token Ring	J2167A
802.3 LAN	36923A opt. 002
FDDI	J2245A
PSI	36922A opt. 002 (NS point-to-point) 30291A opt. 002 (SNA/SDLC link) 32007A opt. 002 (BSC link)

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

- A1747A, option 001, 002—Corporate Business System Precision Bus Adapter without HP-IB interface card
- A1747A, no option—9x7LX, 9x7RX, 9x7SX Precision Bus Adapter with HP-IB interface card
- A1747A, option 001—9x7LX, 9x7RX, 9x7SX Precision Bus Adapter without HP-IB interface card

NOTE: Customers with HP-IB cards who are interested in moving these forward to a 990 or 992 system should order a PBA-IB with options 001 and 002.

HP-PB I/O Card Cage Performance Guidelines

The maximums stated in this table are to optimize system performance. These values should not be confused with the maximum number of cards supported (see **Table 4.1**). To optimize system performance, HP-PB I/O guidelines are recommended in **Table 4.6**.

I/O and Cabinet Configuration Checklist

1. Ensure that you have ordered the correct number of HP-PB slots for the I/O cards selected.
 - a. The SPU Cabinet houses one HP-PB I/O card cage which consists of 14 single-high slots. Seven of these single-high slots are occupied by base configuration I/O cards, leaving seven single-high HP-PB for I/O cards to be selected.
 - b. 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.

2. 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 4.7**).
3. 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 4.4**.
4. 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 in Section 6.

Table 4.6 Maximum Configuration for Optimal Performance

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" (Table 4.7)
SCSI	Single-high	5 ¹	5	Refer to "Power Budget Worksheet" (Table 4.7)
Fast/Wide SCSI	Double-high	5 ³	15	Refer to "Power Budget Worksheet" (Table 4.7)
PBA-IB	Double-high	2	4	Refer to "Power Budget Worksheet" (Table 4.7)
802.3 LANIC	Single-high	N/A	N/A	2 ²
802.5 Token Ring	Single-high	N/A	N/A	1
LAN/Console	Double-high	N/A	N/A	1
FDDI	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 Four for internal HP-PB card cage. Supported September 1994.

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 4.7) 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:

1. 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.

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

3. 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 4.7 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 (ThinLAN)		0.40	14.20	0.40				2	
LAN/Console (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	
Fast/Wide SCSI		0.12	4.72	0.00				2	
PBA-IB ¹ (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	
FDDI		0.00	3.7	0.00					
PSI		0.98	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.

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

Section 5. HP 3000 Corporate Business Systems 995 and 991

General System Configuration Information

Table 5.1 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	5.0	5.0	5.0	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 SPU³	8	8	8	8
Maximum Dual Bus-Converter Cards	4	4	4	4
HP-PB I/O card cages²: 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 × 8 GB	2036	2036	2036	2036
Maximum disks: Total = 255⁴				
PB-FL ⁵	255	255	255	255
SCSI	255	255	255	255
Fast/Wide SCSI	255	255	255	255
PBA-IB ⁶	48	48	48	48
Maximum backup devices				
SCSI (DDS)	8	8	8	8
PBA-IB (HP-IB)/SCSI (tape drive)	8	8	8	8
Optical SCSI	3	3	3	3
1/2-inch cartridge (3480 compatible)	7	7	7	7
Maximum printers				
System PBA-IB (HP-IB)	8	8	8	8
Serial	250	250	250	250
System SCSI	4	4	4	4
Line	16	16	16	16
Maximum number of devices per I/O card				
PBA-IB (PBA with CIO HP-IB)	6	6	6	6
PB-FL	8	8	8	8
SCSI	7	7	7	7
Fast/Wide SCSI	15	15	15	15
Maximum DTCs	120	120	120	120
Maximum cards per HP-PB I/O card cage				
PBA-IB (HP-IB) cards	2	2	2	2
PB-FL (HP-FL) cards	5	5	5	5
SCSI cards	5	5	5	5
Fast/Wide SCSI cards	5 ⁸	5 ⁸	5 ⁸	5 ⁸
Maximum network links per system				
802.3 LANIC ¹	3	3	3	3
802.5 Token Ring	1	1	1	1
FDDI	1	1	1	1
Maximum PSI cards per system⁷	8	8	8	8

¹First 802.3 LANIC standard on LAN/Console card.

²First 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.

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

⁴Configurations exceeding 128 disks must be factory approved. LDEV 1 must be 4 Gbytes or less.

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

⁶Not supported as LDEV 1.

⁷PSI (Programmable Serial Interface) cards are the hardware components for the SNA Link, BSC Link, and NS Point-to-Point 3000 products in Section 9.

⁸Four for the internal HP-PB card cage. Supported September 1994.

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

(continued)

Maximum Supported Hardware Configuration (cont'd)

Table 5.1 Maximum Supported Hardware Configuration* (cont'd)

	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	5.0	5.0	5.0	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 SPU³	8	8	8	8
Maximum Dual Bus-Converter Cards	4	4	4	4
HP-PB I/O card cages²: 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 = 2036 GB PB-FL ⁵ –255 ⁴ spindles × 8 GB	2036	2036	2036	2036
Maximum disks: Total = 255⁴ PB-FL ⁵ SCSI Fast/Wide SCSI PBA-IB ⁶	255 255 255 48	255 255 255 48	255 255 255 48	255 255 255 48
Maximum backup devices SCSI (DDS) PBA-IB (HP-IB)/SCSI (tape drive) Optical SCSI 1/2-inch cartridge (3480 compatible)	8 8 3 7 transports	8 8 3 7 transports	8 8 3 7 transports	8 8 3 7 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 PBA-IB (PBA with CIO HP-PB) PB-FL SCSI Fast/Wide SCSI	6 8 7 15	6 8 7 15	6 8 7 15	6 8 7 15
Maximum DTCs	120	120	120	120
Maximum cards per HP-PB I/O card cage PBA-IB (PBA with CIO HP-PB) cards PB-FL (HP-FL) cards SCSI cards Fast/Wide SCSI cards ⁸	2 5 5 5 ^a	2 5 5 5 ^a	2 5 5 5 ^a	2 5 5 5 ^a
Maximum network links per system 802.3 LANIC ¹ 802.5 Token Ring FDDI	3 1 1	3 1 1	3 1 1	3 1 1
Maximum PSI cards per system⁷	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. LDEV 1 must be 4 Gbytes or less.

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

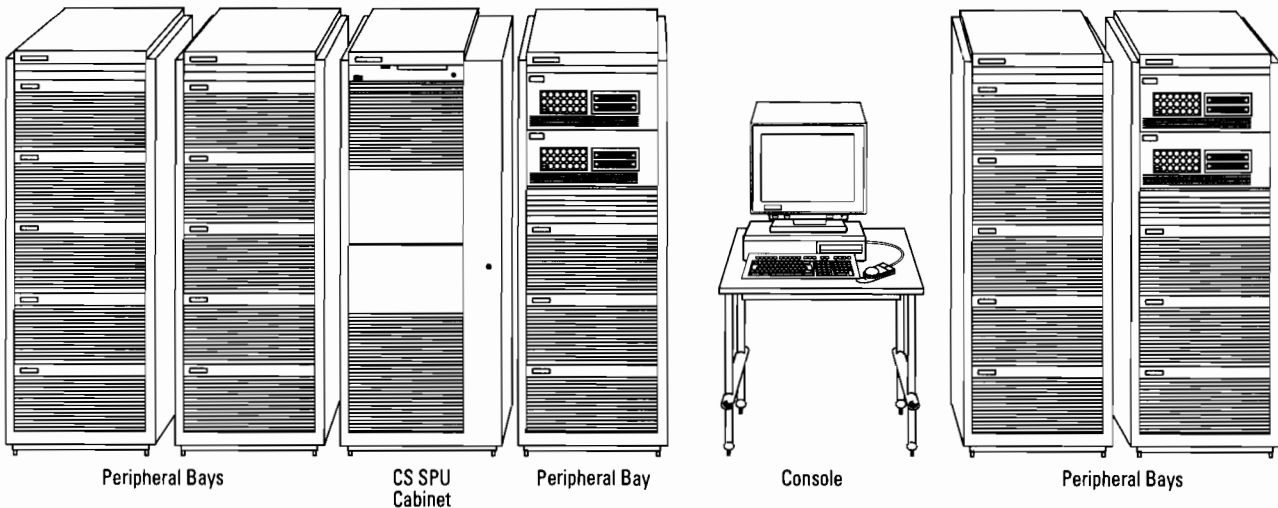
⁶ Not supported as LDEV 1.

⁷ PSI (Programmable Serial Interface) cards are the hardware components for the SNA Link, BSC Link, and NS Point to Point 3000 products in Section 9.

⁸ Four for the HP-PB internal card cage. Supported September 1994.

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

Figure 5.1 HP 3000 Corporate Business System



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, 2036 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 995 or 991 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.

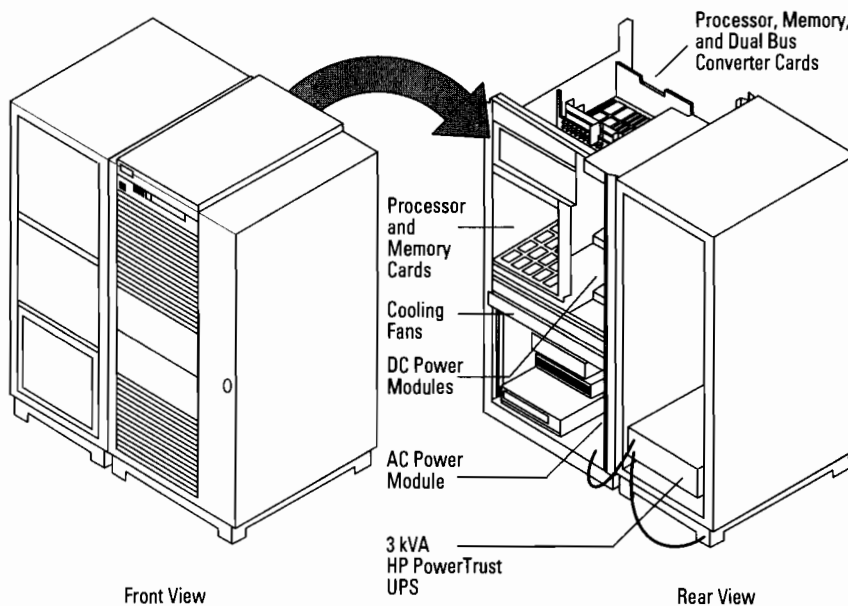
The nine performance levels of the HP 3000 Corporate Business System 995/991 are available in

two solution choices, each with its own SSP number. The customers' desired user license level and database management choice are then designated via products entered as sub-items to that SSP number. SSP number A3080A (the CS 995/991 "DX") offers standard software for systems and performance management, and an OpenView Console PC. The A3079A SSP (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 5.2

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 5.2 SPU Frame, Cards, and Power Module Locations



- 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)

Base Configuration

The base CS 995/100 CX and 991 CX 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
- Each Corporate Business System base configuration includes a class/concurrent license to use MPE/iX Fundamental Operating Software for 1–100 users

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 CS systems.)

Systems Management Software Group

- An OpenView Console 486/33XM PC is included. OpenView Console software provides full OpenView System Manager functionality (36936A) for the CS DX. See OpenView console discussion on the following page 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-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 in **Table 5.3**, 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 in **Table 5.3** are subject to change more frequently than revisions of this document, so please contact your HP representative if you

Table 5.3

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

need to know the current version number. Version numbers shown are current as of the date of this publication.

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 modem or 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 5-15.)

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 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.

*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.

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 Section 11 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.

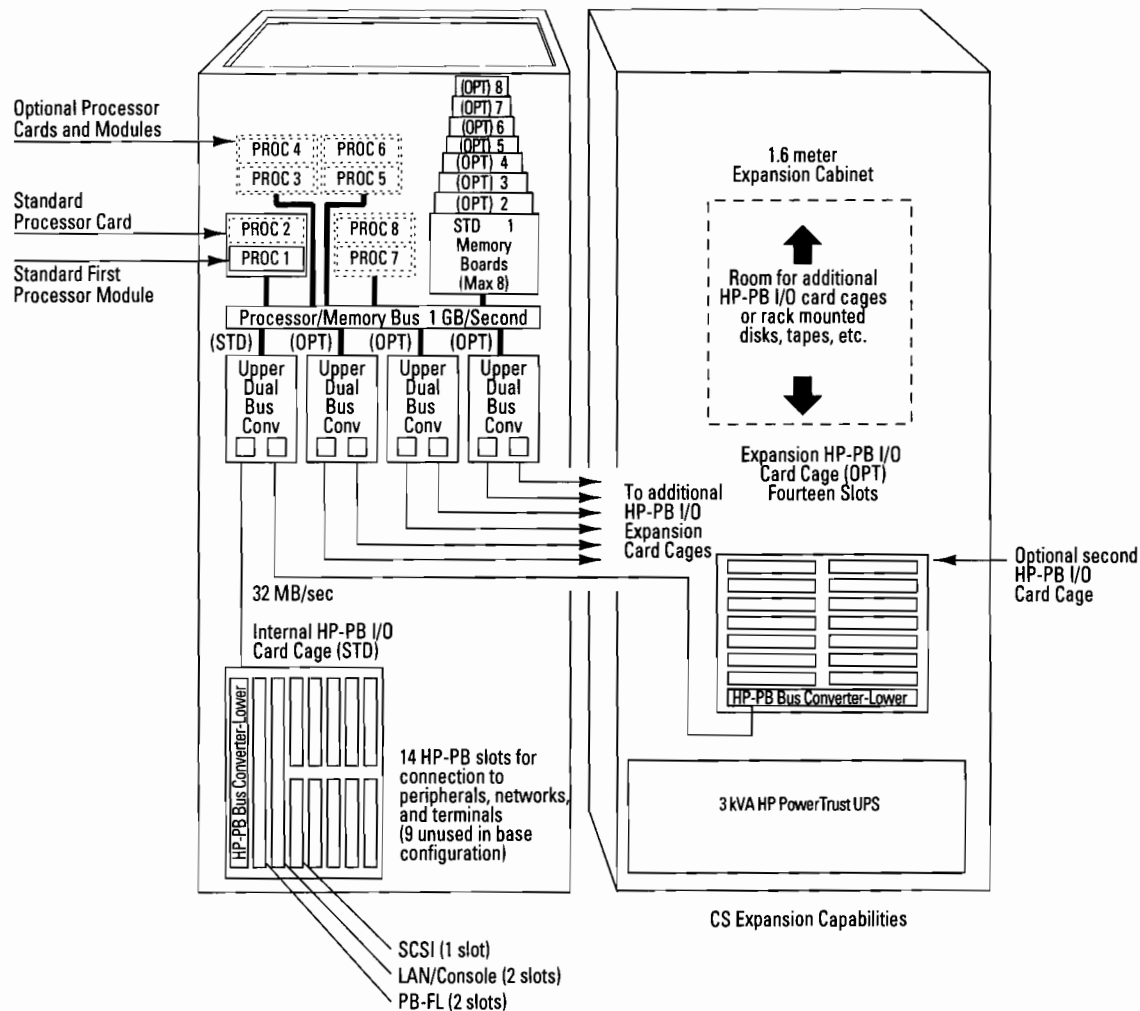
Processor Expansion

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 5.3 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 expanded to 112 I/O slots.

Table 5.4

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	

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).

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.

Slot Availability

Processor/Memory Bus (PMB) Card Slot Availability

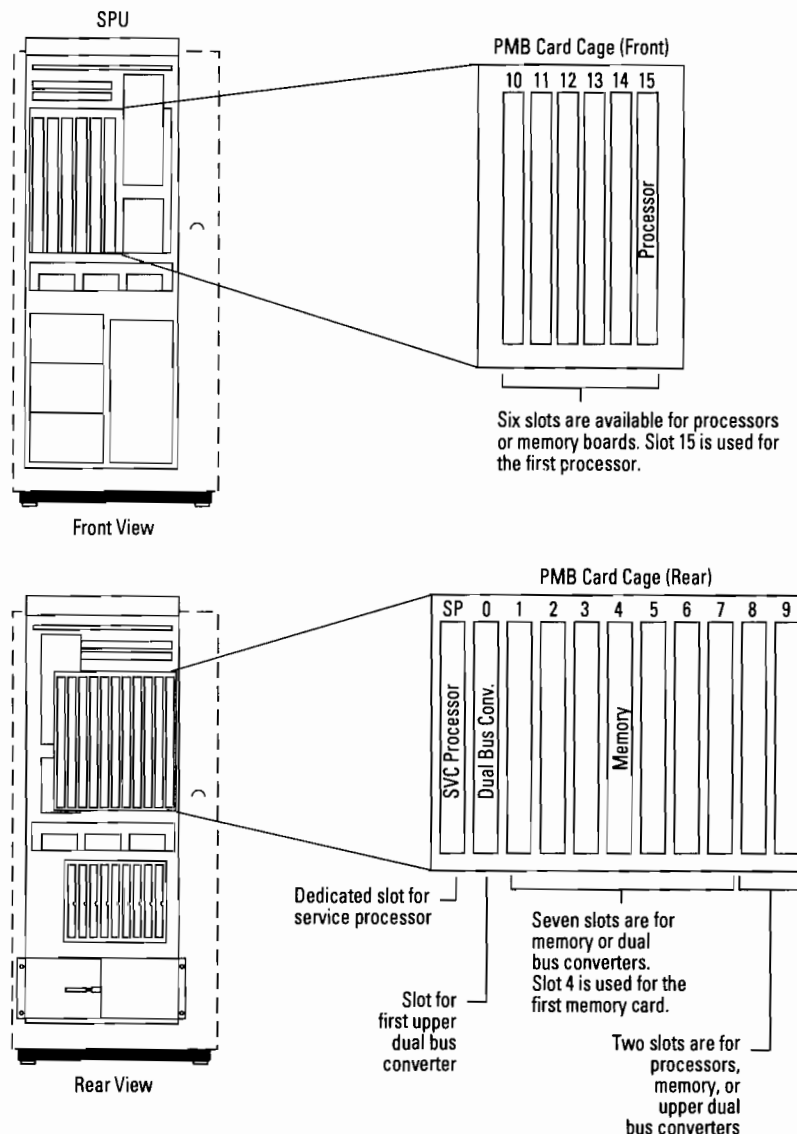
There is a front and a rear PMB card cage in the upper section of the SPU system cabinet. Refer to the PMB card cage slot illustration, **Figure 5.4**. The Processor Cards, Memory Array Cards, and Dual Bus Converter Cards must be

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 5.4 Processor/Memory Bus (PMB) Card Cage Slots

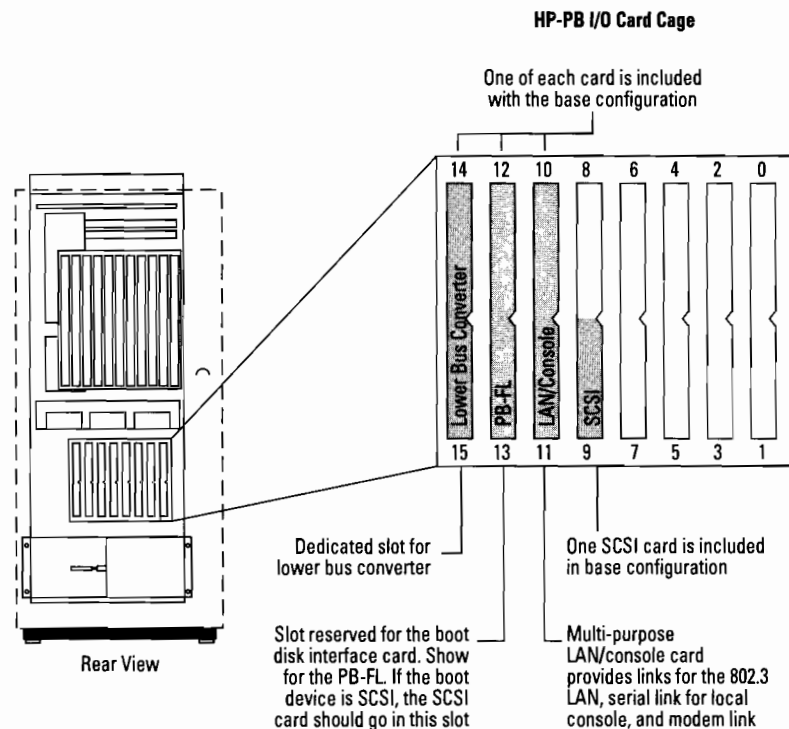


HP-PB I/O Card Slot Availability

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 5.5 HP-PB I/O Card Cage Slots



starting at the base of the Expansion Cabinet working upwards, unless an HP PowerTrust UPS is racked in the same cabinet. In that case the UPS should be racked at the base. 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
- Integrated 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 additional 802.3 LANIC cards are needed, the HP-PB 802.3 LAN card (36923A Option 002) must be ordered.

Table 5.5

HP-PB Cards	Product Number
PB-FL	28616A
SCSI	28642A
Fast/Wide SCSI	28696A
802.5 Token Ring	J2167A
802.3 LAN	36923A opt. 002
FDDI	J2245A
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 with the Corporate Business System

HP-PB I/O Card Cage Performance Guidelines

The maximums stated in **Table 5.6** are to optimize system performance. These values should not be confused with the maximum number of cards supported as shown in **Table 5.1**. To optimize system performance, the HP-PB I/O guidelines in **Table 5.6** 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 5.7**).
- 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 5-15.)
- 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 5.4**.
- 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 in Section 6.

Table 5.6 Maximum Configuration for Optimal Performance

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" (Table 5.7)
SCSI	Single-high	5 ¹	5	Refer to "Power Budget Worksheet" (Table 5.7)
Fast/Wide SCSI	Double-high	5 ⁴	15	Refer to "Power Budget Worksheet" (Table 5.7)
PBA-IB	Double-high	2	4	Refer to "Power Budget Worksheet" (Table 5.7)
802.3 LANIC	Single-high	3 ²	N/A	2 ³
802.5 Token Ring	Single-high	1	N/A	1
LAN/Console	Double-high	1	N/A	1
FDDI	Double-high	2	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.

⁴ Four for the HP-PB internal card cage.

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 5.7) 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 5.7 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 (ThinLAN)		0.40	14.20	0.40				2	
LAN/Console (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	
Fast/Wide SCSI		.12	4.72	0.00				2	
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	
FDDI		0.00	3.7	0.00				2	
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.

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, 1.8 kVA, or 1.3 kVA HP PowerTrust UPSs can be ordered for providing protection to additional Expansion Cabinets. See Section 6 for more details on the HP PowerTrust UPS product line.

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 external 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 Section 6. In computing the Volt-Amperes to be provided by the first HP PowerTrust UPS, use **Table 5.8** 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 HP PowerTrust UPS will support no more than two Expansion Cabinets. When a single 3 kVA 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 9- or 25-pin RS-232C type modem 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 5.8 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

Section 6.

Cabinets and Uninterruptible Power Supply

Cabinets for the HP 3000 Business Systems

Product Overview

Two cabinets are available for racking HP 3000 Business Systems as well as for racking disks, tapes, Distributed Terminal Controllers (DTCs), HP PowerTrust UPSs, and additional Corporate Business Systems HP-PB I/O card cages. A 1.1 meter cabinet provides 21 EIA (Electronic Industries Association) units of rack space (one EIA unit = 1.75 inches). The 1.6 meter cabinet provides 32 EIA units of rack space.

All peripherals must be racked in the 1.6 meter expansion cabinet for the Corporate Business System, not in the SPU cabinet.

How to Order Cabinets and Peripherals

Cabinets can be ordered as a factory integrated product or as a standalone product. See **Table 6.1**. The factory integrated cabinet provides a choice of peripherals as options to the cabinet which are rackmounted at the factory. Additional separate peripherals

Table 6.1 Cabinet Overview

Product Number	Factory Integrated	Racking Space Available (EIA units)	Power Distribution	Maximum Current	Height	Width	Depth
C2785A	No	21	100–120V/200–240V	16A	1.1 m	.48 m	.9 m
A1883A	Yes	21	100–120V/200–240V	16A	1.1 m	.48 m	.9 m
C2786A	No	32	100–120V/200–240V	16A	1.6 m	.48 m	.9 m
A1884A	Yes	32	200–240V	16A	1.6 m	.48 m	.9 m

can be ordered as add-on products to the cabinet and rack-mounted at the customer site by a 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. Bundled standard into the CS 995/991 system is one Factory Integrated Cabinet for the system UPS and initial system peripherals.

Supported Racked Components

The HP 3000 Business System cabinets support a variety of HP 3000 SPU, disk drives, tape drives, UPSs, DTCs, and the Corporate Business Systems HP-PB I/O Card Cage. Combinations of supported products are

limited only by space inside the cabinet and the 16-amp maximum current limit. 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. Refer to **Table 6.2** for a list of supported peripherals in the 1.1 and 1.6 meter cabinets.

Table 6.2 Components Supported in the 1.1 and 1.6 Meter Cabinets

Product Number	Description	EIA Units	Required Mounting Hardware	Current Consumption (VAC)		Power Required (VA)	
				120	208–240	120	200–240
SPUs							
	Series 9x7LX	6	C2797A for standalone rack C2797AZ for factory installed rack	6.5 A	3.5 A	N/A	N/A
	Series 9x7RX/SX	10	C2798A for standalone rack C2798AZ for factory installed rack	12 A	6 A	N/A	N/A
	Series 9x8LX/RX	6	C2803A for standalone rack A2962AZ for factory installed rack	6.5 A	3.5 A	600	600
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	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	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
C3040R/RZ	One 2 GB 3 1/2-inch SCSI disk	4	Included	1.08 A	0.7 A	129.6	168
C3041R/RZ	Two 2 GB 3 1/2-inch SCSI disks	4	Included	1.52 A	0.94 A	182.4	225.6
C3042R/RZ	Three 2 GB 3 1/2-inch SCSI disks	4	Included	1.96 A	1.18 A	235.2	283.2
C3550R	One 2 GB 3 1/2-inch Fast/Wide SCSI disk	4	Included				
C3551R/RZ	Two 2 GB 3 1/2-inch Fast/Wide SCSI disks	4	Included	1.0 A	0.7 A	120	168
C3553R/RZ	Three 2 GB 3 1/2-inch Fast/Wide SCSI disks	4	Included	2.3 A	1.2 A	276	288
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
C3560U	600 MB CD-ROM drive	4	Included				
HP-FL Disk Array ^{3,4}							
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

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 00G for field service installation.

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

⁴ HP-FL disk arrays with suffix HZ and BZ (denote factory integrated) are not available in the 1.1 meter factory integrated cabinet.

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

NOTE: Suffixes RZ, HZ, BZ, and AZ denote racking performed in a factory integrated cabinet at the factory. Suffixes A, S, XC, SX, R, HA, and B denote racking performed in a standalone cabinet at the customer site by a CE.

Table 6.2 Components Supported in the 1.1 and 1.6 Meter Cabinets (cont'd)

Product Number	Description	EIA Units	Required Mounting Hardware	Current Consumption (VAC)		Power Required (VA)	
				120	208–240	120	200–240
Data Terminal Connects							
2340A	DTC16	6	35199E	2 A	1 A	240	240
J2062A(Z)	DTC16iX	1	Option 1AC (standalone)	0.5 A	0.25 A	60	60
J2063A(Z)	DTC16MX	1	Option 1AC (standalone)	0.5 A	0.25 A	60	60
J2064A(Z)	DTC16RX	1	Option 1AC (standalone)	0.5 A	0.25 A	60	60
J2070A(Z)	DTC72MX	3-10	Option 1AC (standalone)	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
Filler Panels							
Package of Six One-EIA-Unit Filler Panels ⁵							

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

HP PowerTrust Uninterruptible Power Systems

Product Overview

Hewlett-Packard provides a wide range of deskside and rackmountable HP PowerTrust Uninterruptible Power Supplies (UPSs) which can be used to provide power protection for HP 3000 9x8LX/RX and 995/991 systems. The HP PowerTrust UPSs feature:

- Protects against facility power interruption
- Worldwide support for use with HP 3000 systems

- Supplies (at least) 15 minutes of continuous backup power
- Four capacities
 - 600 VA (volt-amperes), deskside
 - 1300 VA, deskside
 - 1.3 kVA rackmount
 - 1.8 kVA rackmount
 - 3.0 kVA, rackmount
- Includes 2.5 m RS-232 cable to communicate from UPS to SPU
- Working with the HP PowerTrust UPS Monitor/iX software, UPSs can send messages to system console
- Cables connectors are male DB-9 at UPS and male DB-25 at the HP 3000 system end

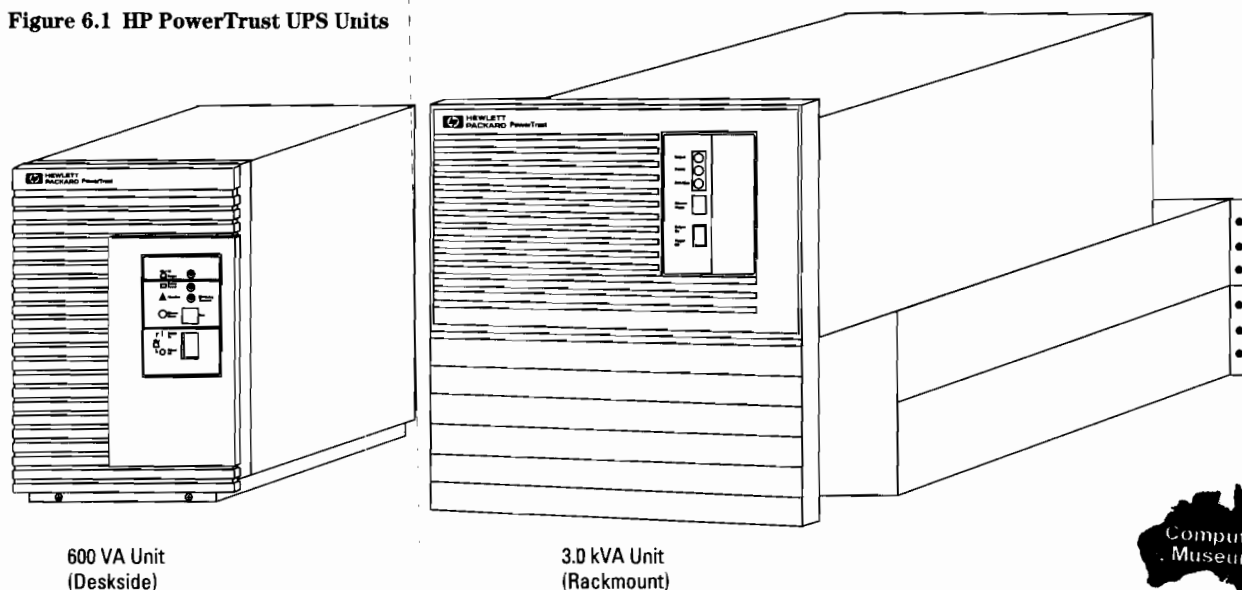
Power Protection

The HP PowerTrust UPS provides up to 15 minutes of uninterrupted power after normal AC power has been interrupted for the HP 3000 Series 9x8 or 991/995 systems. This is similar to the battery backup unit on other HP 3000 systems. The HP PowerTrust UPS will work properly with the HP 3000 Series 9x8LX/RX systems and Corporate Business Systems 991 and 995 and MPE/iX Release 4.0; however, MPE/iX Release 5.0 adds the HP PowerTrust UPS Monitor/iX software for the management of HP PowerTrust UPSs on the HP 3000 Series 9x8 or 995/991 systems. The HP PowerTrust UPS Monitor/iX detects all incoming AC power

Table 6.3 HP PowerTrust UPS Product Summary

Product	Capacity	Configuration	Input Power	Output Power Connections	Unpackaged Dimensions (W×H×D)	Packaged Weight	EIA
A2941A	600 VA	Deskside	North America/Asia: 100–120V/6.7A Europe: 200–240V/3.0A	Worldwide: (4) IEC 320–C13	22.7 cm × 35 cm × 39.5 cm	20.9 kg 46 lbs	N/A
A2994A	1300 VA	Deskside	North America/Asia: 100–127V/14–12A Europe: 200–240V/7–6A	(4) IEC C320–C13 (1) IEC C320–C15	47.6 cm × 22.7 cm × 59.7 cm	87.0 kg 192 lbs	N/A
A2996A	1.3 kVA	Rackmount	North America/Asia: 100–127V/14–12A Europe: 200–240V/7–6A	(4) IEC C320–C13 (1) IEC C320–C19	42.5 cm × 25.5 cm × 61 cm	89.8 kg 198 lbs	6
A2997A	1.8 kVA	Rackmount	North America/Asia: 100–127V/20–16A Europe: 200–240V/10–8.2A	(6) IEC C320–C13 (1) IEC C320–C19	42.5 cm × 25.5 cm × 61 cm	133 kg 295 lbs	9
A2998A	3.0 kVA	Rackmount	North America/Asia: 200–240V/30A; L6-30 Europe: 200–240V/30A; hardwire	North America/Asia: (1) 240V NEMA L6-30 (1) IEC 320–C19 Europe: (1) 240V/30A hardwire receptacle (1) IEC 320–C19	42.5 cm × 51.1 cm × 61.5 cm	197 kg 434.5 lbs	12

Figure 6.1 HP PowerTrust UPS Units



600 VA Unit
(Deskside)

3.0 kVA Unit
(Rackmount)



failures on the HP 3000 Series 9x8LX/RX CS 995/991 system and Corporate Business Systems 991 and 995 and reports all HP PowerTrust UPS power failure events to the HP 3000 system logs and to the system operator. (HP PowerTrust UPS Monitor/iX software only supports HP PowerTrust UPSs). The HP PowerTrust UPS Monitor/iX maintains communication with the HP PowerTrust UPS via an RS-232 connection to the system. If all components of the HP 3000 Series system are power protected, then normal operation and/or system shutdown can be accomplished during the 15 minutes of power protection.

600 VA Unit

The 600 VA unit is designed to supply power for a 9x8 SPU and a Series 700/xx console. The UPS can support up to 4 individual devices. Each device plugs into the back of the UPS unit with IEC 320 style jumper cords. All HP desktop and deskside devices can

utilize this style of removable power cord. Two cords are included with each UPS unit for use with such devices as the SPU and the HP 700/xx console terminal. Cords for additional devices may be purchased separately (P/N 8120-1625).

NOTE: The 600 VA UPS is intended for use with small integrated servers, PCs, workstations, and terminals only. It is *not* suitable for ac-motorized devices such as standalone disks, disk arrays, and laser printers.

1300 VA and 1.3 kVA Unit

The 1300 VA deskside unit and the 1.3 kVA rackmountable unit are designed to supply power for the 9x8 SPU either standalone or in a 1.1 or 1.6 meter cabinet and also for add-on peripherals to 9x8 or 995/991 systems racked in 1.1 or 1.6 meter cabinets. The 1300 VA and 1.3 kVA UPSs contain two field replaceable battery packs.

The UPSs have receptacles for up to 4 individual devices. The 1.3 kVA has a cabinet connection as well. Each device plugs into the back of the UPS unit with IEC 320 style jumper cords. All HP desktop and deskside devices can utilize this style of removable cord. Two cords are included with each 1300 VA UPS unit for use with such devices. Cords for additional devices may be purchased separately (P/N 8120-1625).

Additionally, the 1300 VA deskside unit provides one IEC 320 female C15 HOT version receptacle for connecting to high current products. The 1.3 kVA rackmountable unit provides one IEC 320 female C19 receptacle for connecting to a PDU in a cabinet.

1.8 kVA

The 1.8 kVA rackmountable unit is designed to supply power for the 9x8 SPU either standalone or in a 1.1 or 1.6 meter cabinet and also for add-on peripherals to 9x8 or 995/991 systems racked in 1.1 or

1.6 meter cabinets. The 1.8 kVA UPS contains one, field replaceable battery pack and two external battery packs in a battery box.

The UPS has receptacles for up to 6 individual devices and/or one cabinet. Each device plugs into the back of the UPS unit with IEC 320 style jumper cords. All HP desktop and desktide devices can utilize this style of removable cord. Two cords are included with each 1.8 kVA UPS unit for use with such devices. Cords for additional devices may be purchased separately (P/N 8120-1625).

The 1.8 kVA rackmountable unit provides one IEC 320 female C13 receptacle for connecting a cabinet.

3.0 kVA Unit

The 3.0 kVA unit is designed to provide power for two separate devices.

The first power outlet on the back of the 3.0 kVA HP PowerTrust UPS is designed to provide power for the 1.6-meter expansion cabinet that the UPS is mounted in. With this configuration, all devices plugged into this expansion cabinet's power distribution strip will be protected by the UPS. To order a cabinet with this power strip configuration, specify cabinet A1884A, Opt. 021. This same cabinet is used for both North America/Asia as well as Europe. Existing 1.6-meter cabinets may be upgraded to this configuration by ordering cabinet upgrade product, A3085A Opt. 001.

The second power outlet on the back of the 3.0 kVA uses a 240V L6-30 style connector (hardwire for Europe). This is designed to provide power for a large SPU (e.g., Corporate Business Server) or a specially configured 1.6 meter expansion cabinet. See **Figure 6.2**. Connecting a separate expansion cabinet to this outlet provides UPS power protection for all devices that are installed in that cabinet. To plug an expansion cabinet into this outlet, specify cabinet P/N A1884A Opt. 022 for North America and Asia, and A1884A Opt. 023 for Europe. This specifies that the power distribution strip in the cabinet is configured with the proper cord and connector to plug into the 3.0 kVA UPS which is in an adjacent rack. The European version is designed for hardwire connection to the UPS. Existing 1.6 meter cabinets may be upgraded to this configuration by ordering cabinet upgrade product A3085A Opt. 002 for North America/Asia, or Opt. 003 for Europe.

How to calculate how many systems and/or devices can be powered by an HP PowerTrust UPS

Each HP PowerTrust UPS is capable of supplying power to one or more systems or peripheral devices as long as the total volt-ampere (VA) capacity of the UPS is not exceeded. Use the worksheets provided in this chapter to determine the UPS required.

Follow the steps outlined in the Cabinet Racking Worksheet (**Table 6.4** or **Table 6.6**).

How to calculate how many RS-232 connections are needed to control HP PowerTrust UPSs

Each UPS must be connected to an RS-232 connection. Keep the following rules in mind when filling out your worksheets for the DTCs. It is possible that your DTC configurations will need modification after all your UPS requirements have been determined.

- For Series 9x8 systems: If only one UPS is in the system, then it connects to the dedicated UPS RS-232 port on the 9x8 CPU, and no DTC ports are needed for UPS connection. But if more than one UPS is used, then each UPS beyond the first UPS needs one 25-pin RS-232 port on a DTC.
- For Series 991/995 systems: Each UPS in the system needs one 25-pin RS-232 port on a DTC.
- When a DTC port is needed for a UPS connection, it can *not* be one of the RJ-45 direct ports, because the UPS I/O cable will not fit into this port. It *must* be a *DB25 connector* port, either direct-connect type or modem type.

Factory Integrated System Solutions (A1883A and A1884A)

For quick, easy ordering, and installation, the Factory Integrated Expansion Cabinets (A1883A and A1884A) are the recommended racking choice. The integrated cabinet contains options for disk storage, tapes, DTCs, HP PowerTrust UPSs, and Corporate Business Systems HP-PB I/O Card Cages. When the system and racking options are ordered together, the entire system (including SPU package, disk, tape, etc.) will be pre-installed in the cabinet prior to shipment from the factory. The first integrated cabinet is included standard with the CS 995/991. Refer to the Factory Integrated Expansion Worksheet (**Table 6.4**) for a list of supported options and add-on peripherals, EIA units, and power requirements.

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 tapes, 7980 tape drives, and 4280 cartridge tape drives.) Peripherals that are part of the Integrated Expansion Cabinet can also be ordered later as standalone and installed at the customer site.

NOTE: HP-FL disk arrays are only available in the 1.6 meter factory integrated cabinet. They are not available in the 1.1 meter factory integrated cabinet.

Integrated Cabinet Racking Configuration Worksheet

The Factory Integrated Expansion Cabinet Racking Configuration Worksheet (**Table 6.4**) illustrates the integrated expansion cabinet options and add-on products. Use the worksheet to determine supportability of the proposed peripheral and Corporate Business Systems 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 units for the 1.6 meter cabinet or less than or equal to 21 units for the 1.1 meter cabinet.
3. Multiply the quantity entered for each peripheral and card cage by the Power Required listed for each component (**Table 6.2**). 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.

4. If HP PowerTrust UPS power protection is going to be used, sum all of the Volt-Amperes of all components. Choose the appropriate HP PowerTrust rackmounted UPS based on the Volt-Amperes required. Remember that up to two cabinets may be protected using a single 3 kVA HP PowerTrust UPS.

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 6.4 Factory Integrated Expansion Cabinet Racking Configuration Worksheet

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power* Required (Table 6.2)	Total Power Required (VA Units)
I. SPU (select SPU to be racked)						
<i>C2797AZ (9x7LX), C2798AZ (9x7RX/9x7SX), or A2962AZ (9x8LX/RX) racking hardware must be ordered for factory racking. Factory Integrated Cabinets have been structured so that all orderable configurations will not exceed the 16-amp maximum current limit.</i>						
917LX, 927LX, 937LX, 947LX	_____	× 6 = _____				
918LX, 918RX, 928LX, 928RX, 968LX, 968RX, 978LX, 978RX	_____	× 6 = _____		_____ × 600VA = _____		
937RX, 947RX, 957RX, 967RX, 937SX, 947SX, 957SX, 967SX, 987RX, 987SX, 987/150RX, 987/150SX, 987/200SX	_____	× 10 = _____				
CS 990/992			N/A			
CS 995/991 SPU (see Table 5.8)			N/A	_____ × _____ = _____		
II. A1883A 1.1 meter cabinet. 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.						
or						
A1884A 1.6 meter cabinet						
Filler panels to cover unused space will be installed automatically at the factory for integrated cabinet products.						
Power Options:						
AW3—Adds U.S. 200V–240V power						
AW5—Adds European 200V–240V power						
Disk Products:						
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 = _____		_____ × _____ = _____		
C3040RZ ⁴ — One 2 GB 3 1/2-inch SCSI disk	_____	× 4 = _____		_____ × _____ = _____		
C3041RZ ⁴ — Two 2 GB 3 1/2-inch SCSI disks	_____	× 4 = _____		_____ × _____ = _____		
C3042RZ ⁴ — Three 2 GB 3 1/2-inch SCSI disks	_____	× 4 = _____		_____ × _____ = _____		
C3551RZ ⁵ — Two 2 GB 3 1/2-inch Fast/Wide SCSI disks	_____	× 4 = _____		_____ × _____ = _____		
C3553RZ ⁵ — Three 2 GB 3 1/2-inch Fast/Wide 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 availability disk	_____	× 6 = _____		_____ × _____ = _____		
C2252BZ— Adds 2.7 GB HP-FL disk without parity	_____	× 6 = _____		_____ × _____ = _____		
C2258HZ ⁴ — Adds 4.0 GB HP-FL high availability disk	_____	× 6 = _____		_____ × _____ = _____		
C2258BZ ⁴ — Adds 4.0 GB HP-FL disk without parity	_____	× 6 = _____		_____ × _____ = _____		
C2259HZ ⁴ — Adds 8.0 GB HP-FL high availability disk (1.6 m cabinet only)	_____	× 6 = _____		_____ × _____ = _____		
C2259BZ ⁴ — Adds 8.0 GB HP-FL disk without parity (1.6 m cabinet only)	_____	× 6 = _____		_____ × _____ = _____		

(Continued)

* Note: Power requirement calculations are not required for the 9x7 or CS 990/992. These systems include Battery Backup units and are not supported with the HP PowerTrust UPS.

Table 6.4 Factory Integrated Expansion Cabinet Racking Configuration Worksheet (cont'd)

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 6.2)	Total Power Required (VA Units)
DTC Products:						
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.						
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 =	_____			
<i>For example, to configure 48 modem ports and 24 direct ports, order: One option 003 (provides 72 ports), two option UG6 (provides 48 modem ports on six MDPs), one J2087AZ (provides racking for up to ten MDPs)</i>						
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 They do not require additional EIA units.						
<i>Note: The DTC72MX comes with three 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. A Telnet Access Card and an X.25 card can be used in the same DTC.</i>						
HP-PB I/O Card Cage (Corporate Business Systems only):						
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 =	_____	_____ × _____ =	_____	_____

(Continued)

Table 6.4 Factory Integrated Expansion Cabinet Racking Configuration Worksheet (cont'd)

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 6.2)	Total Power Required (VA Units)
III. Add-on Peripherals^{1,2,3}						
Not factory racked peripherals. Filler panels and rackmount kits must be ordered for add-on peripheral products.						
	_____	x _____	= _____	_____	x _____	= _____
	_____	x _____	= _____	_____	x _____	= _____
	_____	x _____	= _____	_____	x _____	= _____
	_____	x _____	= _____	_____	x _____	= _____
IV. Optional Power Protection						
A2998A—3 kVA HP PowerTrust UPS	_____	x 12	= _____			
A2996A—1.3 kVA HP PowerTrust UPS	_____	x 6	= _____			
A2997A—1.8 kVA HP PowerTrust UPS	_____	x 9	= _____			
V. Total EIA Units			= _____			
VI. Integrated Cabinet:						
Order the cabinet(s) that meet your total EIA requirements (see Table 6.1 Cabinet Overview)						
VII. Total Power					= _____	
For 9x8, 995, and 991 systems must order the HP PowerTrust UPS that meets your total power protection requirements (see Table 6.3 HP PowerTrust UPS Product Summary)						

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 power patches or 5.0.⁵ Not orderable until September 1994.

Field Installed Cabinets

Standalone expansion cabinets (C2785A and C2786A) are available for customers who decide to order peripherals and Corporate Business Systems 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). 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 units for the 1.6 meter cabinet or less than or equal to 21 units for the 1.1 meter cabinet.

3. Sum the current requirements of all components to ensure the 16-amp current limit is not exceeded. Refer to **Table 6.2** 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 6.11**). 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. If HP PowerTrust UPS power protection is going to be used, sum all of the Volt-Amperes of all components. Choose the appropriate HP PowerTrust rackmounted UPS based on the Volt-Amperes required. Remember that up to two cabinets may be protected using a single 3 kVA HP PowerTrust UPS.

The standalone expansion cabinet racking configuration worksheet (**Table 6.6**) illustrates the standalone cabinet products.

Table 6.5 Product Structure

Product/Option	Description
C2785A	1.1 meter cabinet (21 EIA units)
Opt. AW3	100–120V with U.S. power cord
Opt. AW5	200–240V with European power cord
Opt. AW4	Substitute 200–240V for U.S.
C2791A	Add six 1-unit filler panels
E4464A	Front door (can be locked for security purposes)
C2786A	1.6 meter cabinet (32 EIA units)
Opt. AW4	200–240V with U.S. power cord
Opt. AW5	200–240V with European power cord
Opt. AW3	100–120V with U.S. power cord
C2791A	Add six 1-unit filler panels
E4465A	Front door (can be locked for security purposes)

Table 6.6 Standalone Expansion Cabinet Racking Configuration Worksheet

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 6.2)	Total Power Required (VA Units)
I. C2785A 1.1 meter racking cabinet. The C2785A 1.1 meter cabinet is not available for the CS 995 and CS 991 systems because its height is not the same as that of the CS 99x SPU. Filler panels to cover unused space must be ordered separately. or C2786A 1.6 meter racking cabinet Filler panels to cover unused space must be ordered separately.	1	4				
Power Cords:						
ABA—Adds U.S. 200V–240V power cord						
ABB—Adds European 200V–240V power cord						
Disk Products: ^{3,4,5}						
		x	=		x	=
		x	=		x	=
		x	=		x	=
		x	=		x	=
		x	=		x	=
		x	=		x	=
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.						
Additional Peripherals: ^{1,2}						
		x	=		x	=
		x	=		x	=
		x	=		x	=
		x	=		x	=
		x	=		x	=

(Continued)

Table 6.6 Standalone Expansion Cabinet Racking Configuration Worksheet (cont'd)

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 6.2)	Total Power Required (VA Units)
DTC Products:						
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.						
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.						
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 48 modem ports and 24 direct ports, order: One option 003 (provides 72 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 They do not require additional EIA units.						
NOTE: The DTC72MX comes with three 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. A Telnet Access Card and an X.25 card can be used in the same DTC.						
HP-PB I/O Card Cage (Corporate Business Systems only):						
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 6.6 Standalone Expansion Cabinet Racking Configuration Worksheet (cont'd)

Component	Quantity	EIA Units	Vertical Space Required (EIA Units)	Quantity	Power Required (Table 6.2)	Total Power Required (VA Units)
II. Optional Power Protection						
A2998A—3 kVA HP PowerTrust UPS	_____	x 12	= _____			
A2996A—1.3 kVA HP PowerTrust UPS	_____	x 10	= _____			
A2997A—1.8 kVA HP PowerTrust UPS	_____	x 10	= _____			
III. Filler Panels						
C2791A—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						
Order the cabinet(s) that meet your total EIA requirements (see Table 6.1 Cabinet Overview)			= _____			
V. Total Power						
For 9x8, 995, and 991 systems must order the HP PowerTrust UPS that meets your total power protection requirements (see Table 6.3 HP PowerTrust UPS Product Summary)					= _____	

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 plus power patch or 5.0 for the C2258/59 disk arrays. This patch can be obtained through Powerpatch or by ordering C3300A.

⁵ Fast/Wide SCSI disks will be orderable September 1994.

Cabling and Racking Configuration Guidelines

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

CS Illustrated Racking Configuration Example

The illustrated configuration in **Figure 6.2** 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 UPSs are shown connected to RS-232 connections of the DTC72MX to provide a communication path between the SPU and the HP PowerTrust UPSs.

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 6.2**) to allow the use of a 10 meter HP-PB Dual Cable.

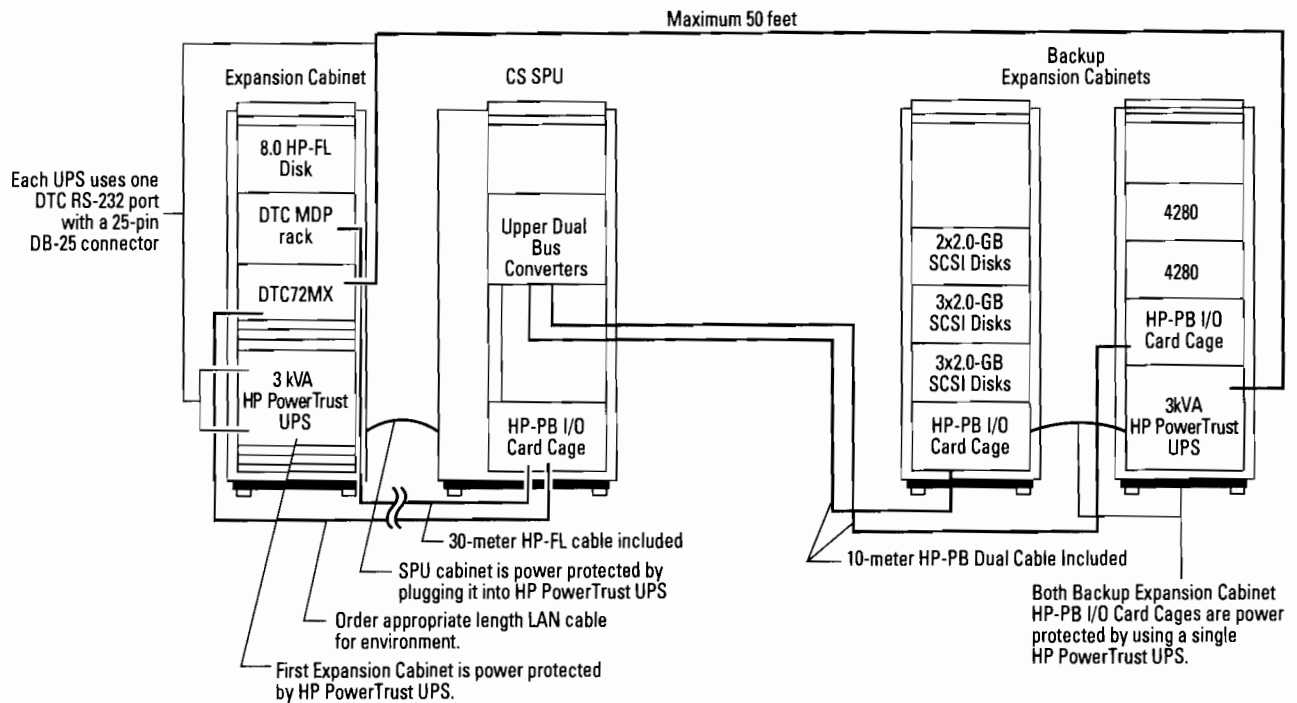
Since each of the two cabinets to the right has an HP-PB I/O Card Cage, an HP PowerTrust UPS is included in one cabinet to provide power protection to both cabinets. This HP PowerTrust UPS is connected to the DTC72MX to provide a communication path between the SPU and the

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 1.75 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 6.3 is an example of a CS 990/992. In this example, since the 990/992 does not support an HP PowerTrust UPS, a UPS is not illustrated.

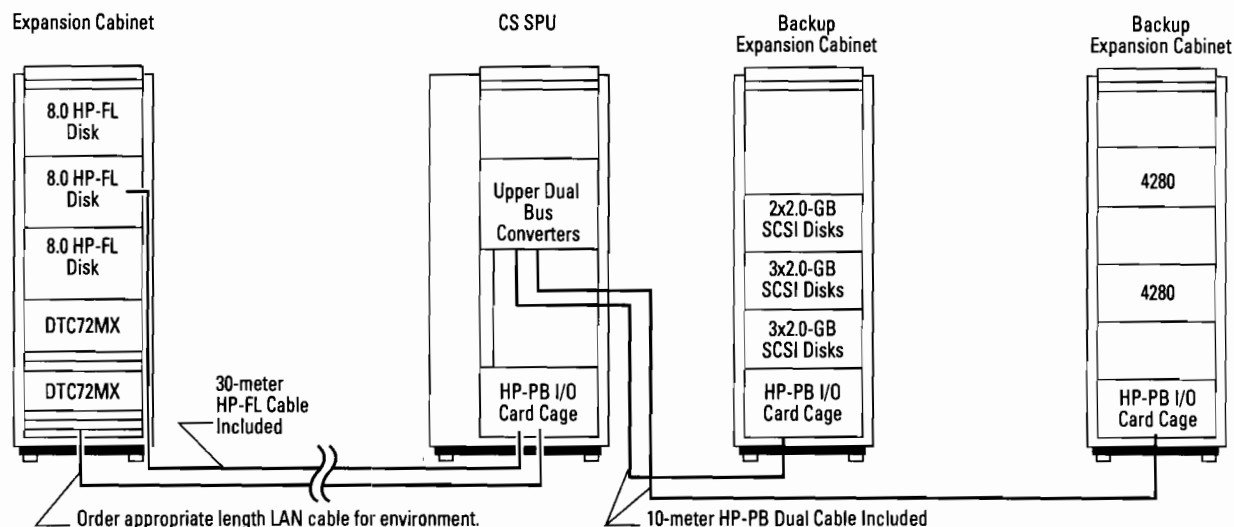
Figure 6.2 CS 995/991 Illustrated Racking Configuration Example



Qty	P/N	Description
1	A1884A	1.6-meter Integrated Expansion Cabinet
2	C2259HZ	8.0-GB HP-FL Disk
1	J2070AZ	DTC72MX
1	Opt. 003	72 RJ45 Direct Ports
1	Opt. UG5	Replace 8 direct with 8 modem DB-25 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" Cartridge Tape
1	A2998A	3kVA HP PowerTrust UPS

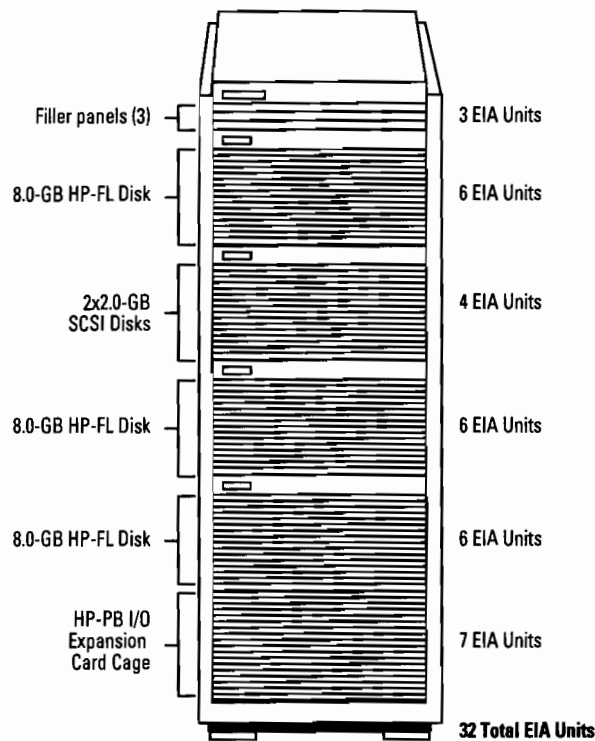
Figure 6.3 CS 990/992 Illustrated Racking Configuration Example (Does NOT include an HP PowerTrust UPS)


Qty	P/N	Description
1	A1884A	1.6-meter Integrated Expansion Cabinet
3	C2259HZ	8.0-GB HP-FL Disk
2	J2070AZ	DTC72MX
1	Option 002	48 RJ45 Direct Distribution Ports
1	Option 003	72 RJ45 Direct Distribution Ports

Qty	P/N	Description
1	A1884A	1.6-meter Integrated Expansion Cabinet
1	C3024RZ	2 x 2.0-GB SCSI Disks
2	C3025RZ	3 x 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" Cartridge tape

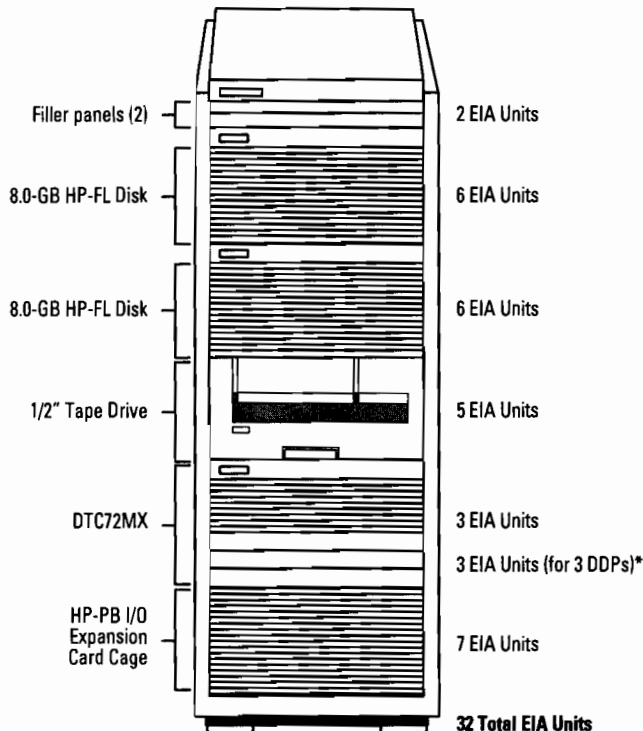
Figure 6.4 1.6 Meter Factory Integrated Backup Expansion Cabinet Configuration Example for the CS



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 6.5 1.6 Meter Standalone Backup Expansion Cabinet Configuration Example for the CS



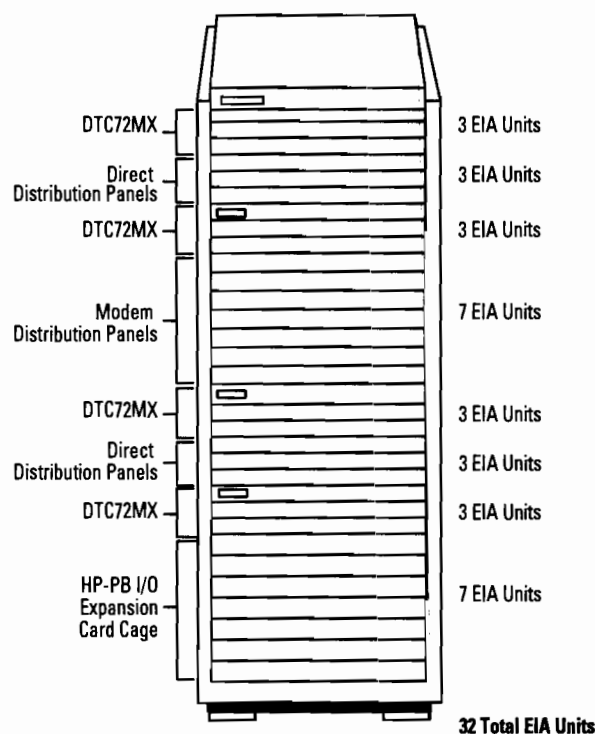
Qty	P/N	Description
1	C2786A	1.6-Meter Standalone Expansion Cabinet
2	C2259HA	8.0-GB HP-FL Disk
1	C7980SX	1/2" SCSI Tape Drive
1	J2070AZ	DTC72MX
1	Option 003	72 RJ45 Direct Ports (includes 3 DDPs)
1	A1828A	HP-PB I/O Card Cage

Note: This configuration requires the following racking hardware:
7980SX 1/2-inch SCSI tape drive option 1A4.

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.

*DDP = Direct Distribution Panel

Figure 6.6 1.6 Meter Factory Integrated Backup Expansion Cabinet Configuration Example for the CS



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 001	24 RJ45 Direct Ports
3	Option UG5	Replace 8 Direct Ports with 8 Modem Ports
1	J2070AZ	DTC72MX
1	Option 001	24 RJ45 Direct Ports
1	Option UG6	Replace 24 Direct Ports with 24 Modem Ports
1	J2087AZ	Rack Mounting Kit (Supports 10 MDPs)

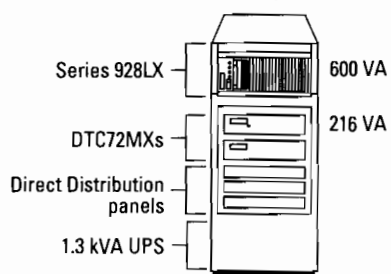
NOTE: Any cabinet containing an HP-PB I/O Card Cage must be power protected by an HP PowerTrust UPS or a customer-provided power protection solution.

9x8 Illustrated Examples

Figure 6.7 Factory Integrated Cabinet Ordering Example—1.1 Meter Cabinet (A1883A) for the 9x8 Systems

Example 1:

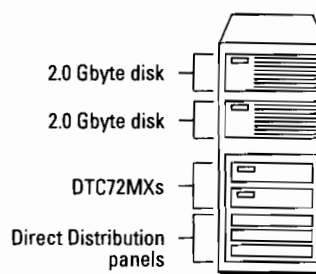
Series 928LX with 3 Gbyte disk, 96 ports



Quantity	Part Number	Description
1	A2934AW	Series 928 SPU with 1.0 GB disk
1	A2948AZ #0DT	Replace standard memory with 64 MB memory
1	A3089A #UBD	100 user license
1	A2960AW	928LX (2 single-high I/O slots)
1	A2962AZ	Add racking hardware
1	A1883A	1.1 meter cabinet
1	A3087A #0DZ	Add one 2.0 GB disk (integrated in 928LX)
2	J2070AZ #002	48 port DTC72MX
1	A2296A # 0DZ	1.3 kVA Rackmount UPS

Example 2:

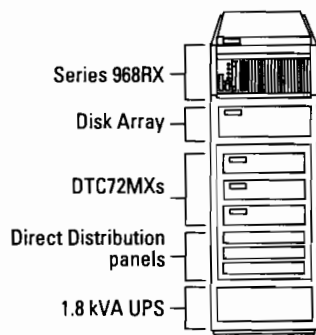
Peripherals only — 4 Gbyte disk, 96 ports



Quantity	Part Number	Description
1	A1883A	1.1 meter cabinet
2	C3040RZ	2.0 GB disk
2	J2070AZ #002	48 port DTC72MX

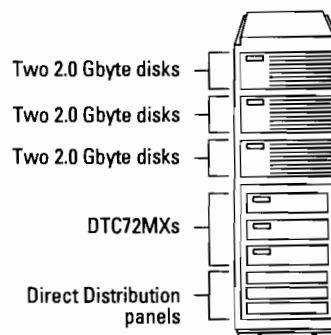
Figure 6.8 Factory Integrated Cabinet Ordering Example—1.6 Meter Cabinet (A1887A) for the 9x8 Systems

Example 3:
Series 968RX with 4 Gbyte disk, 216 ports



Quantity	Part Number	Description
1	A2933AW	Series 968 SPU with 64 MB memory
1	A2948AZ #0DS	64 MB memory
1	A3087A #0DU	Replace standard with 2.0 GB disk
1	A2490A #0DZ	Add one 2.0 GB disk
1	A3092A #UAD	256 user license
1	A2936AW	968RX (4 single-high I/O slots)
1	A2962AZ	Add racking hardware
1	A1884A	1.6 meter cabinet
1	C2258HA	Disk Array
3	J2070AZ #001	24 port DTC72MX
1	A2297A #0DZ	1.8 kVA Rackmount UPS

Example 4:
Peripherals only — 12 Gbyte disk, 216 ports

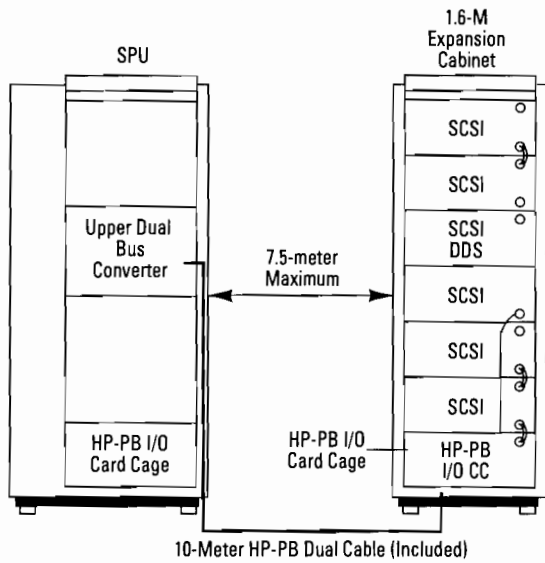


Quantity	Part Number	Description
1	A1884A	1.6 meter cabinet
3	C3044RZ	Two 2.0 GB disks
3	J2070AZ #001	24 port DTC72MXs

SCSI and HP-FL Racking Examples

Figure 6.9 SCSI Racking Examples

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



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 DDS, 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.

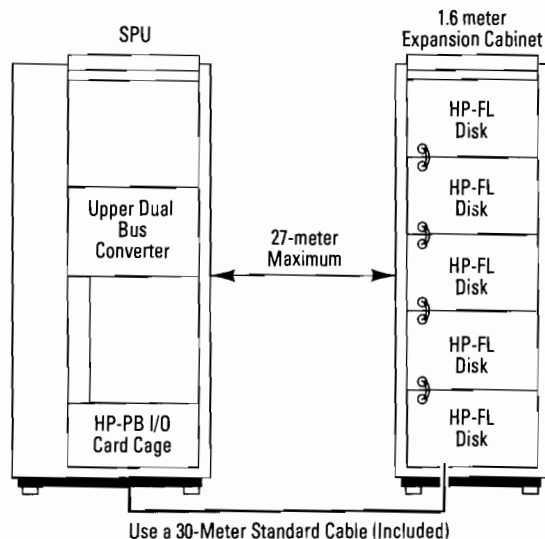
Internal SCSI cable length for each Series 6000 SCSI multi-mechanism package is equivalent to 1.75 meters.

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 6.10 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.



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.

Maximum Cable Length

The maximum combined length of single ended SCSI cable is six meters. The maximum length applies to cables that interconnect each daisy-chained device and the cable lengths that are internal to each device.

The total cable length is the sum of the length of all SCSI cables (see **Table 6.7**).

HP PowerTrust UPS Cabling

The RS-232C cable supplied with the HP PowerTrust UPS is 2 meters with a DB25 25-pin male RS-232C connector on one end (for connection to the 9x8 system or to the DTC) and a DB9 9-pin

Table 6.7 Maximum SCSI Cable Lengths

Where	Cable Length
Inside SPU	
Series 9x7LX, Series 9x8LX/RX	1.5 meters
Series 9x7RX/SX	3.0 meters
Inside Series 6000 Multi-Mechanism Package	
Mini Tower	1.3 meters
Rackmount	1.75 meters
Between the Series 9x8LX/RX and 9x7LX/RX/SX SPU and the first peripheral	1 or 1.5 meters

male connector on the other end (for connection to the UPS). If the 9x8 system or the DTC is more than two meters from the HP PowerTrust UPS, then a 25-pin RS-232C extension cable can be used. The maximum RS-232C cable length is 50 feet.

The following are illustrations showing cabling configurations for the HP PowerTrust UPS. Note only 9x8, 991, and 995 systems support the use of the HP PowerTrust UPS.

Figure 6.11 9x8 Class SPU/UPS Configuration Example #1

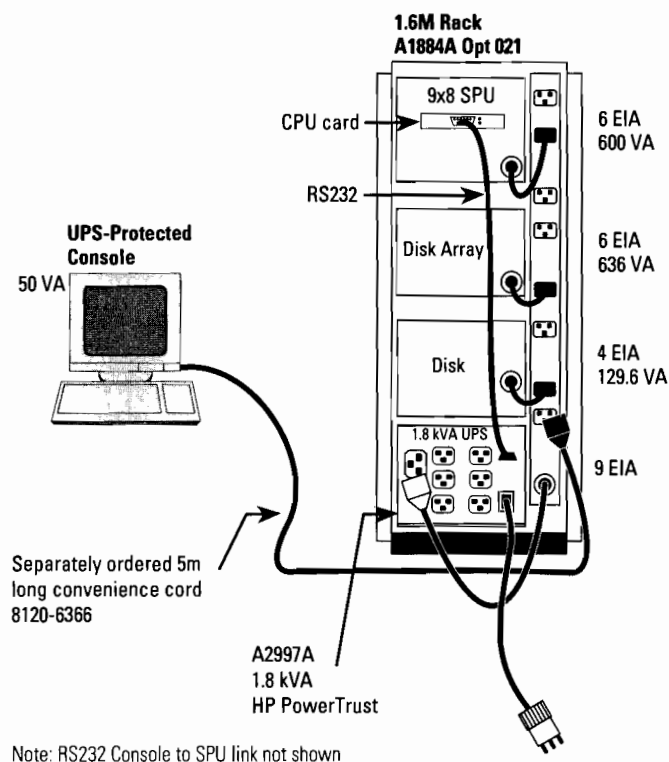


Figure 6.12 9x8 Class SPU/UPS Configuration Example #2

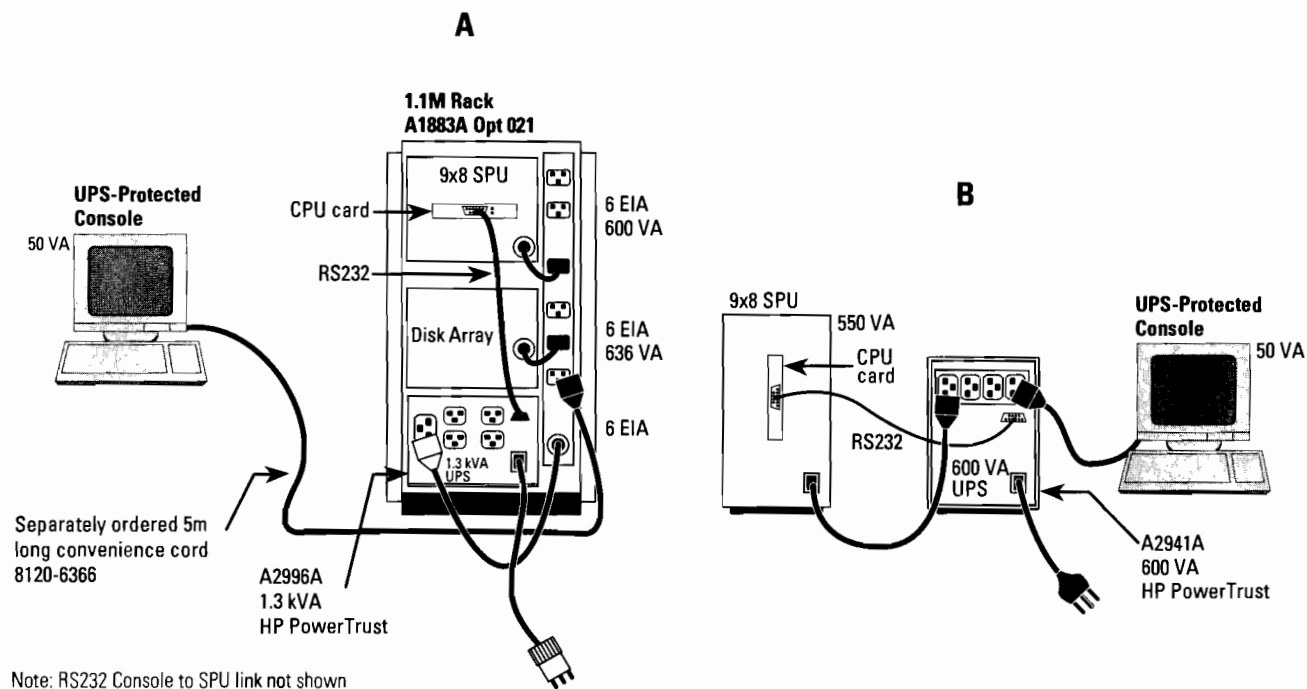
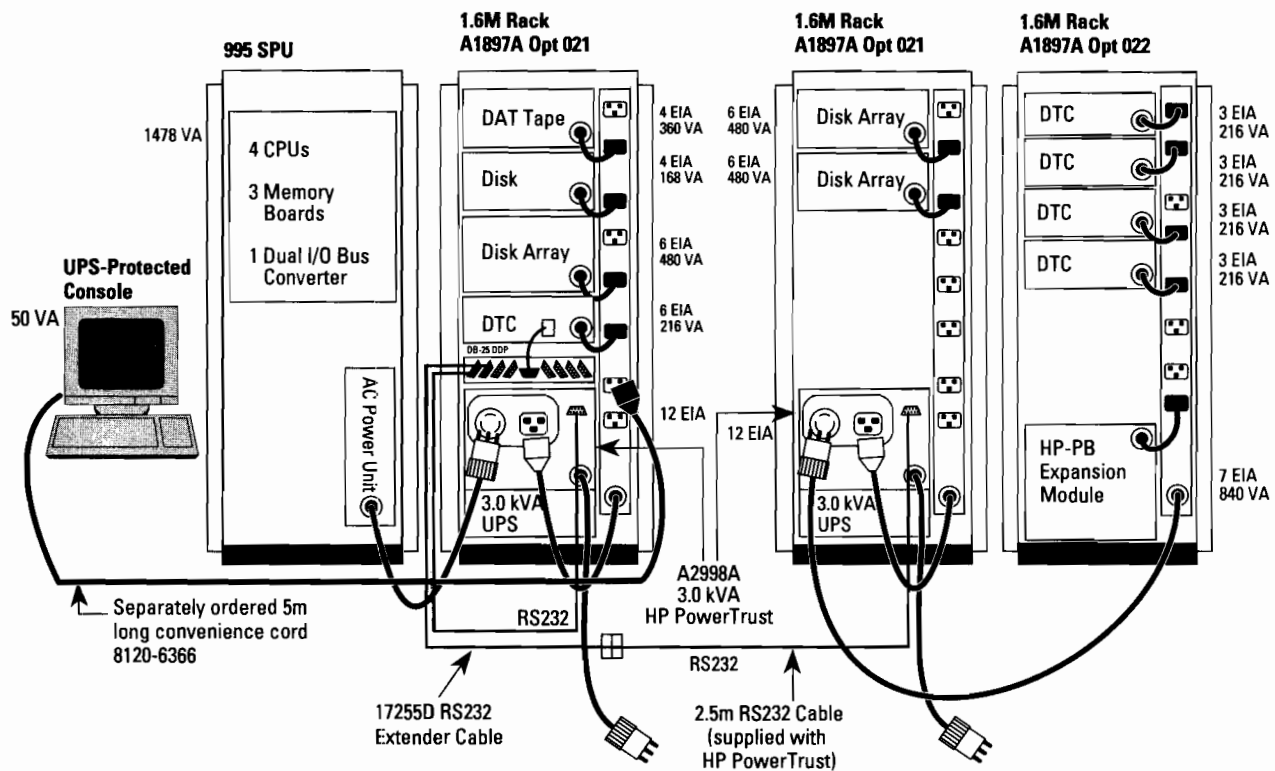


Figure 6.13 995 Class SPU/UPS Configuration Example #1



Note: RS232 Console to SPU link not shown

Section 7. Peripheral Interfaces

The HP 3000 MPE/iX operating system supports interface cards for two types of I/O architectures, HP Precision Bus (HP-PB) also known as NIO, and Channel I/O Bus (CIO or CIB). Refer to **Table 7.1** for NIO and CIO interface cards supported on HP 3000 systems. CIO was a bridge technology (MPE V/E "Classic" to MPE/iX) while the Precision Bus is a true PA-RISC I/O architecture. The Series 920, 922, 932, 948, and 958 systems support both NIO and CIO interface cards. **Not all peripheral devices are supported by these systems. Refer to Tables 8.34 and 8.35 in Section 8 for a comprehensive peripheral-to-system support matrix.**

Table 7.1 I/O Cards on the HP 3000

	9x8LX, 9x8RX, 9x7LX, 9x7RX, 9x7SX, 987/150RX, 987/150SX, 987/200, CS 990, CS 991, CS 992, CS 995 (NIO)	920, 922, 932, 948, 958 (NIO)	(CIO)	925, 935, 949, 950, 955, 960, 980 (CIO)
HP-IB (CIO)			27113A	27113A
PBA-IB (NIO)	A1747A ⁴ 2405	A1747A		
SCSI (CIO)			27251A ³	27251A ^{5,6} 4995
SCSI (NIO)	28642A ² 1825	28642A ³		
F/W SCSI (NIO) ⁷	28696A 2235	N/A	N/A	N/A
HP-FL (CIO)			27115A	27115A
PB-FL (NIO)	28616A ¹			
PBA-FL (NIO)	A1748A ^{1,2}			

¹ PB-FL replaces the PBA-FL.

² Supported only on the Series 9x7 systems and not supported with disk arrays. If a Series 9x7 customer orders C2252/54 or C2258/59, a PB-FL (28616A) **must** be ordered.

³ Not supported as a system disk.

⁴ Not supported as a system disk on the Corporate Business System.

⁵ No boot supported on the Series 925, 935, and 949.

⁶ System boot capability for systems manufactured prior to June 1991 is supported with the purchase of the I/OOC Firmware version 8.0, P/N A1756A, option 463 for Series 950, 955, 960, and 980.

⁷ Supported September 1994.

Interconnect Positioning

SCSI

Use SCSI to:

- Connect disks, optical autochangers, HP 5000 printer family, HP tape drives, and 1/2-inch cartridge tape (3480 compatible) (configurations larger than 15 Gbytes should consider using Fast/Wide disks to achieve high system level performance)
- Satisfy industry standard and open system requirements
- Replace HP-IB as customers migrate to new 900 Series systems

HP-IB (PBA-IB)

Use HP-IB (PBA-IB) to:

- Meet customers need to migrate HP-IB peripherals

HP-FL (PB-FL)

Use HP-FL (PB-FL) to:

- Connect disk arrays on the 900 Series midrange and high end systems
- Satisfy high performance requirements for disk
- Satisfy High Availability requirements for midrange and high end systems (Disk Mirroring, SPU SwitchOver/XL)

- Satisfy longer distance requirements between host and disk

- Satisfy fiber-optic requirements (EMI/RFI noise)

Fast/Wide SCSI

Use Fast/Wide SCSI to:

- Connect disks on the 900 Series midrange and high-end systems
- Satisfy high-performance requirements for disk
- Provide greater configuration flexibility

NOTE: Fast/Wide SCSI is not supported until September 1994.

Table 7.2 Interconnect Positioning

	HP-IB (PBA-IB)	SCSI	HP-FL (PB-FL)	Fast/Wide SCSI
Primary focus	• Upgrade systems with HP-IB devices • Printers	• General interconnect • Industry standard	• Disk arrays on midrange and high-end systems	• Disks • High performance • Industry standard
High availability	No	• Mirrored Disk • SharePlex Clustering	• Parity Array (RAID) • Mirrored Disk • SharePlex Clustering	• Mirrored Disk
Cable length maximum	15 meter	6 meter	500 meter	25 meter
Maximum throughput	1 MB/sec	5 MB/sec	5 MB/sec	20 MB/sec
Sustained throughput relative to HP-IB	1	2×	4×	8×
Maximum devices per interface card	6	7 (5 for performance)	8	15
Interface card size	Single	Single	Double	Double

Table 7.3 Interconnect Product Number Summary

Interface Card	Part Number	Cable(s)	Extender
HP-IB	27113A	10833A (1 meter)	37204B
PBA-IB	A1747A	10833B (2 meter)	
		10833C	
HP-FL	27115A	HFBR-AWQnnn	
PB-FL	28616A		
PBA-FL	A1748A		
Single-Ended SCSI	27251A		
	28642A		
Fast/Wide SCSI	28696A		

Fast/Wide Differential SCSI-2

Description

- 28696A, HP Precision Bus card
- Double-high card
- 20 MB/second burst speed
- 7–10 MB/second maximum sustained throughput
- Supports up to 15 peripherals
- Supports *total* cable lengths up to 25 meters
- Fast/Wide Differential SCSI-2 interface cards and Single-Ended SCSI-2 cards may coexist in the same system
- Single-Ended SCSI peripherals may not be connected to a Fast/Wide card
- Fast/Wide Differential devices may not be connected to single-ended cards
- Supported with Operating System Release 5.0 plus power patch in September 1994

The SCSI address of a device dictates the device's priority when arbitrating for the SCSI bus. SCSI address '7' is the address for the highest priority device (and is usually reserved for the host). Address '7' is followed in priority (from highest to lowest) by the subsequent addresses 6, 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, and 8.

The Fast/Wide card ships standard with a 2.5 meter 68-pin P-connector cable which supports

Table 7.4 Summary of Fast/Wide and Single-Ended SCSI Characteristics

Characteristic	Single-Ended SCSI	Fast/Wide SCSI
Other names bus is known by	"Standard SCSI" "SCSI" "SCSI-2" "SE-SCSI"	"Differential-Wide" "F/W-SCSI" "Fast and Wide"
Compatibility with the other SCSI bus types	No	No
Maximum bus transfer rate	5 Mbytes/second	20 Mbytes/second
Data bus width	8 bits	16 bits
Number of connector pins	50 pins	68 pins
Maximum cable length	6 meters	25 meters
Maximum connectivity	7 devices	15 devices

NOTE: Fast/Wide SCSI will be supported September 1994.

16-bit devices. The F/W card is equipped with differential transceivers that are able to support distances up to 25 meters.

Similar to Single-Ended (S.E.) SCSI, devices on Fast/Wide SCSI are connected to the bus in a "daisy-chain." Also like the S.E. SCSI bus, Fast/Wide SCSI requires termination at both ends of the bus. The interface card provides termination at the host end. A terminator, which fits on a SCSI connector, is shipped with the interface card and **MUST** be used to terminate the bus at the last connected device or device enclosure. Termination Power (Term Pwr) is provided by the Fast/Wide SCSI card. Only one source of Term Pwr is required, however, a second source eliminates a single point of failure if the Term Pwr fuse on the primary source were to fail.

Other functionality features for Fast/Wide SCSI include support of disk mirroring. Full boot, swap, install support is available for all Fast/Wide devices with MPE/iX release 5.0.

Series 900 Support for Fast/Wide SCSI

Fast/Wide SCSI is supported on HP 3000 9x7LX/RX/SX, 9x8LX/RX, and Corporate Business Systems packages with MPE/iX 5.0 plus power patch. Fast/Wide SCSI is not supported on the HP 3000 920, 922, 925, 932, 935, 948, 949, 950, 958, 960, 980, or any CIO based Series 900 platforms. Refer to **Table 7.1**.

Refer to Business Systems at a Glance in Section 1 for a summary of the number of Fast/Wide SCSI cards supported on various HP 3000 systems.

Comparing Fast/Wide Differential SCSI and Single-Ended SCSI

The introduction of Fast/Wide SCSI now gives HP 3000 Series 900 users the ability to choose between two industry-standard I/O interfaces on the HP 3000 Series 900. Although Fast/Wide SCSI and Single-Ended SCSI are both SCSI-2 compliant, S.E. devices may not be connected to F/W SCSI bus. **Table 7.4** summarizes the key characteristics of Fast/Wide and Single-Ended SCSI.

Cabling Fast/Wide SCSI

The Fast/Wide interface card (P/N 28698A) uses differential transceivers that support cable distances up to 25 meters. When considering cable distances, however, all cable distances must be added, including cable from the host to the first storage device, cable consumed within the storage enclosure, and cable from storage device to storage device.

A Fast/Wide SCSI tower enclosure consumes 1.3 meters of Fast/Wide SCSI cable internally. A rack-mount Fast/Wide SCSI storage enclosure consumes 1.75 meters. Be sure to include these values in your calculations.

There are three types of Fast/Wide SCSI cables:

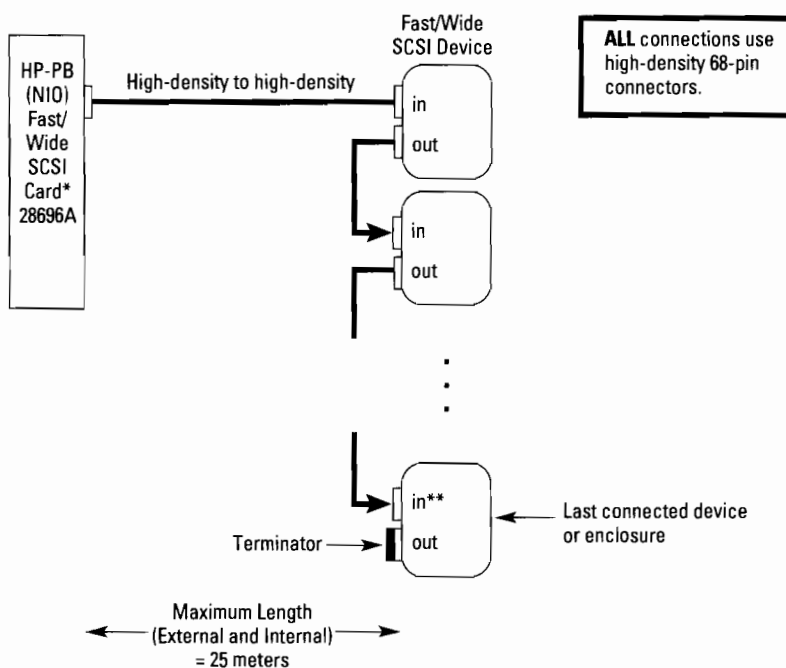
1. Standard male-male 68-pin high-density cable which can be used to cable from the host adapter to the first peripheral, and from peripheral to peripheral. These cables are available in 0.9, 2.5, 5, and 10 meter lengths.
2. An extender cable which is also 68-pin high-density with one male and one female connector. This cable can be used to extend the cable from the adapter to a peripheral or to extend the peripheral to peripheral cable. Extender cable lengths available are 2, 5, and 10 meters.

Table 7.5 summarizes the various Fast/Wide SCSI cables which are available.

Table 7.5 F/W SCSI Cables

Type of Cable	Standard Cable		Extender Cable	
Connectors	male-male		female-male	
Purpose	– adapter to peripheral – peripheral to peripheral		– extends standard cable – extends V-cable	
Distances and Product Numbers Available	0.9 m	#28696A opt 002 or C2911A	2.0 m	#28696A opt 003
	2.5 m	Comes standard with #28696A card or C2424A	5.0 m	#28696A opt 004
	5.0 m	#28696A opt AF1	10.0 m	#28696A opt 005
	10.0 m	#28696A opt AF8 or C2925A		
	20.0 m	C2926A		

Figure 7.1 Fast/Wide SCSI Cabling



*Card supplies Term Power to bus (required)

**Device supplies Term Power to bus (optional)

SCSI Interface

SCSI Guidelines

- There are seven available device addresses on each interface card. Most SCSI peripheral devices use one SCSI address.
- Most SCSI peripherals (disks and tapes) can be mixed and matched in any combination on the same SCSI bus as long as the total number of SCSI devices does not exceed seven. Note, performance factors should be considered when determining the mix of devices to be connected.
- The C17xxA optical libraries and HP 5000 printers each require a dedicated SCSI interface card. The C17xxT **does not** require a dedicated SCSI interface card.
- Even if two optical libraries are racked in the same cabinet, they still count as 4 disks and 2 auto-changers, requiring 6 SCSI device addresses.
- The HP C17xxA/T optical libraries count as two or three devices on the SCSI bus.
- Use of third-party peripherals is at user's risk and is not supported by HP's standard support process.
- Third-party SCSI devices are not supported, except the 1/2-inch cartridge tape from StorageTek and the 8 mm tape drive from IEM. These products are supported by StorageTek and IEM.
- SCSI switch boxes are not supported.
- Use daisy chain configuration for all devices.

Table 7.6 Replacement SCSI Cables from Complementary Products

Product Number	Length	Description
SCSI Card-to-Peripheral SCSI Cables		
K2296	1 meter	High-density (HD) screw to low-density (LD) bail-lock connectors (male/male)
K2297	1.5 meter	High-density (HD) screw to low-density (LD) bail-lock connectors (male/male)
Peripheral-to-Peripheral SCSI Cables		
92222A	0.5 meter	LD bail-lock male/male connectors
92222B	1 meter	LD bail-lock male/male connectors
92222C	2 meters	LD bail-lock male/male connectors
SCSI Extender Cable		
92222D	1 meter	LD bail-lock extension cable with male/female connectors

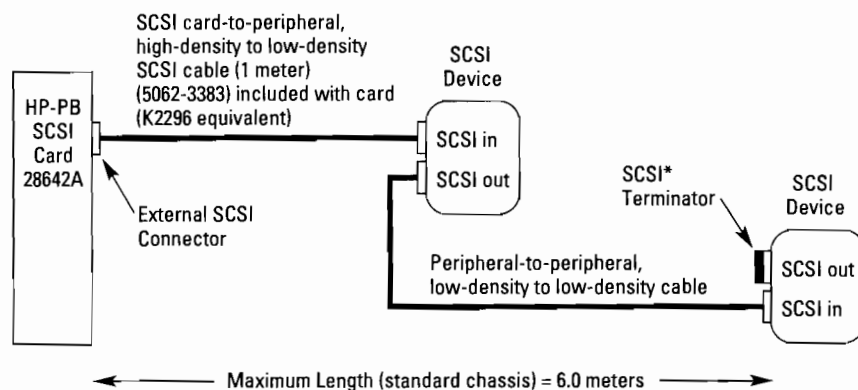
- All devices must have a unique address between 0 and 6.
- The last HP SCSI device in a chain of devices must have a terminator installed on the second connector. The terminator is included with the SCSI device.
- Non-HP SCSI devices may or may not need a terminator installed—the device documentation should be consulted.
- All devices must be connected to a common (single point) reference ground. Refer to appropriate Site Preparation Guide for details.
- All devices must be powered up with the self-test completed before power is applied to SPU.
- Keep all devices powered up during and after system boot-up.
- To enhance performance with TurboSTORE/XL or TurboSTORE/XL II, modified configurations are suggested. If backup devices will only be used sequentially, they may share a SCSI channel. If devices are used in parallel or parallel in device pools the transfer rate of each device needs to be considered to determine how many devices can be on the same SCSI DA.
- For best performance results with SCSI disks, follow these guidelines:
 - Place add-on DDSs or other back-up device on a separate SCSI bus from disks.
 - Connect 5 or less disks per SCSI bus.

SCSI Cabling for HP-PB SCSI Card (28642A) and CIO SCSI Card (27251A)

SCSI Card-to-Peripheral SCSI Cables

The CIO SCSI card includes a 2-meter SCSI cable for SCSI card-to-peripheral connection. This cable has a 50-pin high-density thumb-screw connector for the SCSI card side and a 50-pin low-density bail-lock connector for the peripheral connect. K2296 and K2297 listed below are replacement cables for this SCSI card-to-peripheral cable. These and the cables listed in **Table 7.6** can be ordered from Complimentary Products Sunnyvale (CPS).

Figure 7.2 Single-Ended SCSI Cabling (HP-PB SCSI Card)

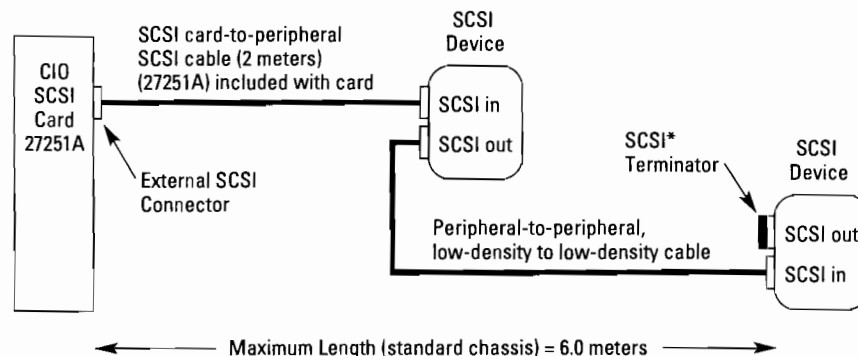


*The last device on the SCSI cable must have an external SCSI terminator. This terminator is generally included with the SCSI device. If no devices are attached to the external SCSI connector, the 50-pin high-density terminator is required.

Cabling Single-Ended SCSI

- The maximum cable length (including external and internal cables) is 6 meters. The maximum length applies to cables that interconnect each daisy-chained device and to the cable lengths that are internal to each device.
- SCSI cable length should be kept as short as possible, however, do not use cables shorter than 0.5 meters.
- SCSI cable impedance and construction affect bus signal quality. Therefore, only HP cables are recommended.
- HP 5000 printers require a SCSI extender (28643A), as the 6-meter limitation is not adequate for an HP 5000 connection.
- All cables should be attached to a device at both ends.

Figure 7.3 Single-Ended SCSI Cabling (CIO SCSI Card)



*The last device on the SCSI cable must have an external SCSI terminator. This terminator is generally included with the SCSI device. If no devices are attached to the external SCSI connector, the 50-pin high-density terminator is required.

Fiber-optic SCSI Extender

The fiber-optic SCSI extender (28643A) overcomes the 6 meter SCSI distance limitation.

Configuration Information

- Only one Rewritable Optical Autochanger or HP 5000 high-end printer can be connected to each extender. Multiple DDS drives, 1/2-inch tape drives, and 1/2-inch cartridge tape drives can be connected to the extender, although if the tape drives will be used simultaneously, there will be performance implications. No devices are allowed to be connected to the same SCSI bus as the extender.
- Only one extender per SCSI bus.
- The extender is required for HP 5000 printers and is otherwise **only** recommended for customers who **must have greater cabling flexibility** than 6 meters allows.

Table 7.7 SCSI Extender Support Matrix

Required	Not Supported	Supported
HP 5000 printers	All disks	1/2" tape
	HP 1512A and C2463 DAT drives	1/2" cartridge tape
	All CD-ROMs	Optical
		DATs except where explicitly noted

Figure 7.4 Fiber Optic Single-Ended SCSI Extender



Performance Considerations

- The SCSI extender will affect the performance of the SCSI bundle by as much as 50% depending on the extender length and specific peripheral device.
- The extender is available in 50-meter and 100-meter lengths. The 100-meter extender will have a 5%–10% performance degradation from the 50-meter extender.
- HP 5000 printers, DDS drives, 7980S 1/2-inch tape drives, and 1/2-in cartridge tape drives all have a synchronous interface and therefore should see little performance degradation when connected to the extender.
- HP 28643A includes 2 extender units, 2 mounting bracket kits, an installation/reference manual, and a loopback test coupler. Option AFB and AFD add 50 meters and 100 meters of 62.5/125 mm fiber-optic duplex cable, respectively.
- SCSI extender supports tape boot capability with no degradation of performance.

HP-FL Interface

Description

The HP Fiber-Optic interface card used to connect HP-FL disk drives to the HP 3000 systems. The following interface cards are available:

- HP 27115A—CIO HP-FL interface card for the channel I/O bus (CIO) systems. Supported on Series 980 systems.
- HP 28616A—PB-FL interface card for the Precision Bus systems. Supported on Series 9x7LX/RX/SX, 9x8LX/RX, and Corporate Business systems.
- HP A1748A—PBA-FL interface card for the Precision Bus systems. Supported only on 9x7LX/RX/SX systems. The PB-FL replaces the PBA-FL.

Each interface uses two I/O slots and attaches one fiber-optic cable. The cable needed to connect the interface card to its first disk drive is included with the HP-FL interface card. Each interface may support up to 8 disks in a daisy-chain using a disk-to-disk bus called P-Bus.

There are advantages of HP-FL (PB-FL) relative to HP-IB (PBA-IB).

- First, up to eight HP-FL disks can be placed on a single HP-FL Device Adapter (DA) while, for performance reasons, it is not recommended to exceed five HP-FL (PB-FL) disks per HP-FL (PB-FL) DA. This means larger disk configurations can be achieved with HP-FL using fewer system I/O slots.
- Second, HP-FL (PB-FL) supports fiber-optic cable lengths up to 500 meters while HP-IB (PBA-IB) supports a maximum cable length of 15 meters. This allows HP-FL (PB-FL) a higher degree of configuration flexibility because disks can be placed further away from the CPU.
- Third, HP-FL (PB-FL) offers an improved data transfer rate relative to HP-IB (PBA-IB), 5 megabytes per second versus 1 megabyte per second, respectively.

HP-FL Guidelines

Series 9x7LX, 9x7RX, 9x7SX

PB-FL interface card may be ordered for the Series 9x7 systems either as a product with the system (28616A option 0DZ) or via a Precision Bus Adapter with HP-FL (A1748A). The Precision

Bus (PB-FL), part number 28616A, is also supported on the 9x7LX, 9x7RX, and 9x7SX systems. Refer to **Table 3.1** for PB-FL interface card maximums. The PB-FL replaces the PBA-FL.

*NOTE: The HP-FL disk arrays (C2252, C2254, C2258, C2259) are **NOT** supported by the PBA-FL bus adapter. Series 9x7 and 9x8 customers who have a PBA-FL bus and want to connect disk arrays must order the new PB-FL (28616A).*

Series 9x8LX, 9x8RX

9x8LX systems support a maximum of 1 PB-FL card. 9x8RX systems support up to 2 cards. The PBA-FL card is not supported on 9x8LX/RX systems.

Corporate Business Systems 990, 991, 992, and 995

Each system supports a maximum of 5 PB-FL (HP-FL cards used exclusively on HP-Precision Bus systems—9x7, 9x8, and 99x) interface cards per HP-PB I/O card cage (a total of 40 per system). Each PB-FL card supports 8 devices. The PBA-FL card is not supported on the Corporate Business Systems.

For best performance, configure a maximum of 5 HP-FL disks per PB-FL interface card (single disks and disk arrays).

HP-FL Cabling Guidelines

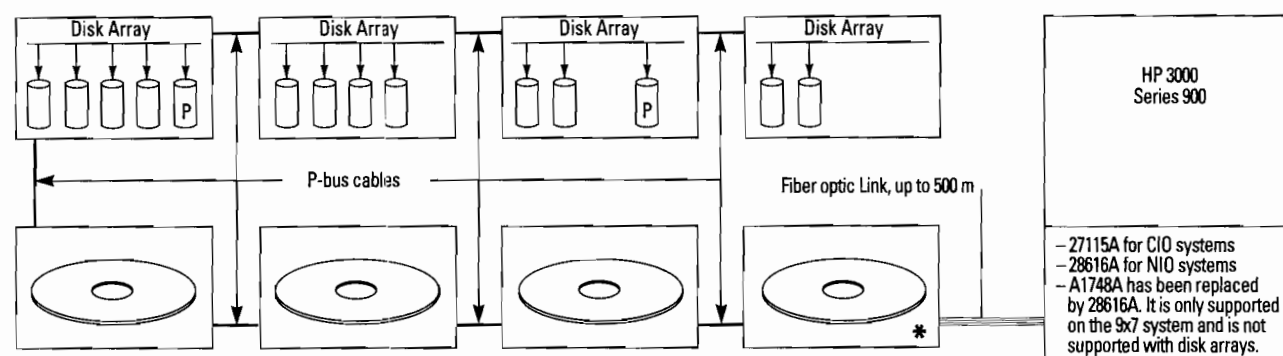
Unlike HP-IB (PBA-IB), there are two cabling methods incorporated into the HP-FL (PB-FL) interface. The fiber-optic cable is used to connect a group of HP-FL disk drives to the HP-FL (PB-FL) DA. The fiber-optic cable is a duplex cable of glass fiber containing two fiber-optic strands. One strand is used to transmit data from the CPU to the disks and the other is used to transmit data from the disks to the CPU. As shown in **Figure 7.5**, the fiber-optic link connects from the system to one or a group of disks. A 30 meter fiber-optic link is included with P/N 27115A and P/N 28616A. The 30 meter cable can be replaced by a custom fiber-optic cable, up to 500 meters long. This is orderable as HFBR-AWQnnn, where nnn is the length in meters.

As a space and cost savings solution, a multi-wire P-Bus cable is used to daisy-chain up to eight HP-FL disk drives together on a single HP-FL (PB-FL) interface card in a single cabinet. The P-Bus cable is a 64-wire copper cable. The transfer rate capabilities of the P-Bus cable match that of the fiber-optic cable at 5 megabytes per second.

P-Bus cabling limitations restrict the number of HP-FL disk drives supported in multiple cabinets. Up to eight HP C2201A or C2204A disk drives are supported in two HP 92211Y cabinets. Disks in adjacent cabinets are connected using a long P-Bus cable, P/N 13367A. The C22XXA product P-Bus cables are backward compatible. The older P-Bus cables on the 793X products are not forward compatible.

Option 1BG available on the HP C2201A and C2204A disk drives deletes the fiber-optics hardware from the controller. These disk drives can be interconnected via the P-Bus, but not directly to the system via the fiber-optic cable. At least two disk drives per channel should have fiber-optic circuits (the standard drive) for configuration flexibility.

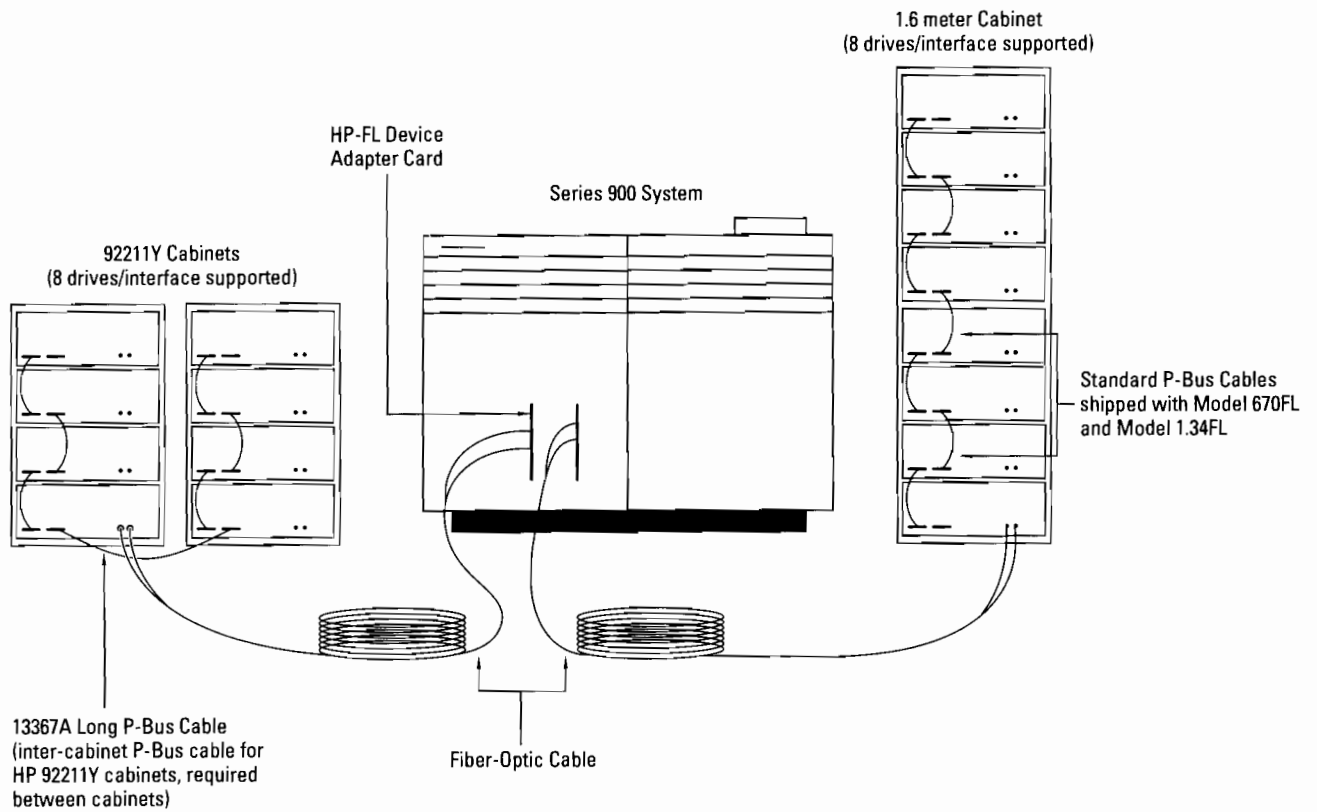
Figure 7.5 HP-FL Disk Interface



HP C2201A, or C2204A disks or C2254HA, C2254B, C2252HA, C2252B, C2258HA, C2258B, C2259HA, or C2259B Disk Arrays (Up to 8 drives/arrays)

*Must be standard HP C2201A or C2204A Disk Drive or 225XHA/B Disk Array

Figure 7.6 P-Bus Cabling



HP-IB Interface

Description

The HP-IB interface card is a hardware controller used to interface HP-IB (IEEE 488 protocol) peripherals to the 900 Series systems.

- HP 27113A—CIO HP-IB interface card for use on Channel I/O Bus (CIO) systems (must also order 27113A)
- HP A1747A—PBA-IB interface card for use on Precision Bus (PB) systems

Each HP-IB interface is a card that supports one HP-IB cabling system. Each HP-IB cabling system may be used to connect from one to six HP-IB peripherals. Peripherals connected to one HP-IB interface are linked together with HP-IB cables. The number of peripherals which may be practically connected to a single HP-IB interface depends on cable length restrictions and performance considerations.

HP-IB Guidelines

Series 9x7LX/RX/SX

HP-IB interface cards are only supported in the Series 9x7LX/RX/SX and 9x8LX/RX via the Precision Bus Adapter (PBA-IB). Each PBA-IB uses 2 I/O slots (double-wide card).

HP-IB interface cards may be ordered two ways:

- A1747A option 0DZ (9x7 and 9x8 only) at time of initial purchase
- A1747A (PBA-IB) after initial purchase

Refer to **Tables 2.1 and 3.1** for HP-IB interface maximums of Series 9x7LX/RX/SX and 9x8LX/RX systems.

Corporate Business Systems 990, 991, 992, 995, and 9x8

Corporate Business System (CS) and 9x8 HP-IB interface cards are supported via the Precision Bus Adapter (PBA). Only one HP-IB interface card can be connected to each PBA. Disks connected via HP-IB are not supported as the system disk or LDEV 1. The following ordering information should be used to order a PBA with or without an HP-IB card:

- A1747A—PBA with HP-IB
- Option 001—PBA without HP-IB
- Option 002—supplies version of PBA required for the Corporate Business System

Refer to **Tables 2.1, 4.1, and 5.1** for HP-IB interface maximums.

HP-IB Performance Considerations/Device Loading

- A maximum of six non-disk devices may be attached to each HP-IB device adapter
- A mixture of disk, tapes, and printers may be attached to an HP-IB device adapter as long as the firmware date code of the HP-IB adapter card is 2912 or greater
- Any variance from the above guidelines must have prior written approval from your local Hewlett-Packard Support office
- A maximum of 4 disks should be attached to each HP-IB device adapter for consistent performance results
- The electrical device load maximum remains at 8 external device loads per HP-IB device adapter

HP-IB Cabling Guidelines

- HP-IB Switch Boxes are not supported
- Use daisy-chain configuration for all devices
- All devices must have a unique address between 0 and 7
- All cable connections should occur at device (i.e., no cables should be connected together simply to extend to effective cable length)

- There should be no unterminated cables. All cables should be attached to a device at both ends
- All devices must be connected to a common (single point) system reference ground. Refer to appropriate Site Preparation Guide for details
- All devices must be powered with the self test completed before power is applied to the SPU
- Keep all devices powered during and after system boot-up

Maximum Cable Length

The maximum combined length of HP-IB cables connected to a single device adapter is 15 meters. However, this maximum may be further restricted by the "seven plus one rule" described below. When connecting multiple peripherals to a single device adapter, the first device in the chain connects via a special 4 meter HP-IB cable included with the device adapter.

The calculation of maximum cable length also includes the length of HP-IB cable internal to the system and/or peripherals. The maximum length applies to the combination of cables whether they are "daisy-chained" in a line or connected in a branched layout.

The total cable length is the sum of the length of all HP-IB cables:

- a. Inside the peripheral devices
- b. Between peripherals
- c. Between the nearest peripheral and the junction panel (HP-IB interface)
- d. Between the HP-IB DA and the first device (4m)

The Seven Plus One Rule

The maximum combined length of HP-IB cables is restricted by electrical device loading as well as total cable length. *The total HP-IB cable length may not exceed seven*

meters plus one meter for each electrical device load attached to the HP-IB cable, up to a 15 meter maximum. This calculation optimizes data transfer rates, ensuring correct performance.

All HP-IB cables internal to either the system or the peripherals are supplied standard with the product ordered. A special 4 meter cable is supplied standard with the HP-IB device adapter. External HP-IB cables are usually supplied with the peripheral, but there are exceptions.

To increase cabling flexibility, the following HP-IB cables may be ordered separately:

- 1 meter HP-IB cable: P/N 10833A
- 2 meter HP-IB cable: P/N 10833B
- 4 meter HP-IB cable: P/N 10833C

HP-IB Extender (For Printers Only)

For environments which require printers to be located longer distances from a 900 Series system, an HP-IB extender configuration may be installed. Extenders are available with coaxial cabling. Coaxial cable lengths are supported up to 250 meters. Coaxial cable must be ordered separately. The coaxial cable is a 70 ohm cable (RG59U) that can be purchased at any electronic store along with BNC connectors. The coaxial cable is no longer available via HP.

Each extender configuration requires a pair of extenders, one at each end. A configuration example is shown **Figure 7.7**.

An HP-IB extender configuration is subject to the following limits:

- HP-IB extenders are supported on MPE/iX release 1.2 or later.
- A maximum of four printers are supported per extender configuration. These may be a combination of 256x, C235xA, 2688A* or 2680A* printers. However, only two page printers (2688A or 2680A) are supported per extender configuration.

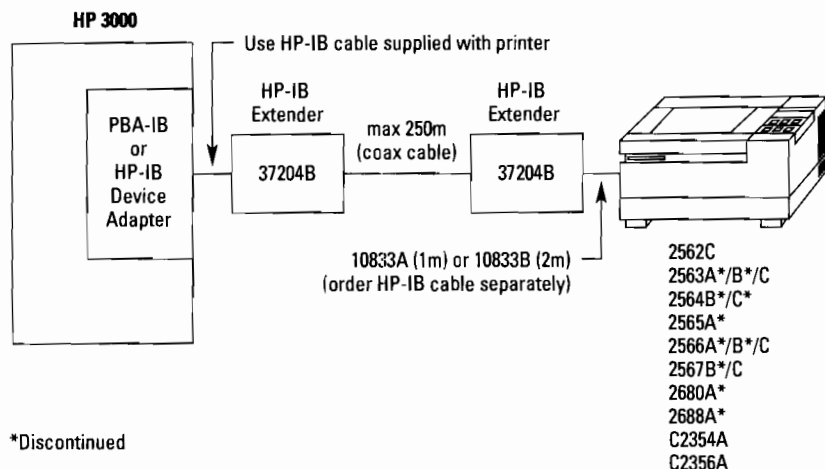
*Discontinued

- When multiple printers are connected to an extender configuration, a maximum of 1 meter HP-IB cable (P/N 10833A) can be installed between printers. This cable must be ordered separately.

- Two sets of extender pairs may be connected to a single HP-IB device adapter, but only 256x and C235xA printers may be used on both extender pairs.

NOTE: For HP-IB device adapters with firmware 27113-81002 (Rev. 2733), a firmware upgrade is required to support HP-IB extenders. See service note 27113A-02 for details.

Figure 7.7 Single Printer Cabling with HP-IB Extenders (37204B)



Section 8. Peripherals

What's New

New Mass Storage Offerings on the HP 3000

- 2-gigabyte, 3.5-inch, Single-Ended and Fast/Wide SCSI disk drive
- Fast/Wide SCSI support on HP 3000 Series 9x7, 9x8, and Corporate Business Systems with MPE/iX 5.0. Fast/Wide will be supported in September 1994.
- CD-ROM drive
- New optical libraries

Disk Drives

The new 2-gigabyte, 3.5-inch drive replaces the 2.0-gigabyte 5.25-inch drive. Both Single-Ended (channel transfer rate of up to 5 Mbytes per second) and Fast/Wide SCSI (up to 20 Mbytes per second) interfaces are available. With the high transfer rate, high capacity, and longer cable length of Fast/Wide, it is very popular in information services, manufacturing, telecommunication, research and development, and other environments in which large sequential transfers of data occur and in which large amounts of data are used.

Specifics on the drives are:

- High performance
 - Average seek (read/write) is 8.8/9.5 on the 2-gigabyte drive.
 - Average latency is 4.7/5.6.
 - Sustained transfer rate on the drives is 3.2 to 5.1 milliseconds.
- More compact—3.5-inch form factor
- High reliability
 - There is a 500,000 MTBF on the 2-gigabyte drive.

- More capacity
 - This new drive increases the total disk capacity of the mini-tower to 12 GB (from 7) and of the rackmount to 10 GB (from 6).
- 2 GB Single-Ended SCSI drive is integrated into 9x7 and 9x8 system packages
- Fast/Wide SCSI and Single-Ended interfaces
 - The Fast/Wide and Single-Ended interfaces for the 2-gigabyte mass storage systems are SCSI-2 industry standard interfaces.

Fast/Wide SCSI Support on the HP 3000

The 2-gigabyte, 3.5-inch Fast/Wide drive is supported on the HP 3000 Series 9x7, 9x8, and Corporate Business Systems with Operating System Release 5.0.

The advantages of Fast/Wide are:

- *Increased transfer rate.* The channel transfer rate (i.e., the rate at which data is transferred from the controller on the drive to the SCSI bus) is up to 20 megabytes per second (versus 5 Mbytes with Single-Ended). This is most beneficial in environments where there are large sequential transfers of data (versus random access).
- *Increased throughput per device.* Fast/Wide is capable of accommodating the burst transfer rate of the device.
- *More devices per bus.* With Fast/Wide SCSI up to 15 devices (up from 7 with Single-Ended) can be used per SCSI bus. This is particularly useful for customers who require large amounts of

storage, and were previously constrained by the number of Single-Ended SCSI connections.

- *Increased cabling.* With Fast/Wide SCSI a cable length of 25 meters (including lengths internal to all cabinets in the link) is supported. This increases the location and configuration flexibility of the storage system.

CD-ROM

For software distribution, database libraries, multi-media applications and more, the Series 6000 mass storage systems support compact disk read-only memory (CD-ROM) drives. The 5.25-inch form factor, half-height drive has a capacity of 600 Mbytes.

Specifics on the CD-ROMs include:

- 200 milliseconds average access time
- 50,000 MTBF (AFR of 18%)

Optical Libraries

New optical libraries with double-density drives are now available on the HP 3000 as backup devices. A 20-GB Rewritable Optical Library (C1708T) and 40-GB Rewritable Optical Library (C1700T) will be supported in September 1994. In addition, a 186-GB Rewritable Optical Library System (C1705T) is **supported only with software from FileNet Corporation**. It is not currently supported by MPE/iX for any other use.

Disk Products

The new 3.5-inch 2-GB SCSI disks, as well as the older 5.25-inch 2-GB SCSI disks, are orderable on the HP 3000 systems. These disks require MPE/iX 4.0 plus power patch as a minimum operating system. The new Fast/Wide SCSI disks are supported with MPE/iX 5.0 on the 9x7, 9x8, and Corporate

Business Systems only. **Refer to Table 8.31 at the end of this chapter for a comprehensive matrix of peripheral-to-system support.**

Disk drives are available as:

- Series 6000 SCSI disk products for rackmount or floor model storage system. See **Figure 8.1**.

- Integrated at the factory in the 1.1-meter (A1883A) or 1.6-meter (A1884A) cabinet

- Integrated in the SPU

See **Tables 8.1 and 8.2** for a description of these products.

Table 8.1 C304x, C355x 3-1/2" 2-GB SCSI and Fast/Wide SCSI Drives Rackmount (R) and Mini-tower (T) SCSI Storage System (External)

Product Number	C3040R/T	C3041R/T	C3042R/T	C3550R/T ²	C3551R/T ²	C3552R/T ²
Interface card	SCSI	SCSI	SCSI	Fast/Wide SCSI	Fast/Wide SCSI	Fast/Wide SCSI
Capacity	2.0 GB	Two × 2.0 GB	Three × 2.0 GB	2.0 GB	Two × 2.0 GB	Four × 2.0 GB
Average seek time (ms)	8.8–9.5	8.8–9.5	8.8–9.5	8.8–9.5	8.8–9.5	8.8–9.5
Latency (ms)	4.7–5.6	4.7–5.6	4.7–5.6	4.7–5.6	4.7–5.6	4.7–5.6
Controller overhead	<1	<1	<1			
Internal disk transfer rate (MB/sec)						
Burst	5.2	5.2	5.2			
Sustained	3.2–5.1	3.2–5.1	3.2–5.1	3.2–5.1	3.2–5.1	3.2–5.1
Operating system release	4.0 plus power patch	4.0 plus power patch	4.0 plus power patch	5.0	5.0	5.0
MTBF	500K	500K	500K	500K	500K	500K
Expansion kits for rackmount and minitower storage system	C3044U	N/A	N/A	C3554U	N/A	N/A
Factory Integrated Product Racked Number	C3040RZ	C3041RZ	C3042RZ	N/A	C3551RZ	C3552RZ
Integrated in SPU ¹	A3087A	N/A	N/A	N/A	N/A	N/A

¹Order option DDZ for factory integration and option 002 for SCSI Expansion Upgrade kits.

²Not supported until September 1994.

NOTE: The average transfer rate listed indicates the capacity of the disk hardware; not system achievable transfer rates.

Table 8.2 C302x 3-1/2" 1-GB SCSI Drive and C302x 5-1/4" 2-GB SCSI Drive Rackmount (R) and Mini-tower (T) SCSI Storage System (External)

Product Number	C3022R/T	C3023R/T	C3024R/T
Interface card	SCSI	SCSI	SCSI
Capacity	1.0 GB	2.0 GB	Two 2.0 GB
Average seek time (ms)	10.5–11.5	10.5–11.5	10.5–11.5
Latency (ms)	5.6	5.6	5.6
Controller overhead	<1.0	<1.0	<1.0
Internal disk transfer rate (MB/sec)			
Burst	5.2	5.2	5.2
Sustained	3.0–3.8	3.0–3.8	3.0–3.8
Operating system release	4.0	4.0	4.0
Factory Integrated Racked Product	N/A	C3023RZ	N/A
Expansion kits ² for rackmount and minitower storage system	C3027U	C3028U	N/A
Integrated in SPU ¹	A2445A	A2446A	N/A

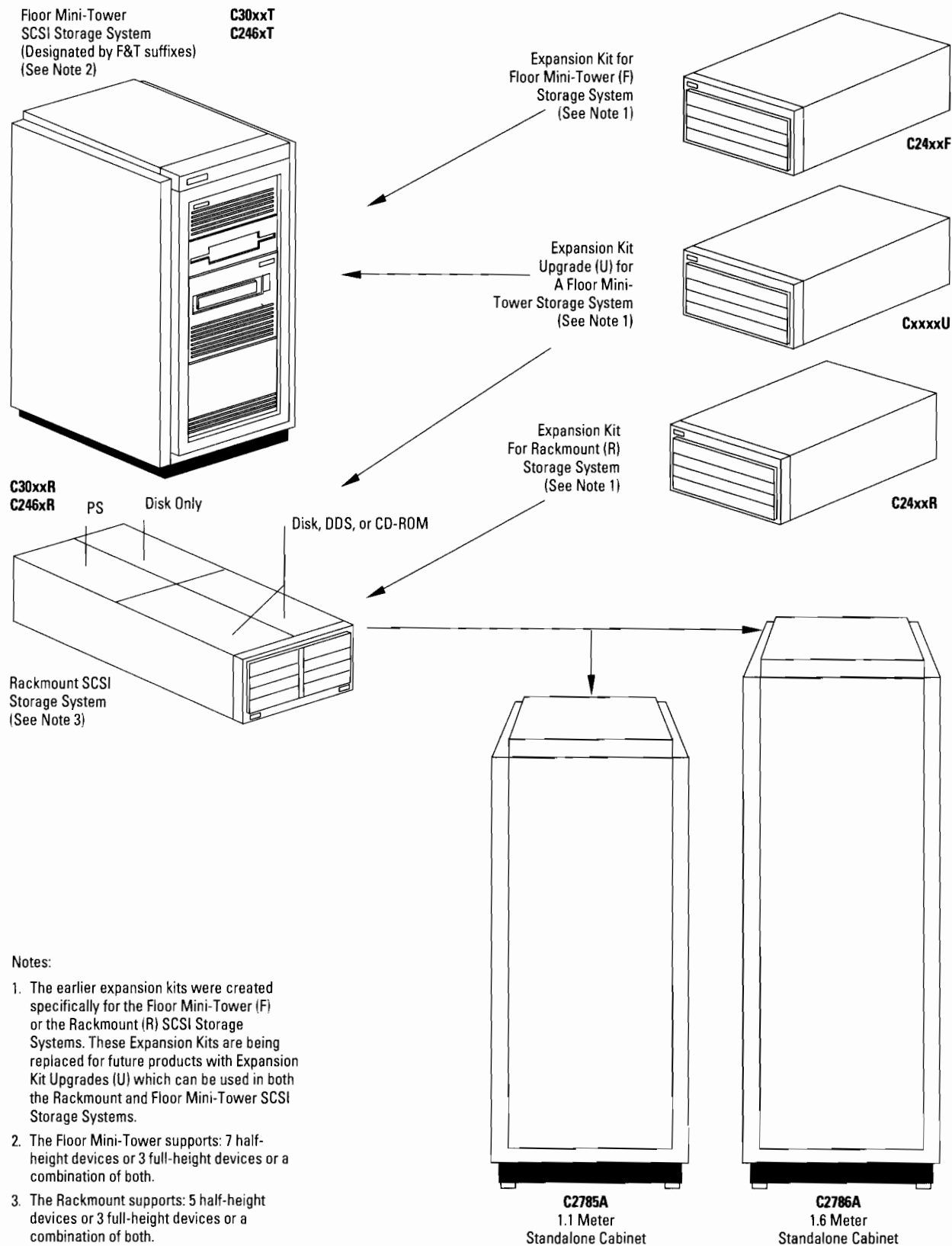
¹ Order option 00Z for factory integration and option 002 for upgrade kits.

² The above disks require that option 002 be ordered to ensure correct firmware for multiuser disks and option 00G for field service installation.

NOTE: The average transfer rate listed indicates the capacity of the disk hardware; not system achievable transfer rates.



Figure 8.1 Series 6000 SCSI Storage Systems



Notes:

1. The earlier expansion kits were created specifically for the Floor Mini-Tower (F) or the Rackmount (R) SCSI Storage Systems. These Expansion Kits are being replaced for future products with Expansion Kit Upgrades (U) which can be used in both the Rackmount and Floor Mini-Tower SCSI Storage Systems.
2. The Floor Mini-Tower supports: 7 half-height devices or 3 full-height devices or a combination of both.
3. The Rackmount supports: 5 half-height devices or 3 full-height devices or a combination of both.

HP-FL Disk Arrays

HP-FL disk arrays are available on the HP 3000 Series 9x7LX/RX/SX, 9x8LX/RX, and Corporate Business Systems. Refer to the peripheral support matrix at the end of this chapter for array support on additional HP 3000 systems. The newest arrays are the C2259HA and C2258HA which offer 8 Gbytes and 4 Gbytes of protected storage respectively. Both new models are also available without data protection in a "B" version: C2259B and C2258B. The disk arrays require 4.0 plus a patch as a minimum operating system. This patch may be obtained through Powerpatch or by ordering C3300A.

The newest arrays expand storage capacities to 8 Gbytes per array and up to 40 Gbytes in a 19-inch 1.6 meter high EIA cabinet. These arrays are supported in the C2786A 1.6 meter standalone cabinet and the C2785A 1.1 meter standalone cabinet. CE installation of the arrays in these cabinets occurs at the customer site. The arrays can also be ordered factory integrated in the A1884A cabinet with product numbers C2259HZ, C2259BZ, C2258HZ, and C2258BZ.

Disk Array Guidelines

- Only C2252HA or C2252B are supported as LDEV 1 (2.7 GB). C2258HA and C2258B (4.0 GB) are also supported as LDEV1 MPE/iX 4.0 plus power patch on NIO systems only.

NOTE: On Channel I/O Bus (CIO) systems, LDEV 1 will be limited to 2.0 GB of usable space. This is necessary to ensure files can be

Table 8.3 C2259HA/B and C2258HA/B High-Capacity HP-FL Disk Arrays

Product Number	C2259HA	C2259B	C2258HA	C2258B
Expansion kit 2.0 GB disk module	C2257A	C2257A	C2257A	C2257A
Interface ¹	HP-FL	HP-FL	HP-FL	HP-FL
Capacity	8.0 GB plus parity disk	8.0 GB	4.0 GB plus parity disk	4.0 GB
Average seek time (ms)	11.5	11.5	11.5	11.5
Latency (ms)	5.6	5.6	5.6	5.6
Controller overhead (ms)	.5	.5	.5	.5
Integrated disk transfer rate (MB/sec) burst	4.7	4.7	4.7	4.7
Internal disk transfer rate (MB/sec) sustained	3.4	3.4	3.4	3.4
Operating system	4.0	4.0	4.0	4.0

¹ The HP 3000 only supports the HP-FL Disk Arrays. Fast/Wide Disk Arrays are not supported on the HP 3000.

NOTE: The HP-FL disk arrays (C2252, C2254, C2258, C2259) are not supported by the PBA-FL bus adapter. Customers who have a PBA-FL bus adapter and want to connect disk arrays must order the PB-FL (28616A).

Table 8.4 C2252HA/B and C2254HA/B HP-FL Disk Arrays

Product Number	C2254HA	C2254B	C2252HA	C2252B
Expansion kit/replacement module (1.35 GB)	C2251A	C2251A	C2251A	C2251A
Interface	HP-FL	HP-FL	HP-FL	HP-FL
Capacity	5.4 GB + parity disk	5.4 GB	2.7 GB + parity disk	2.7 GB
Average seek time (ms)	13.5	13.5	13.5	13.5
Average latency (ms)	7.5	7.5	7.5	7.5

NOTE: The HP-FL disk arrays (C2252, C2254, C2258, C2259) are not supported by the PBA-FL bus adapter. Customers who have a PBA-FL bus adapter and want to connect disk arrays must order the PB-FL (28616A).

retrieved at boot time. CIO I/O Dependent Code (IODC) can only manage up to 2 GB.

On Precision Bus (PB) systems, LDEV 1 will be limited to 4.0 GB of usable space. IODC on PB systems can manage up to 4.0 GB.

- Disk configurations less than 15 GB should use only C2252 (2.7 GB) or 4.0 GB disk arrays for high random I/O performance. The

large disk array in this configuration may not provide the system with sufficient concurrent I/Os.

- Each 4 GB or 8 GB array is considered by the system to be a single drive. The OLTP performance of a single 8 GB array is the same as a single 2.0 GB SCSI drive. Users who need maximum OLTP performance should consider multiple 2 GB SCSI drives or multiple 4 GB arrays instead of one 8 GB array.

Optimal system performance can be achieved by following the guidelines in **Table 8.5**.

HP-FL Disk Array and Relational Database

The HP-FL disk arrays offer a variety of different configurations. Some of these offer more data protection than others. Hewlett-Packard recommends that customers interested in data security choose striped mode with parity.

The C2252HA, C2254HA, C2258HA, and C2259HA offer 'striped with parity' mode or "RAID 3," where the data is striped across two or four data mechanisms, and an extra disk mechanism preserves a parity checksum of the others. This allows the array to survive a mechanism failure invisibly. In the case of such a failure, the array controller uses the checksum to reconstruct the data from the failed mechanism without any performance degradation.

The distinction between striped with and without parity is important. First, a striped disk array without parity cannot survive a mechanism failure. Second, such a disk has a lower mean time between failure because of the multiple components in the device. And third, such a disk is subject to a new type of failure (new with disk arrays) which, although extremely rare, could potentially cause data loss,

Table 8.5 Guidelines for Optimal Performance

	Series 9x7	Series 9x8	Corporate Business System
Number of FL cards per HP-PB	3 PBA-FL or 4 PB-FL (3 PBA-FL and PB-FL cards combined)	3 PBA-FL or 4 PB-FL (3 PBA-FL and PB-FL cards combined)	5 PB-FL
Number of disk arrays per HP-FL channel	5 or less	5 or less	5 or less

depending on the application. This new type of disk failure occurs when:

1. A power failure occurs, AND
2. The power remains off beyond the period safeguarded by the system battery backup (approximately 15 minutes), AND
3. The disk was doing a write, AND
4. The power loss occurred in such a way as to cause the write to complete to some mechanisms and not to others, AND
5. The application relies on the resulting data mix without recognizing it as an error.

We estimate that, IF the first two conditions are met, then the chances of the last three also being met are less than 1 in 1,000. This type of error is impossible with a parity disk, since the mix of old and new data should corrupt the checksum, causing the disk to return a read error for that sector.

Some relational database systems will be susceptible to this type of problem due to their error detection schemes. If a customer chooses to use a relational database with disk arrays without a parity disk configuration, they should ALWAYS reload their database and roll forward to recover up to the point of the powerfailure if numbers 1 and 2 above occur. This will prevent any data loss.

This type of failure is NOT an issue for HP 3000 TurboIMAGE users. The recovery mechanisms for TurboIMAGE are sufficiently robust to prevent this situation from occurring.

SCSI CD-ROM

The 600 MB SCSI CD-ROM drive is supported via MPE/iX Release 4.0 plus power patch, Release 4.5 without power patch, and Release 5.0. A new easy-to-use, menu driven software installation tool, HPINSTAL/iX, allows customized software update tapes (system load tapes) created from CD-ROM media. HP provides a custom key word to be used with the CD-ROM. HPINSTAL/iX uses the key word to verify the product list and ensure that the correct software is being put onto the system.

The SCSI CD-ROM drive can be ordered as a standalone CD-ROM drive, as part of the expansion or upgrade kit for the rackmount and mini-tower Series 6000 Peripheral Package, and as an integrated CD-ROM drive into the 9x7LX/RX/SX and 9x8LX/RX SPU.

Table 8.6 SCSI CD-ROM

TBA	Standalone CD-ROM drive
C3560U	Expansion kit for a mini-tower/rackmount storage system
A3086A, Opt. DDZ	SCSI CD-ROM drive integrated in SPU

To protect the investment of the customers who signed up for the HP Laser Release Program for MPE V system, the HP-IB CD-ROM standalone drive (C1707A) is still supported. However, the drive is no longer orderable from Hewlett-Packard.

CD-ROM and PC Application Access

Beginning with MPE/iX Release 5.0, the supported CD-ROM drives can also be accessed from your PC applications, such as HP LaserROM, allowing you to utilize your CD-ROM drive for both MPE and PC applications.

These HP CD extensions provide some new benefits and capabilities:

- Share the CD-ROM drive between MPE and PC applications
- Reduce your cost for support materials when ordering with CD options
- LaserROM documentation utility available on the network to PC users running MS-Windows

Backup and Recovery Solutions

Backup and recovery recommendations are a combination of disk configurations, hardware devices and software solutions. Your disk and volume set configuration will determine how much data you need to recover in the unlikely event of a disk media failure. This consideration should guide your backup strategy. With this in mind not only must you consider backup device capacity and transfer rates but also software options such as volume sets, database logging and recovery features, high availability products, and options offered with the TurboStore/iX II product family.

There are many parameters which need to be considered when evaluating a backup solution for a specific environment. The customer's objective, with regard to backup, needs to be well understood in order to make the appropriate choices. Following is a list of parameters you need to consider when evaluating a particular solution for your customer's environment.

- Attended versus unattended backup
- Online versus dedicated backup
- System size (CPU)
- System configuration (how many GB need backing up)
- Customer's backup strategy (how often, for what purpose, full and/or partials, onsite or offsite storage, media interchange, retrieval time)

- Number of disks and what type of disks and interface
- Capacity and transfer rates of backup devices
- Impact of rewind time for 1/2-inch magnetic tape, DDS, and 1/2-inch cartridge tape
- Database logging and recovery features

HP 3000 Backup Device Positioning

HP 3000 900 Series customers have many backup solutions from which to choose to meet their specific backup needs. On the hardware side, HP offers:

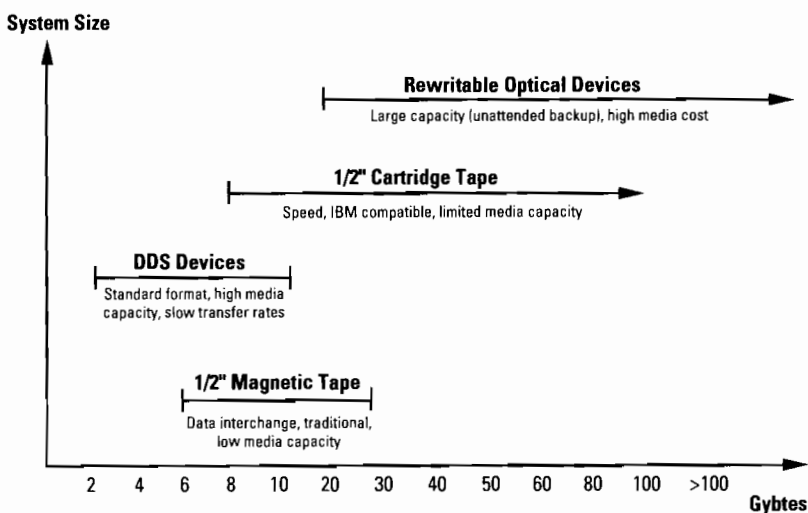
- 1/2-inch magnetic tape
- DDS-format Digital Audio Tape (DAT) drives
- 1/2-inch cartridge tape from StorageTek (3480 compatible)
- 8-mm Tape from IEM
- Rewritable Optical Disk Library System

HP also offers a family of backup software products, TurboSTORE and TurboSTORE/iX II, to provide fast, unattended, and online backup solutions.

Low to Mid-range Backup Solutions

For low to mid-range systems DDS DAT, 8-mm Tape, and Magnetic Tape drives are the appropriate backup solutions. Historically, customers chose Magnetic Tape as their backup solution, and therefore, have a large investment in this media. Today, DDS DAT replaces Magnetic Tape as the backup solution of choice on the low-end. They are small, have a high tape capacity, and the media format is defined by industry standards. With the hardware data compression version of these drives you gain even more capacity at a lower price per megabyte.

Figure 8.2 HP Systems Backup Device Recommendations



Note: Assumes backup under 2 hours is required under dedicated backup conditions. Trade offs can be made on devices if using on-line backup or if backup time is not a major criteria.

High-end Backup Solutions

Large data centers with high-end systems depend on backup devices with fast transfer rates. 1/2-inch cartridge tape and the Rewritable Optical Disk Device provide the most appropriate solution. The 1/2-inch cartridge tape boasts the fastest transfer rates of any HP 3000 backup solution.

However, the capacity of the 1/2-inch cartridge tape, even with the autoloader and data compression, is not sufficient to provide unattended backup. If you need unattended backup for a large capacity system you should consider Rewritable Optical Disk Libraries. These devices transfer data at lower speeds than the 1/2-inch cartridge tape but have much larger capacities.

Magnetic and Cartridge Tape Backup

The 1/2-inch magnetic tape and 1/2-inch cartridge tape (3480 compatible) is ideal for data interchange with non-HP systems. The 1/2-inch cartridge tape products are available from StorageTek Corporation (4220 and 4280). The 4280 is ideal for fast backup and for data interchange in a mainframe environment. These products are only supported with autoloaders that hold up to ten cartridges. The 1/2-inch cartridge tape cannot share a SCSI device card with HP SCSI devices.

The dual transport version 4280 writes to one tape at a time. Using the serial device chaining feature of TurboStore II, data can be written to one transport while the other transport is rewinding. This eliminates rewind time thereby increasing the effective transfer rate.

The 4220 and 4280 can not be ordered from HP. They must be ordered from StorageTek distributors.

DDS DAT

The DDS cassette can provide up to 2 GB of storage with no data compression. With data-compressed drives up to 8 GB of data can be stored. As the amount of data per cassette increases, so does the need to improve the access time to the stored data. Single and multiple DDS devices can provide low cost and unattended backup for small to medium configurations.

NOTE: "DDS format quality" cassettes must be purchased by customer either from HP or other vendors. Not all generic DAT tapes meet HP standards.

Series 9x7LX, 9x7RX, and 9x7SX SCSI Device Configuration Rules

The following configuration rules must be adhered to for systems with add-on DDS (C2463) SCSI devices connected to the 9x7LX/

RX/SX and 9x8LX/RX systems. These configuration restrictions are necessary to support Powerfail Recovery.

This configuration restriction is **only** necessary for C2463 (5 1/4-inch SCSI DDS). Any Series 6000 multi-mechanism package which contains one or more C2463 DDS tape drives must be connected to the Series 9x7LX, 9x7RX, and 9x7SX system via its own SCSI bus. It can NOT be daisy-chained to another multi-mechanism package NOR can it be connected via the same SCSI bus as the integrated peripherals.

Series 6000 multi-mechanism packages containing only disks or disks and DDS drives **other than** C2463 can be daisy-chained to another multi-mechanism package or to the integrated SCSI bus up to the limit of 7 devices per SCSI bus.

NOTE: The SCSI bus which supports the integrated mechanisms can ONLY support a maximum of seven devices (five devices are recommended for best performance results).

Table 8.7 Backup Drives Supported

Product Number	Description	Interface Card	Recording Density	Maximum Transfer Rate (KB/sec)
Magnetic Tape Drive				
7974A ¹	Magnetic tape	HP-IB	1600 bpi	80/40/160/80
7978B ¹	Magnetic tape	HP-IB	6250/1600 bpi	468/120
7979A	Autoloading magnetic tape	HP-IB	1600 bpi, 800 bpi Optional	200
7980A ⁵	Autoloading magnetic tape	HP-IB	6250/1600 bpi, 800 bpi Optional	781/200
7980XC ⁵	Autoloading magnetic tape with data compression	HP-IB	6250/1600 bpi	781/200
7980S	Autoloading magnetic tape	SCSI	6250/1600 bpi	781/200
7980SX	Autoloading magnetic tape with data compression	SCSI	6250/1600 bpi	1500/200 ²
1/2-inch Cartridge Tape Drive from StorageTek				
4220	Cartridge tape with autoloader	SCSI	37.8 KB/in	2,900
4280 Model A01	Cartridge tape—1 transport with autoloader	SCSI	37.8 KB/in	3,000
4280 Model A02	Cartridge tape—2 transports with autoloaders	SCSI	37.8 KB/in	3,000
DDS Drive				
C2463F/R ^{1,3}	1.3 Gbyte DDS	SCSI	61,000 bpi	183
C2464F/R	2.0 Gbyte DDS	SCSI	61,000 bpi	183
C2465F/R	Two 2.0 Gbyte DDS	SCSI	61,000 bpi	183
C2466F/R	2 Gbyte DDS with data compression (8 Gbyte)	SCSI	61,000 bpi	183
C2477U ⁴	2 Gbyte DDS	SCSI	61,000 bpi	183
C2477SZ ⁶	2 Gbyte DDS	SCSI	61,000 bpi	183
C2478U ⁴	Up to 8 Gbyte DDS	SCSI	61,000 bpi	183
C1520B	2 Gbyte DDS (standalone)	SCSI	61,000 bpi	183
C1521B	2 Gbyte DDS with data compression (8 Gbyte) (standalone)	SCSI	61,000 bpi	183
8 mm from IEM				
6042s	Exabyte 8500 drive w/autofeeder	SCSI		
6044s	Exabyte 8500c drive w/autofeeder	SCSI		
4870s	5 GB drive (Exabyte 8500)	SCSI		
4880s	5-GB drive (Exabyte 8500c)	SCSI		

¹ Discontinued.² Data compression supplies two to three times tape data capacity and transfer rate of 6250 cpi without compression.³ Only supported on the 9x7LX/RX/SX, 9x8LX/RX, and Corporate Business Systems.⁴ Upgrade kit for rackmount and minitower storage system.⁵ Upgrade kit available from HP-IB to SCSI (HP 88707S).⁶ Upgrade kit for SPU.

Table 8.8 Optical Backup Devices Supported

Product Number	Description	Interface Card	Capacity	Average Access Time	Maximum Transfer Rate (KB/sec)
Optical Drive					
C1700A ¹	Model 20 GB/A Rewritable Drive	SCSI	32 disks, 20.8 Gbyte	95 ms	read 680/write 340
C1703A ¹	Model 10 GB Rewritable Drive	SCSI	16 disks, 10.4 Gbyte	95 ms	read 680/write 340
C1700T ²	Model 40 GB Rewritable Double Density Drive	SCSI	32 disks, 40 Gbyte	35 ms	read 1000/write 500
C1708T ²	Model 20 GB Rewritable Double Density Drive	SCSI	16 disks, 20 Gbyte	35 ms	read 1000/write 500

¹ These optical drives are discontinued but still supported.² These optical libraries will be supported in September 1994.

Table 8.9 Maximum Backup Drive Configurations

	9x8LX 9x7LX	9x8RX 9x7RX	9x7SX	995 991 990 992
1/2-inch Tape Drives*	6	8	8	8
DDS tape drive	4	8	8	8
1/2-inch cartridge tape	2	7	7	7
Total Tape Drives	6	8	8	8
Optical	2	3	3	3

* 7974A, 7978A/B, 7979A, 7980A¹, 7980XC¹, 7980S², 7980SX²

¹ Highest performance with TurboSTORE/XL requires configuring each 7980XC and 7980 to a separate HP-IB channel.

² Maximum performance can be achieved with two 7980S tape drives on the same SCSI channel. The 7980SX should be on its own SCSI channel.

Table 8.10 HP 3000 900 Series Summary of Backup Capacity

	7980S	7980SX	DDS	DDS-DC	Optical	1/2-inch ¹ Cartridge (3480)
Media Capacity Comparison						
Media capacity basic	0.14 GB	—	2 GB	—	20 GB	2 GB
Media capacity with (typical) low data compression	0.28 GB ²	—	4 GB	—	40 GB ²	4 GB ²
Media capacity with (typical) high data compression	0.50 GB ²	0.5 GB	7 GB	7 GB	70 GB ²	7 GB ²
Media Cost Comparison						
Media cost per unit	\$23.00	\$23.00	\$15.00		\$200.00	\$9.00
Media cost per MB basic	.16	.05	.01		.31	.05
Media cost per MB with fast data compression	.08	N/A	.005		.16	.03
Media cost per MB with high data compression	.05	N/A	.003		.09	.01

¹ Each device contains 10 cartridges for a maximum of 7 GB of unattended backup capacity.

² Data compression achieved w/TurboSTORE/iX II.

Table 8.11 HP 3000 900 Series Summary of Backup Rates in Gbytes/Hour

	7980S	7980SX	DDS	DDS-DC	Optical Library	1/2-inch Cartridge
Standard device	~2.5	—	~.65	—	3.8	9.3
Low data compression	~5.0 ¹	—	~1.3	—	~6.8 ¹	~13.0 ¹
High data compression	~7–8.0 ¹	~7–8.0	~2.2	~2.2	~9 ¹	13.7 ¹

NOTES:

These transfer rates are based on TurboIMAGE databases being backed up under optimal conditions. Your customer may get different results depending on their environment. Transfer rates depend on back-up device, number of devices per bus, processor performance, TurboSTORE/XL II compression ratio, and type of data being compressed.

Rewind time not included in transfer rates.

¹ Transfer rates achieved w/TurboSTORE/iX II data compression.

Rewritable Optical Disk Library System

The HP Series 6300 Model 40GB/A Rewritable Optical Disk Library System (C1700T) and Model 20GB (C1708T) provide unattended backup for large configurations on the HP 3000. *Note: These optical libraries will be supported in September 1994.*

The Rewritable Optical Library is supported as a serial device accessed through TurboSTORE/iX II. Two versions of TurboSTORE/iX II are available for support of the Rewritable Optical Autochanger: 36397A Support for Rewritable Optical Disk and 36398A Support for Online Backup for Rewritable Optical Disk.

Configuration limitations for C1700T and C1703T are:

- No boot capabilities are provided
- Only three C1700T or C1708T products per MPE/iX system

To ensure operability on the HP 3000, three pieces need to be ordered:

1. TurboSTORE/iX II with support for Rewritable Optical Disk (P/N 36397A) or TurboSTORE/iX II with Online Backup for Rewritable Optical Disk (P/N 36398A).
2. Rewritable Optical Disk Library System (P/N C1700T or C1708T, option 1AC or option 133). Option 1AC provides the 1 meter, 19-inch rack version of the library system. Option 133 provides the library

system without the cabinet for installation into an existing 1-meter cabinet. Option AFJ provides 2-meter SCSI cable.

3. SCSI host-adapter for CIO HP 3000 systems (P/N 27251A) includes 2-meter cable. SCSI host-adapter for HP-PB systems (P/N 28642A) includes a 1-meter cable. P/N 92222D can be ordered for 1-meter SCSI cable extender.

In configuring the Optical Disk Library, each Library System must have its own SCSI host adapter card.

Comparative Peripheral Transfer Rates and Capacities

The transfer rates and capacities in **Tables 8.10 and 8.11** are based on a number of system assumptions. These assumptions are:

1. Disk devices and backup devices need to be spread across multiple device adapter cards for maximum backup performance especially if total backup speeds of over 12 GB/hour are needed. For maximum backup performance the system configuration should contain no more than 4 disks per DA card.
2. SCSI DA cards cannot sustain more than 10 GB/hour data transfer across the bus. Backup devices can share the SCSI bus, up to a total data transfer of 10 GB/hour. So, for maximum performance—no more than 4 DC-DDS, 4 7980S, 2 7980SX, 3 Optical Libraries (JAWS), or 1 1/2-inch cartridge tape should share a SCSI

bus. Due to HP-IB bandwidth limitations, only 1 7980XC per HP-IB DA card should be used.

3. 1/2-inch cartridge, 7980XC, and 7980SX backup numbers assume the use of the interleaving option of TurboSTORE/iX II.

4. Backup numbers are raw transfer speeds and don't include times for media switching. The impact of reel switch can be avoided by using TurboSTORE/iX II Sequential device or Sequential device pool functionality. Rewind times for 1/2-inch cartridge and magnetic tape can be significant. The use of TurboStore/iX II sequential device pools, dual transport on StorageTek 4280 can reduce this time.

5. Performance numbers at the high end assume devices are kept streaming. This means that there must be enough CPU available and the disk I/O rate is sustained at maximum throughput.

6. File extent placement and INTERLEAVE on STORE must be optimal.

7. Optical Libraries and 7980S require the use of TurboStore to achieve data compression.

8. Optical Library is a 20 GB auto-changer with 2 drives.

9. 1/2-inch cartridge capacities assume the use of the autoloaders with 10 tapes.

Series 9x7 and Mainframe Class Backup Recommendations

Based on these transfer rates and capacities we make the following backup recommendations. For backups of under 12 GB of data use DDS-DAT drives. If you wish

to backup more than 12 GB of data you should consider 1/2-inch cartridge tape for dedicated and on-line attended backup. For high-end unattended backup use optical disk libraries. These recommendations are based on <2 hour backup time requirements. If using on-line backup

and/or backup time is not a major criteria, other devices may be considered.

Futhermore, we recommend partitioning the disk subsystem into User Volume Sets. This is particularly important for large system configurations. See the discussion on User Volume Sets on page 8-16.

Table 8.12 Series 9x7 and 9x8 Backup Recommendation

		System					
		Entry Level	Low End	Midrange	High End		
Typical number of users		0-20	46	100	160	256	325
Typical Gbytes		1	2	3.5	5.5	8.0	10.0
Dedicated backup <2 hour backup time - High compression ratio with TurboSTORE/iX for optical and 1/2-inch cartridge - Hardware data compression for DDS-DC DAT	Attended	1 DDS	1 DDS-DC	1 DDS-DC	2 DDS-DC	2 DDS-DC or 1 1/2-inch cartridge	3 DDS-DC or 1 1/2-inch cartridge
	Unattended	1 DDS	1 DDS-DC	1 DDS-DC	2 DDS-DC	3 DDS-DC or 2 1/2-inch cartridge	3 DDS-DC or 2 1/2-inch cartridge
On-line backup <2 hour backup time - Low data compression with TurboSTORE for optical and 1/2-inch cartridge - Hardware data compression for DDS-DC DAT	Attended	1 DDS-DC	1 DDS-DC	1 DDS-DC	2 DDS-DC	2 DDS-DC or 1 1/2-inch cartridge	3 DDS-DC or 1 1/2-inch cartridge
	Unattended	1 DDS-DC	1 DDS-DC	1 DDS-DC	2 DDS-DC	3 DDS-DC or 2 1/2-inch cartridge	3 DDS-DC or 3 1/2-inch cartridge or optical

Table 8.13 Corporate Business System Backup Recommendation

Typical number of users		400	750	1200	Unlimited	Unlimited
Typical Gbytes		12.5	23.0	36.5	60.0	>100
Dedicated backup <2 hour backup time - High compression ratio with TurboSTORE/iX for optical and 1/2-inch cartridge - Hardware data compression for DDS-DC DAT	Attended	3 DDS-DC or 1 1/2-inch cartridge	11/2-inch cartridge	2 1/2-inch cartridge	3 1/2-inch cartridge	4 1/2-inch cartridge
	Unattended	3 DDS-DC or 2 1/2-inch cartridge	4 1/2-inch cartridge or 1 optical	3 optical	3 optical	3 optical (3.2 hours)
On-line backup <2 hour backup time - Low data compression with TurboSTORE for optical and 1/2-inch cartridge - Hardware data compression for DDS-DC DAT	Attended	3 DDS-DC or 1 1/2-inch cartridge	2 1/2-inch cartridge	3 1/2-inch cartridge	3 1/2-inch cartridge	4 1/2-inch cartridge (2.6 hours)
	Unattended	3 DDS-DC or 3 1/2-inch cartridge	2 optical (2.3 hours)	3 optical (2.6 hours)	3 optical (4.3 hours)	3 optical (7.2 hours)

Using TurboSTORE/iX II More Effectively

Use Parallel Devices

TurboSTORE/iX can store data to multiple backup devices running in parallel during backup. This will overcome the performance bottlenecks experienced by backup solutions using only a single backup device. This can significantly reduce backup times.

To enhance performance with TurboSTORE/iX or TurboSTORE/iX II, modified configurations are suggested. For Series 9x7 and 9x8 systems with greater than 12 Gbytes storage, spread disks across 3 SCSI busses. Back-up performance is enhanced with TurboSTORE/iX II, SCSI disks, and DDS by having the disks on a separate SCSI bus from the DDS tapes and/or 1/2-inch tape drives.

If HP-IB backup devices will only be used sequentially, they may share an HP-IB DA. If devices are used in parallel or parallel in device pools, it is suggested that

each backup device have its own HP-IB Device Adapter (DA). Additional performance increases can occur with:

- HP-IB disks spread over at least four HP-IB DAs
- A maximum of two HP-FL DAs per CIO
- Have HP-IB and HP-FL DAs on separate CIO
- A maximum of 3 HP-IB DAs per CIO

Use Sequential Pools

TurboSTORE/iX supports up to eight drives for sequential store. After filling one tape, backup continues automatically by switching to a second tape drive while the previous tape rewinds and unloads. Optimally, you can utilize both sequential and parallel backup features in device pools.

When using large capacity devices, such as DDS DAT tapes or Optical disks, using all available devices in parallel will generally

provide greater benefits. Using Sequential devices or sequential device pools is only beneficial if tape rewind and unloading is necessary. Generally, pools of 2 sequential devices are optimal.

Use Data Compression

For products without hardware data compression, such as the 7980S, Optical Disk Libraries, and 1/2-inch cartridge tape without IDRC, TurboSTORE/iX II boosts backup performance and capacity significantly with software data compression. For maximum flexibility two different data compression algorithms are provided. The low algorithm provides on average 2.1 to 1 data compression and more than doubles backup device performance and capacity while requiring the least CPU resources. The high density algorithm compresses data on an average of 3.5 to 1 but requires more CPU resources. Data compression rates are averages, actual compression rates will depend on the type of data you are trying to compress.

Table 8.14 STORE and TurboSTORE/iX II Products

Product	Part Number	Description
STORE/iX		Single device store/restore, fastsearch for DDS as of 2.2 and forward
TurboSTORE/iX	30319A	Up to 8 parallel tape drives, up to 8 sequential tape drives, support dissimilar devices (7980XC and 7978), interleaving, fastsearch as of 2.2 and forward
TurboSTORE/iX II	36387A	Software data compression, up to 8 parallel or serial devices, DDS and fastsearch on DDS, parallel restore, IBM/ANSI label tapes, dissimilar tape devices, interleaving
TurboSTORE/iX II with Online Backup	36388A	All functionality in P/N 39387A plus capabilities for online backup
TurboSTORE/iX II with support for Rewritable Optical Disk	36397A	All functionality in P/N 39387A plus support for Rewritable Optical Disk
TurboSTORE/iX II with Online Backup for Rewritable Optical Disk	36398A	All functionality in P/N 39397 plus online backup

Use the high compress option to reduce the amount of actual data being transferred to the backup media. However, compression does require significant additional CPU time and memory. Therefore, when using TurboSTORE/iX II data compression for unattended online data backup the less CPU intensive low data compression algorithm should be used.

Although HP 3000 systems with typical loads will experience satisfactory on-line backup performance using TurboSTORE/iX II data compression, heavily loaded systems may achieve higher on-line backup performance by utilizing the hardware data compression versions of DDS-DAT's and 7980SX tape drives.

The 1/2-inch tape compressed on the 7980XC or 7980SX cannot be read by TurboSTORE/XL II if restored from a drive other than the 7980XC or 7980SX.

Online Backup Considerations

Utilizing on-line backup reduces system downtime for backup. Instead of the traditional application shut down of 2–6 hours, system unavailability is limited to a small quiescence time to ready the system for backup. Downtime varies between 5 minutes and 20 minutes depending on the number of files, number of processes, and number of open files residing on the system.

Additionally, you should also include application restart time in your system backup and recovery strategy. Application restart time

is application dependent and in most cases elapsed time will be short. However, startup time can be significant in some environments such as a distributed computing environment with a large number of networks. In this environment, each network needs to be restarted.

The system load during online backup is assumed to be low. On-line backup needs adequate CPU resources to compress data and keep devices streaming.

Use Interleaving

Using the INTERleave option of TurboSTORE/iX II increases backup performance by optimizing the retrieval of data from disks. The interleave option allows the store process to perform multiple reads on multiple files. This helps to eliminate idle time waiting for data to be retrieved and keeps the backup devices streaming.

No File Cleanups

To decrease system disk usage and system overhead during an online backup, avoid file cleanup activities (file purge, rename, EOF cutback) that can be done before or after the online backup is complete. If file cleanup is performed during online backup additional disk space is required to keep images of files as they were before the backup started.

Use MAXTAPEBUF Option

The MAXTAPEBUF option can be used to increase the output buffer size from 16 KBytes to 32 KBytes. This will improve backup performance.

The 1/2-inch cartridge tape drive from StorageTek can provide your customer with media interchange in mainframe environments. This standard (3480 compatible) cartridge is usable in IBM's 3480 1/2-inch cartridge tape drives. Data stored to this cartridge with IBM label tape format can be easily transferred to an IBM system, and vice versa. For maximum backup performance with the 1/2-inch cartridge tape drive from StorageTek, STORE's MAXTAPEBUF option should be specified.

Avoid TRANSPORT Option

TurboSTORE/XL II can create compatibility mode tapes which can be recovered on MPE V systems and MPE/iX systems using the "TRANSPORT" parameter. You cannot create tapes with TurboSTORE/iX or TurboSTORE/XL II in Native Mode and recover in Compatibility Mode. Compatibility Mode tapes can be created, but no TurboSTORE/XL or TurboSTORE/XL II options (data compression, online, etc.) can be used.

Use the TRANSPORT option of TurboSTORE/iX II only when an alternative format (pre MPE/iX 4.5 or MPE V) is required for transferring data between systems. Since system backups are system specific and will most likely be used only on the source system, the use of the TRANSPORT option is generally not required. Using this option will increase overall backup time.

High Availability Backup Recommendations (24 × 7)

Today more businesses require high availability features. Following are specific backup recommendations to meet high availability requirements for these businesses.

User Volume Sets

Improves recovery time. Partitioning the disk subsystem into User Volume Sets makes it easier and faster to recover in the event of a disk media failure. Under this strategy, the operator stores all accounts by volume sets. If a drive fails within the volume set, the operator recovers only the files on the affected user volume set, not the entire system.

Decreases downtime. Not all users are restricted from system access during backup. Only the users of the volume set being backed up are impacted and they are impacted for a shorter time. Users accessing data on other volume sets can still be accessing the system during the backup period.

Figure 8.3 Typical High-end System Configuration

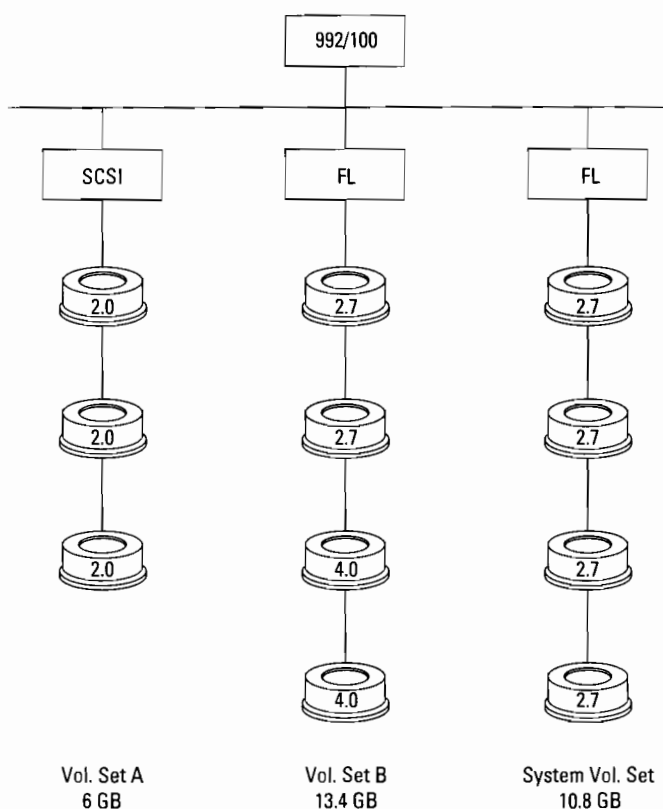


Figure 8.3 shows a typical high-end system configuration. The system is divided into a system volume set and two user volume sets. One volume set contains FL arrays with 13.4 GB of data while the second volume set contains three 2.0 GB SCSI disks.

With the configuration shown in Figure 8.3, Table 8.15 compares how long each device would need to backup or recover each volume set or the entire system if no volume sets are used. This scenario clearly indicates the advantages of partitioning your system into volume sets.

Table 8.15 Backup and Recovery Time Estimates (in hours)

Device	System Volume Set (10.8 GB)		Volume Set A (6 GB)		Volume Set B (13.4 GB)		Total* (30.2 GB)	
	Backup	Recovery	Backup	Recovery	Backup	Recovery	Backup	Recovery
1 DDS	5.0	6.4	2.7	3.5	6.1	7.9	13.8	17.8
2 DDS	2.5	3.3	1.4	1.8	3.1	4.1	6.9	9.2
1/2-inch SCSI tape	1.4	1.8	.8	1.1	1.7	2.3	3.8	5.1
Optical	1.2	1.6	.7	.9	1.5	2.0	3.4	4.5
1/2-inch cartridge	.8	1.1	.4	.6	1.0	1.3	2.2	2.9

* If using User Volume Sets, it is **extremely unlikely** that you would ever need to recover the entire system at one time. That is the primary benefit of user volumes. If a media failure does occur, only users of that volume set experience downtime while the disk is repaired and data restored.

NOTES:

- Assumes 987 processor
- 3.5 : 1 data compression
- Does not include time for media switching or rewind time if applicable

System Backup with TurboSTORE/iX II

To minimize backup time and system downtime we recommend the use of TurboSTORE/iX II. Follow the guidelines starting on page 8-14 for using TurboSTORE/iX II more effectively. The following features of TurboSTORE/iX II should be used to meet high availability requirements.

Online Backup Capability. After the initial quiescent period, users can access their data while it is being transferred from disk to the backup media. In addition, choosing a low activity period and a fast backup device or using multiple backup devices will minimize the impact to users during on-line stores. Some overhead is required to perform on-line backup and users may experience performance degradation.

Use of Parallel Devices. TurboSTORE allows you to backup to more than one device simultaneously. This will obviously increase the throughput of your backup.

Data Compression. Whenever available use the compression capability of the hardware because device compression does not utilize additional CPU resources. DDS-DC

DATs, 7980SX products, and the IDRC version of the 1/2-inch cartridge tapes use hardware data compression. However, if your backup device does not have data compression capability in the hardware, TurboSTORE can provide software data compression. This will reduce the amount of data that needs to be stored to the backup device, but will increase CPU utilization.

The compression ratio will vary depending on the content of your data, but a typical compression rate for hardware data compression is 3.5:1. When using TurboSTORE/iX II to store data on-line we recommend utilizing the low data compression rate with typical compression ratios of 2:1 to minimize performance degradation.

Flexible Backup Scheduling

You may wish to consider more flexible backup scheduling. For example, backing up different user volumes at different times. Or selectively choosing what data is backed up when.

Speed and Capacity of the Device

The speed and capacity of the backup device is always a consideration. You should determine the time you are willing to dedicate to backup and choose the appropriate device with required speed and capacity.

Supplying Redundancy

Log, Data and System Redundancy—Supplying redundancy increases the fault resiliency of the system. You can protect your data by providing redundancy at the log, data, or system level. Refer to the discussions on dual logging or ALLBASE/REPLICATE in the Database Administration Guide. Additionally, the customer can utilize system level redundancy features such as disk arrays, mirrored disks, or SPU SwitchOver/iX to achieve greater levels of data robustness.

Mirrored Volume Sets—

In particular, customers may wish to mirror critical volume sets. In this way, in the unlikely event of a disc failure critical processes are not impacted.

Database log management considerations

Archive Logging and Roll-forward Recovery—

TurboIMAGE/iX and ALLBASE/SQL provide the ability to restore the database to the state it was in just prior to a media failure using archive logging and roll-forward recovery. Log files contain records for all transactions. In the case of a failure, recovery procedures require restoring the database environment from the full backup of the database environment and rolling forward the transactions from the log files. In archive

logging the database environment should be backed up periodically and log files as soon as ready.

NOTE: Non-archive logging and rollback recovery is another term often used in database logging discussions. In this mode customers are not concerned about data loss following a media failure. Non-archive logging and rollback recovery only ensures the logical integrity of a transaction by rolling back transactions that were not complete before a software failure occurred. You are not protected from media failures with non-archive logging and rollback recovery.

Log File Size vs. Operator Intervention—Protecting log files are critical to ensure data availability and integrity. A log file residing on disk is more vulnerable than a log file that has been archived to tape. Therefore, it is important to keep log files as small as possible and back them up as soon as the log file is ready.

However, the smaller the log file the more log backups an operator performs. You must make trade-offs between a desired level of data protection and the degree of labor intensive activity you are willing to tolerate. We recommend that log files be no larger than the size necessary to contain one shifts work of transactions. Refer to the Database Administration Guide to ascertain the appropriate size of the log file for your environment.

Background Process—The DBA should write a background process to monitor a log file's status. This background process should direct the operator to perform a log backup or automatically initiate backup procedures. In the absence of a background process, operators should monitor the status of archive log files to ensure they contain sufficient space.

Use Separate Media—The database environment and log files should be stored on separate media than the system backup files. This greatly increases the efficiency and speed of the recovery process if one is needed.

Optical Library in FileNet

The HP Series 6300 Model 200T Rewritable Optical Disk Library System (C1705T) provides up to 186 gigabytes of optical storage for document images, when used in conjunction with software from FileNet Corporation. This device is not supported in any other environment.

Configuration limits for the C1705T are:

- Only one C1705T products per SCSI channel (host and adapter).

The C1705T uses five SCSI addresses, so it may share an adapter with up to two other non-glitching devices. It should not appear with system disks.

To ensure operability on the HP 3000, four pieces need to be ordered:

1. Rewritable Optical Disk Library System (P/N C1705T).
2. SCSI Adapter for HP-PB (28642A), which includes a 1-meter SCSI cable. A longer cable should be ordered separately if needed.
3. Disk media. Order sufficient quantities of individual disks (92280T), at 1.3 GB each, or 8-packs of these disks (C2589T), to provide the desired storage capacity for the library.
4. Software from FileNet Corporation.

Printers

Description

Four categories of printers are supported directly connected to HP 3000 Series 900 systems. Character printers tend to be less expensive yet versatile in capabilities, including the handling of multipart forms. Line printers offer much of the same versatility

and provide the lowest cost of operation and a highly reliable technology for larger volumes of printing. Some impact printers are as quiet as the HP LaserJet 4Si printer so they are suited to operate in office environments. Page printers are quieter in the office environment and offer crisp, letter quality output in a range of print speeds. High speed page printers are most efficient

for centralized production jobs, such as billing, invoicing, or mass customer communications. **Table 8.16** summarizes the various printers supported directly connected to 900 Series systems.

Table 8.16 Summary of Printers Supported on HP 3000 900 Series Systems

		Maximum Print Speed (DP/Draft)	Paper Type	Resolution	Bar Codes	Interface	Typical Throughput
Dot Matrix Impact Character Printers							
2932A ^{1,3}	General purpose printer	200 cps	FF/MPF	Dft	No	Serial	
2933A ^{1,3}	Factory data printer	200 cps	FF/MPF	Dft	Yes	Serial	
2934A ³	Business printer	40/67/200 cps	FF/MPF/CS	LQ/NLQ/Dft	Yes	Serial	
C1202A ³	Asian character printer	110/220 cps	FF/MPF/CS	NLQ/Dft	No	Serial/HP-IB	
Dot Matrix Impact Line Printers							
2562C	Industrial line printer	300/420 lpm	FF/MPF	140 × 144 dpi	B / U	Serial ⁴ /LAN ² /HP-IB	24K ppm
2563A ¹ /B ¹ /C	48 dba line printer	300/420 lpm	FF/MPF	140 × 144 dpi	B / U / O	Serial ⁴ /LAN ² /HP-IB	48K ppm
2564B ¹ /C ¹	Line printer	600/840 lpm	FF/MPF	140 × 144 dpi	B / U / O	Serial ⁴ /LAN ² /HP-IB	145K ppm
C2354A	54 dba line printer	600/840 lpm	FF/MPF	140 × 144 dpi	B / U / O	Serial ⁴ /LAN ² /HP-IB	145K ppm
C2356A	55 dba line printer	800/1120 lpm	FF/MPF	140 × 144 dpi	B / U / O	Serial ⁴ /LAN ² /HP-IB	190K ppm
2566B ¹ /C	Line printer	900/1200 lpm	FF/MPF	140 × 144 dpi	B / U	Serial ⁴ /LAN ² /HP-IB	240K ppm
2567B ¹ /C	Line printer	1200/1600 lpm	FF/MPF	140 × 144 dpi	B / U	Serial ⁴ /LAN ² /HP-IB	320K ppm

(Continued)

¹ Discontinued product, listed for support reference

² Requires third party software

³ The 293xA and C12xxA provide modem support

cps = characters per second

lpm = lines per minute

ppm = pages per month

dpi = dots per inch

FF = fanfold

MPF = multipart forms

CS = cutsheet

Dft = draft

NLQ = near letter quality

LQ = letter quality

B = Barcodes

U = US Postnet

O = OCR

Table 8.16 Summary of Printers Supported on HP 3000 900 Series Systems (cont'd)

		Maximum Print Speed (DP/Draft)	Paper Type	Resolution	Bar Codes	Interface	Typical Throughput
Page Printers							
2686A ¹	HP LaserJet	8 ppm	CS	300 dpi	Opt	Serial	
33440A ¹	HP LaserJet Series II	8 ppm	CS	300 dpi	Opt	Serial	
33447A ¹	HP LaserJet Series IID	8 ppm	CS	300 dpi	Opt	Serial	
33449A ¹	HP LaserJet Series III	8 ppm	CS	300 dpi	Opt	Serial	
33459A ¹	HP LaserJet Series IIID	8 ppm	CS	300 dpi	Opt	Serial	
33491A ¹	HP LaserJet Series IIISi	17 ppm	CS	300 dpi	Opt	Serial/LAN	
2688A ¹	Page printer	12 ppm	CS	300 dpi	Opt	HP-IB	
2684A ¹	HP LaserJet 2000	20 ppm	CS	300 dpi	Opt	Serial	
2680A ¹	Laser printer	45 ppm	FF	180 dpi	Yes	HP-IB	
C2010A	HP LaserJet Series 4Si	17 ppm	CS	600 dpi	Opt (Parallel)	Hi Speed	
C2011A	HP LaserJet Series 4Si MX	17 ppm	CS	600 dpi	Opt (Parallel)	Hi Speed	
C2001A	HP LaserJet Series 4	8 ppm	CS	600 dpi	Opt (Parallel)	Hi Speed	
C2002A	HP LaserJet Series 4M	8 ppm	CS	600 dpi	Opt (Parallel)	Hi Speed	
C4000A	HP 5000 Model C30 page printer (100–127 VAC, 60 Hz)	30 ppm simplex	CS	300 dpi	Yes	LAN ⁵ /Serial	200K ppm
C4001A	HP 5000 Model C30 page printer (200–240 VAC, 50 Hz)	30 ppm simplex	CS	300 dpi	Yes	LAN ⁵ /Serial	200K ppm
C4002A	HP 5000 Model C30D page printer (100–127 VAC, 60 Hz)	30 ppm simplex, 15 ppm duplex	CS	300 dpi	Yes	LAN ⁵ /Serial	200K ppm
C4003A	HP 5000 Model C30D page printer (200–240 VAC, 50 Hz)	30 ppm simplex, 15 ppm duplex	CS	300 dpi	Yes	LAN ⁵ /Serial	200K ppm
C2753A	HP 5000 F100 60Hz	100 ppm	FF	300 dpi	Yes ²	SCSI	2800K ppm
C2754A	HP 5000 F100 50Hz	100 ppm	FF	300 dpi	Yes ²	SCSI	2800K ppm
C2753B	HP 5000 F100/T 60Hz	100 ppm	FF	300 dpi	Yes ²	SCSI	2800K ppm
C2754B	HP 5000 F100/T 50Hz	100 ppm	FF	300 dpi	Yes ²	SCSI	2800K ppm
C2776A	HP 5000 F135 60Hz	135 ppm	FF	300 dpi	Yes ²	SCSI	2800K ppm
C2777A	HP 5000 F135 50Hz	135 ppm	FF	300 dpi	Yes ²	SCSI	2800K ppm
C2772A	HP 5000 F100XP 60Hz	100/154 ppm	FF	300 dpi	Yes ²	SCSI	4000K ppm
C2773A	HP 5000 F100XP 50Hz	100/154 ppm	FF	300 dpi	Yes ²	SCSI	4000K ppm
C2755B	HP 5000 F135XP 60Hz	135/210 ppm	FF	300 dpi	Yes ²	SCSI	4000K ppm
C2756B	HP 5000 F135XP 50Hz	135/210 ppm	FF	300 dpi	Yes ²	SCSI	4000K ppm

¹ Discontinued product, listed for support reference² Requires third party software³ The 293xA and C12xxA provide modem support⁴ New maximum speed 38.4 Kbps⁵ LAN interface via HP JetDirect EX. Requires third-party network spooling software.

cps = characters per second

lpm = lines per minute

ppm = pages per month

dpi = dots per inch

FF = fanfold

MPF = multipart forms

CS = cutsheet

Dft = draft

NLQ = near letter quality

LQ = letter quality

B = Barcodes

U = US Postnet

O = OCR

Maximum Printer Support

Direct Host Connect

System printers connect through the HP-IB (PBA-IB) or SCSI interface. This configuration generally offers higher printer throughput, guarantees data integrity, ensures print job independence and reports operational status to the system.

Tables 8.16 and 8.17 list the total number of system printers as well as the maximum number of each type of printer supported on 900 Series systems.

- Order the 256xC option 046 or C235xA option 1A8 to obtain the HP-IB interface and a 4-meter HP-IB cable.
- 256x and C235xA printers are shipped configured with one device load (configurable from 1 to 7).
- A maximum of six 256xC or C235xA printers are supported per HP-IB device adapter. *See Section 7 for device loading and cable length rules.*
- Up to four 256x or C235xA printers are supported on an HP-IB extender configuration.
- 2688A and 2680A printers are both shipped configured with four device loads and are both configurable from 1 to 7.
- Both printers include a 1-meter internal HP-IB cable.
- Both printers are shipped with an 8-meter HP-IB cable.

Table 8.17 Maximum Printer Configurations

	9x7LX, 9x8LX	9x7RX, 9x7SX, 9x8RX	960, 980/100, 980/200, 980/300, 980/400	CS 990, CS 991, CS 992, CS 995
2562C	6	8	8	8
2563A ¹ /B ² /C	6	8	8	8
2564B ² /C ²	6	8	8	8
C2354A ¹	6	8	8	8
C2356A ¹	6	8	8	8
2566B ² /C	6	8	8	8
2567B ² /C	6	8	8	8
2680A ²	2	4	4	4
2688A ²	2	4	4	4
HP 5000 printers ³	2	4	4	4
– C2753A F100 (60 Hz)	2	4	4	4
– C2754A F100 (50 Hz)	2	4	4	4
– C2753B F100/T (60 Hz)	2	4	4	4
– C2754B F100/T (50 Hz)	2	4	4	4
– C2776A F135 (60 Hz)	2	4	4	4
– C2777A F135 (50 Hz)	2	4	4	4
– C2772A F100XP (60 Hz)	2	4	4	4
– C2773A F100XP (50 Hz)	2	4	4	4
– C2755B F135XP (60 Hz)	2	4	4	4
– C2756B F135XP (50 Hz)	2	4	4	4
Total Printers	6	8	12	12

¹ The C235xA can be configured as a 2564 line printer on HP 3000 systems

² Discontinued

³ Each HP 5000 printer requires a dedicated SCSI host adapter, cannot be connected to built-in SCSI

Figure 8.4 Cable Configuration for 256x Printers

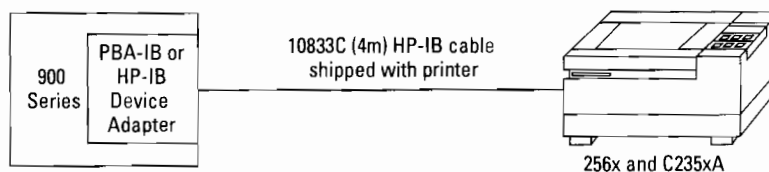
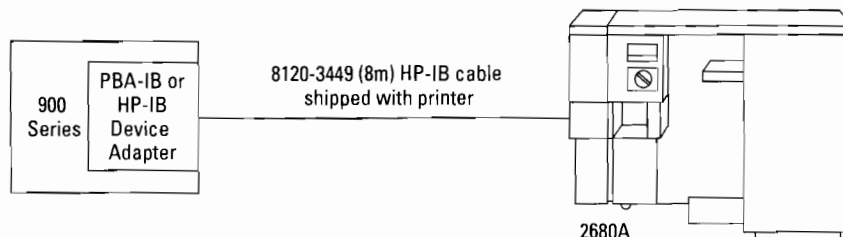


Figure 8.5 Cable Configuration for 2680A Page Printer



- A maximum of two 2688A or 2680A printers are supported per HP-IB device adapter. See previous discussion for device loading and cable length rules.
- Up to two 2688A or 2680A printers are supported on an HP-IB extender configuration.

NOTE: 2680A is discontinued. Information listed here is for reference only.

HP Line Impact Printers 256xC and C235xA

Impact printing technology's advantages are derived from:

- Highly reliable rugged mechanism: long lasting for large volumes

- Lowest cost of operation: average 19,000¹ pages per \$23 ribbon cartridge (\$1.2 per 1,000 printed pages plus paper cost)

- Fan-Fold Multiple-Part Forms (up to 6 parts) and Single-Part paper
- Multiple Fonts installed, scape sequences selectable (may include Bar Codes, US POSTNET, Line Draw, Block, Math; Draft, Normal, NLQ and Compress print quality as well as many languages)

- Maximum dot resolution of 144 × 140 dpi

- HP Label Card II (QMS® 4256 Magnum® Code V version II) provides the printer with easy to program graphics ability for text,

electronic forms, and logos creation, bar codes generation (rotation, sizing, reversing, and shading), and forms storage.

- New sound enclosure brings 2563C noise down to HP LaserJet printer levels; C2354/6A are suited for office environments as well

- HP-IB, Serial and LAN² connection to HP 3000 900 Series systems

All these features make this printer suited for the following applications:

- Where good print quality and very low printing cost is required
- Where impact printing is needed

Table 8.18 HP Line Impact Printer Configurations

I/O Interface Cards—Must specify one I/O card for printer to operate

Product No.	Opt. No.	Description
256xC, C235xA	1AX	Multiple I/O RS232C / Centronics
256xC, C235xA	ALZ	Multiple I/O RS422A / Centronics
256xC	046	HP-IB I/O card
C235xA	1A8	HP-IB I/O card
256xC, C235xA	UGN ²	TCP/IP LAN JetDirectEX Interface Access

To add features to the line printer's basic configuration, order:

256xC	ABB	European configuration
C235xA	ABB	European configuration
256xC, C235xA	400	HP Label Card II Graphics
256xC, C235xA	048	US POSTNET Bar Code character set
26761B		Character Set Field Upgrade Kits (Please refer to CPL to select proper option)
C2342A	1AX*	Multiple I/O RS232C and Centronics Field Upgrade
C2342A	ALZ*	Multiple I/O RS422A and Centronics Field Upgrade
C2342A	UGN ²	TCP/IP LAN JetDirectEX Interface Access (Order 9xx for C2356A, 2566C, and 2567C)
C2343A		Serial I/O for discontinued printers (256xA/B and 2564C) Upgrade Kit
C2345A		HP Label Card II Graphics Upgrade Kit

* C2342A #256 must be ordered for 256xC printers.

² Requires order #1AX or #ALZ. Must also order P/N J2382B LAN interface and NBSPool from QUEST Software, a third-party software vendor.

- Data Processing Centers
- Industrial Graphics
- Volume Printing, Heavy Duty Cycles, Unattended Operation
- Where Bar Codes and Automated Identification Processes are needed
- Accounting, Checks, Invoicing, Reports
- Where Electronic Forms or Multiple Part Forms are convenient
- Where US POSTNET for the U.S. mail helps to cut costs; Labels
- Industrial Rugged environments

NOTES:

¹ 60% print density, 30% character density for 2562/3C and C2354/6A printer. This number may change for other print densities.

² Requires order #1AX or #ALZ. Must also order P/N J2382B LAN interface and NBSPool from QUEST Software, a third-party software vendor.

HP 5000 Fanfold Printers

HP 5000 printers are supported on HP 3000 900 Series systems through a dedicated SCSI (small computer system interface) interface channel. The CIO SCSI Host Adapter Card (27251A) and HP-PB SCSI Host Adapter Card (28642A) are industry-standard local I/O busses that allow computer connections to certain peripherals. They support the SCSI common command and message set, as well as asynchronous and synchronous data transfers.

Requirements:

- MPE/IX 4.0 or later
- CIO SCSI Host Adapter Card (27251A) or HP-PB SCSI Host Adapter Card (28642A)
- Fiber-optic SCSI extender (28643A) with one distance option (AFB or AFD)
- One additional SCSI cable from extender to printer

Configuration Limitations:

- Only one HP 5000 printer per SCSI channel
- Up to four HP 5000 printers per system, depending on slot availability
- The SCSI Host Adapter Card includes 2 meter cable
- The SCSI channel has to be configured at address 7 (factory standard)
- Configuring without the SCSI extender will not meet most customer's distance requirements

Fiber-optic SCSI Extender Support

The extender overcomes the SCSI distance limitation. By delivering up to 100 meters, the HP 28643A provides the flexibility to place the HP 5000 printers in locations more convenient to and efficient for users. The extender comes in

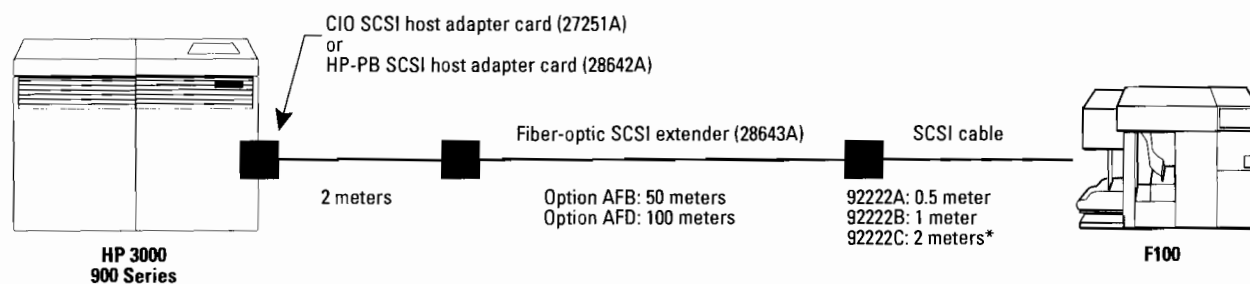
two lengths, 50 meters and 100 meters, and provides industry-standard SCSI compatibility.

HP 28643A includes two extender assemblies, two 19-inch rack-mounting brackets, one install/reference manual, and one loopback test connector. Option AFB provides 50 meters distance, option AFD provides 100 meters. Additional SCSI cabling must be ordered to attach from the remote extender to the printer. The products are:

- 92222A—.5 meter male-male
- 92222B—1 meter male-male
- 92222C—2 meter male-male
- 92222D—1 meter female-male

For distances greater than 100 meters, the HP Router can be used to extended LAN networking.

Figure 8.6 HP 5000 F100 Cabling Alternatives



* Recommended for extender to printer connection

HP 5000 Cut Sheet Printers

HP 5000 C30 and C300 cut sheet printers are supported on HP 3000 Series 900 systems through LAN or serial connection. LAN connection is via the HP JetDirect EX external network interface. The HP JetDirect EX interface provides an intelligent connection between the integrated parallel port of an HP 5000 cut sheet printer and the LAN. Use of the JetDirect for a LAN connection also requires a third-party network spooling product.

HP 5000 cut sheet printers can also be connected to HP 3000 Series 900 systems by means of a serial port on a DTC. For acceptable performance it is recommended that the DTC port have a speed of 38.4 Kbaud and that only light text with simple electronic forms be printed. Configuration should be similar to HP LaserJet III printer configuration.

LAN Connection Requirements

- MPE/iX 4.5 or later
- HP JetDirect EX External Network Interface (J2382B)
- Third-party network spooling product
- Parallel Cable (C2912B or 92284A)

Serial Connection Requirements

- DTC with 38.4 Kbaud port
- Serial cable

Figure 8.7 HP 5000 Cut Sheet Printer LAN Connection

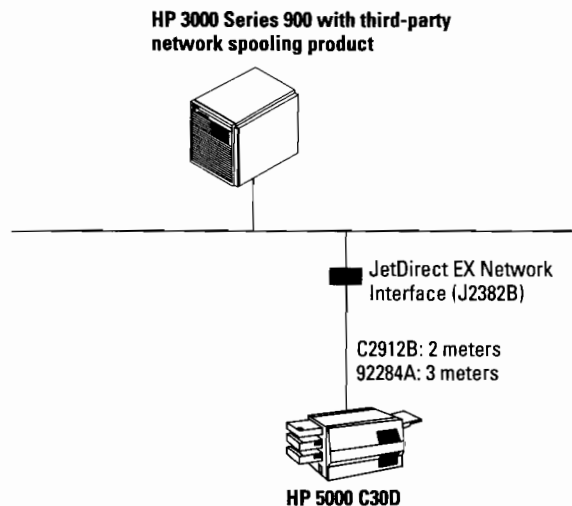
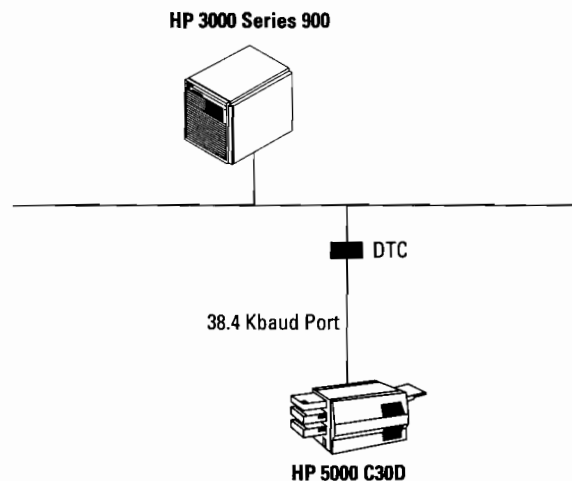


Figure 8.8 HP 5000 Cut Sheet Printer Serial Connection



Serial Printers

900 Series systems support spooled serial printers through the Data Communications and Terminal Controller (DTC). Serial printers connect to a DTC port either via a hardwired RS-232/422 cable or via a modem.

Tables 8.17 and 8.19 list the maximum number of total serial printers as well as maximum

number of each type of printer supported on 900 Series systems.

*NOTE: The configurations in **Table 8.19** have been determined to impose an acceptable impact on system performance. These represent the maximum factory supported configurations. In many cases, customers have successfully exceeded these maximums. There is no electrical*

or operating system limit that would prevent connecting printers to all available system ports. However, a careful evaluation of system loading should be performed before attempting to exceed the specified maximum configuration.

Table 8.19 Maximum Serial Printer Configurations

	9x7LX 9x8LX	937RX 937SX 947RX 947SX 9x8RX	957RX,SX 967RX,SX 977SX 987SX 987/200	980/100	980/200	980/300	980/400	CS 990 CS 991 CS 992 CS 995
2562C	14	21	28	44	68	88	96	200
2563A/B/C	14	21	28	44	68	88	96	200
2564B/C ¹	7	10	14	22	34	44	48	N/A
C2354A ²	7	10	14	22	34	44	48	200
C2356A ²	7	10	14	22	34	44	48	200
2566B/C	5	8	10	16	24	32	40	100
2567B/C	5	8	10	16	24	32	40	100
2932A	N/A	N/A	N/A	104	156	200	228	N/A
2934A	N/A	N/A	N/A	104	156	200	228	N/A
2684A/D LaserJet 2000	3	5	7	10	16	20	24	50
2686A/D LaserJet	10	15	20	25	35	50	55	100
33440A LaserJet II	10	15	20	32	48	64	70	150
33447A LaserJet IID	10	15	20	32	48	64	70	150
33449A LaserJet III	10	15	20	32	48	64	70	150
33459A LaserJet IIID	10	15	20	32	48	64	70	150
33491A LaserJet IIISi	5	8	10	16	24	32	40	100
C2010A LaserJet 4Si	5	8	10	16	24	32	40	100
C2011A LaserJet 4Si MX	5	8	10	16	24	32	40	100
C2001A LaserJet 4	10	15	20	32	48	64	70	150
C2002A LaserJet 4M	10	15	20	32	48	64	70	150
C4000A HP 5000 C30 (60 Hz)	3	4	5	8	12	16	20	50
C4001A HP 5000 C30 (50 Hz)	3	4	5	8	12	16	20	50
C4002A HP 5000 C30D (60 Hz)	3	4	5	8	12	16	20	50
C4003A HP 5000 C30D (50 Hz)	3	4	5	8	12	16	20	50
C1200A	4	4	4	5	5	6	6	8
C1202A	4	4	4	> 4	> 4	6	6	8
7550 Plotter	4	4	4	4	4	4	4	4
Total Serial Printers	32	48	64	104	156	156	156	250

¹ Discontinued

² The C235xA can be configured as a 2564 printer on HP 3000 systems.

N/A = not applicable—obsoleted devices not tested on new platforms.

Serial Printing Interfacing

Serial printers are considered either "local spooled" or "remote spooled" when connected to a 900 Series system. Local spooled printers are hardwired to the DTC via either RS-232C or RS-422. Remote spooled printers connect to the DTC via a modem. For more information on connecting to the DTC, see Section 9.

NOTE: Only 293x printers are supported as remote spooled.

Status Checking

If the serial printer supports the "ESC-?" status checking capability, the MPE Spooler or "hot" printing application has the ability to determine whether a printer is on-line before spooling the print job. This will prevent the data from being sent (and lost) to a printer that is out of paper or encountered a fault condition.

With status checking, if the printer goes off-line for any reason, the spooler will stop printing, save the print job, and automatically resume printing when the printer comes back on-line. Without status checking, printer faults or out-of-paper conditions cannot be detected. The spooler will always send the print job "blind" and purge the spoolfile assuming it printed successfully. The spoolfile will then have to be re-created in order to restart the printing process.

With the exception of some HP LaserJet models and the HP 5000 cut sheet printers, all supported serial printers provide the status checking feature as

standard. All printers with the status checking feature are configured as Term Type 26.

On the HP LaserJet IID, LaserJet III, and LaserJet IIID printers, a status checking card (26013A) is installed in the printer to support the status checking feature. On the LaserJet IIISi, a special MIO RS-232 card (C2059H) must be installed in the printer to provide status checking. In each of these cases, the status checking feature is ordered separately.

If the status checking feature is not installed in an HP LaserJet IID, LaserJet III, LaserJet IIID, or LaserJet IIISi, these printers would be configured as Term Type 18.

On the HP LaserJet 4Si, 4Si MX, 4, and 4M, a third party status checking card (such as Excellink's JetCard/MIO-3000) is required for status checking capability.

All the line impact serial printers support status checking. There is no need to purchase extra hardware or software.

LAN Printers

LAN-based printers offer convenience, speed and connectivity that is difficult to achieve with serial-connected printers. LAN-connected printers can be located in workgroups through the same LAN cable used to connect PC workstations to the HP 3000.

The JetDirect series LAN interfaces provide the LAN connection for the HP LaserJet, HP 5000 cut sheet page printers, and line impact printer families. MPE/iX supports two network protocols

for LAN-based printers, NetWare and TCP/IP. Line impact printers only support the TCP/IP for HP 3000 systems through Quest Software.

With NetWare for the HP 3000 PC based applications can print directly to NetWare print queues serviced by LAN printers using the HP JetDirect interfaces for Novell NetWare (Ethernet/802.3 or Token Ring). MPE-based applications can also print to these LAN printers by using NB Spool from Quest Software, Inc. NB Spool moves print jobs from the MPE Spooler and places the job in the NetWare print queue for printing. NetWare aware MPE applications can print directly to any NetWare print queue without using NB Spool.

When using software from Quest Software, Unison, or Holland House MPE/iX can also support an HP LaserJet IIISi with the HP JetDirect card. The utilities provided from these vendors send print jobs from the MPE/iX spooler directly to the HP LaserJet IIISi.

MPE/iX can also support all the line impact printers when using software from Quest Software. The utilities provided from Quest Software will configure the printer in the LAN at power-up time and will send the print jobs from MPE/iX spooler directly to the line impact printer.

Consult your local HP representative regarding the availability of third party solutions and/or applications programming interfaces that could be used in conjunction with NetWare or TCP/IP on the HP 3000.

Workstations

HP Windows Client

The HP Windows Client models 425SX and 433SX are LAN-connected diskless 486 PCs which provide support for PC applications and HP 3000 sessions via terminal emulation. Each HP Windows Client includes licenses for several software packages and can be ordered bundled with several alternative monitors.

The Windows Client requires a NetWare boot/file server to load its operating system and all programs and data over the LAN. Server functionality can be provided by NetWare for the HP 3000/900 or by another connected NetWare, LAN Manager, or NFS server. NetWare is supported on HP 3000, HP 9000 Series 800, and PC servers. LAN Manager is supported on HP 9000 Series 800 servers and PC servers. NFS is supported on HP 9000 Series 800 servers. As long as there is a boot/file server on the same LAN subnet as the Client, the Client can boot from that server and initiate sessions on the HP 3000 (via terminal emulation) regardless of whether NetWare is running on the HP 3000. ThinLAN 3000/IX Link software (P/N 36923A) is required on the HP 3000 to provide session connections.

Table 8.20 HP Windows Client Product Characteristics

CPU	• 32-bit Intel 486 SX microprocessor
CPU Speed	• 33 MHz (Model 433SX) and 25 MHz (Model 425SX)
Cache	• 8k internal cache memory
Integrated I/O	• Parallel Port - Centronics (25-pin) for printer or plotter • Serial Port - RS232C (9-pin) for modem or printer • Serial/Parallel ports can be disabled for additional security • Mini-DIN keyboard and mouse ports • 15-pin VGA connector
Keyboard	• Industry-standard 101-key layout with mini-DIN interface
Mouse	• 2-button mouse with mini-DIN interface
Clock/Calendar	• With battery backup
LAN Connection	• 10-Base-T (RJ45) port • AUI port for COAX or fibre optic network connection
Video	• Integrated local-bus Ultra VGA • Model 425SX has hardware cursor, color expansion, 512k video RAM • Model 433SX has full hardware acceleration, 1024k video RAM
Memory	• 4 MB Standard, Expandable to 36 MB

Table 8.21 Included Software Licenses with each HP Windows Client

OS and GUI	• Microsoft DOS 6.2 and Microsoft Windows 3.1
Terminal Emulation	• WRQ Reflection 1 for Windows (HP 700/9x and HP2392 Terminal Emulation) • WRQ Reflection 2 for Windows (VT320/220/102/52 Terminal Emulation)
Networking Services	• WRQ Reflection Network Series (TCP/IP, NS/VT, Telnet, LAT, SPX/IPX, NDIS, ODI and FTP)

Each site requires one Server Kit for the System Administrator. The Server Kit includes the diskettes and complete documentation for all included software. It also includes the HPAssist installation tool kit.

See **Tables 8.20 and 8.21** for a list of HP Windows Client characteristics and software licenses included.

HP Windows Client Cabling

The Windows Client power cord and cables for connection to the keyboard and mouse are included with all Windows Clients. If a monitor is ordered, the monitor power cord and cable are included. See **Table 8.22** for LAN connection guidelines.

HP Windows Client Server Kit

The Server Kit includes media and complete documentation for all included software (see **Table 8.23**). Order one Server Kit **per customer site**. The software in the Server Kit may be installed on multiple servers at a single customer site. The Server Kit includes:

- HP, Microsoft, and WRQ software on 3 1/2-inch diskettes.
- Installation and reference documentation
- HP Assist Installation Utility which includes preconfigured boot images
- Licenses to install software on one or more servers per site
- Licenses to use bundled software on an unlimited number of HP Windows Clients
- License to use WRQ software on a system administrator's PC
- Telephone support for the system administrator

The HPAssist Installation Utility automates much of the process of setting up a server for diskless client operation. It assists the System Administrator in installing MS DOS, MS Windows and the WRQ products onto the server. It contains preconfigured boot images which can be selected and copied to the server. It also helps create new boot images.

Table 8.22 HP Windows Client LAN Connection Guidelines

If your LAN Cabling is:	Connect the Windows Client using:
Twisted Pair	Integrated RJ45 connector on the Windows Client back panel
ThinLAN	P/N 28641B AUI-to-BNC Transceiver (ordered separately)
Fiber Optic	P/N 28683A AUI-to-ST Transceiver (ordered separately)

Table 8.23 HP Windows Client Product Manuals

Windows Client	• HP Windows Client User Manual • Microsoft DOS 6.2 and Windows 3.1 Concise Guide • WRQ Reflection R1, R2 for Windows Quick Start Guides
Server Kit	• HP Windows Client System Administration Guide • Microsoft DOS 6.2 and Windows 3.1 manuals • WRQ Reflection 1 and 2 for Windows technical Reference Manuals and Quick Start Guides • WRQ Reflection Network Series Reference Manual; User's Guide and Reference Card; WRQ Reflection Command Language Manual

Table 8.24 Sizing HP Windows Client on HP 3000 Servers

HP 3000 System	Standard Recommendation for Concurrent PC Workload
918	16
928	16
948	16
958	16
968	26
978	32
957	20
967	40
987	60
987/150	88
980/x00	44
990	56
992/x00	68

HP Windows Client Installation Process

Because the Windows Client is diskless, the installation process requires a PC with a 3 1/2-inch floppy on the LAN in order to install the software that comes with the Server Kit. Once the necessary software is installed on the server, the disk-based PC is not required for operation of the Windows Client.

Sizing the Windows Client on HP 3000 Series 900 Servers

Sizing will depend on the customer's workload. The recommendation in **Table 8.24** assumes a moderately heavy workload of PC applications and that 50% of the server is dedicated to file server functions. It is important to consult the Hotline under WCPERFNW for additional sizing and Boot time information before sizing a system.

Table 8.25 Ordering Information

Choose the desired SPU and corresponding monitor.

P/N	Description
C3401A	Model 425SX with No Monitor
C3403A	Model 425SX with 14" Color VGA
C3404A	Model 425SX with 14" Super VGA
C3405A	Model 425SX with 14" Ergonomic Super VGA
C3406A	Model 425SX with 15" Ergonomic Ultra VGA
C3407A	Model 425SX with 17" Ergonomic Ultra VGA
C3410A	Windows Client 425SX to 433SX SPU Upgrade
C3411A	Model 433SX with No Monitor
C3413A	Model 433SX with 14" Color VGA
C3414A	Model 433SX with 14" Super VGA
C3415A	Model 433SX with 14" Ergonomic Super VGA
C3416A	Model 433SX with 14" Ergonomic Super VGA
C3417A	Model 433SX with 17" Ergonomic Ultra VGA

Table 8.26 Country/Language Options

Choose the appropriate country/language option (required). This determines country-specific power cord, local language keyboard and local language documentation (as available).

Option	Description
ABA	U. S. English
ABB	U. S. English (Europe)
ABD	German
ABE	Spanish
ABF	French
ABG	Australian
ABM	Latin-Spanish
ABN	Norwegian
ABP	Swiss-German
ABQ	Swiss-French
ABR	Rep. of S. Africa
ABS	Swedish/Finnish
ABU	U. K. English
ABW	Dutch/Flemish
ABY	Danish
ABZ	Italian
AC4	Brazil
AC8	Argentina
AKH	Chile
702	U. S. English (Europe)—delete keyboard
703	U. S. English—delete Keyboard

Table 8.27 Memory Configuration Options

Choose the desired memory configuration. Two SIMM sockets are available for expansion up to 36 MB. Supported memory configurations are 4, 6, 8, 10, 12, 16, 20, 24, 28 and 36 MB. Memory can be ordered with the Windows Client by using the option number or it can be added later by ordering the memory product number.

Option	SIMM	
	Description	Number
002	4 MB	C3491A
003	8 MB	C3492A
004	16 MB	C3493A

Table 8.28 Server Kits

For each SITE, order one Server Kit by ordering the appropriate option with one of the Windows Client SPUs.

Option	Description
100	English
101	German
102	French
103	Spanish
104	Italian
105	Swedish
106	Dutch
107	Portuguese

Table 8.29 Warranty Upgrade Options

Select the appropriate option for additional hardware support during the warranty period.

Option	Description
OS0	One year, next day, onsite
OS1	One year, 4 hour, onsite

Terminals

HP designs and manufactures high-quality terminals specifically for HP 3000 systems. These terminals offer:

- Anti-glare displays
- High character definition
- Functional keyboard layouts
- Display screen tilt and swivel
- Enhanced keyboard with tactile feedback

All terminals have:

- 14-inch screen
- Printer port
- Selectable 80 or 132 column display modes
- Detachable adjustable keyboard with 8 shiftable function keys
- Green, white, or amber phosphor

700/96, 98, and 60 have:

- Full overscan
- Larger, sharper characters
- Serial and parallel printer ports

Table 8.30 Terminals

Product	Description	Memory	Additional Features
700/43	Multipersonality ASCII	4 pages	Supports 12 popular compatibility modes
700/60	ASCII/ANSI/PC-Term	Wyse 60 VT320	Wyse 60, DEC VT320, and PC-Term modes
700/60ES	ASCII/ANSI/PC-Term	Wyse 60 VT320	Meets Swedish MPR 1990:10 guidelines
700/96	Blockmode VPLUS	8 pages	High-quality display; EC 92 regulations (EN 55022B)
700/96ES	Blockmode VPLUS	8 Pages	Meets Swedish MPR 1990:10 guidelines
700/98	High performance blockmode VPLUS	16 pages	High-quality display Local forms cache, edit checks, modified data tag; EC 92 regulations (EN 55022B)
700/98ES	High performance blockmode VPLUS	16 pages	Meets Swedish MPR 1990:10 guidelines

NOTE: VPLUS requires a 700/92, 94, 96, or 98 terminal. Oracle's SQL*Forms, INGRES forms, and JAM will run on any 700 series terminal. JAM also runs on a block mode terminal, giving the user optimal performance.

HP 3000 Peripheral Support Matrixes

Table 8.31 HP 3000 900 Series Disk Drive Support Matrix

		1st MPE/iX Release and System Support					
Part Number	Description	Interface	HP-PB 9x7LX ² , RX, SX, 9x8LX, RX, 987/150RX, SX, CS 990, CS 991, CS 992, CS 995	HP-PB 920, 922, 932, 948, 958		HP-PB 925, 935, 949, 950, 955, 960, 980	Notes
			(NIO)	(NIO)	(CIO)	(CIO)	
Disk Drives							
7933HR	404 Mbyte disk drive	HP-IB	Release 3.1	NS	Release 2.05	Release 1.0	D
7933XR	404 Mbyte disk drive with cache	HP-IB	Release 3.1	NS	Release 2.05	Release 1.0	D
7935HR	404 Mbyte removable disk drive	HP-IB	Release 3.1	NS	Release 2.05	Release 1.0	D
7935XR	404 Mbyte removable disk drive with removable cache	HP-IB	Release 3.1	NS	Release 2.05	Release 1.0	D
7936FL/XP	307 Mbyte fixed disk drive	HP-FL	Release 3.1	NS	Release 3.1	Release 1.0	D
7936H	307 Mbyte formatted fixed disk drive	HP-IB	Release 3.1	NS	Release 3.1	Release 1.0	D
7937FL/XP	571 Mbyte FL disk drive	HP-FL	Release 3.1	NS	Release 3.1	Release 1.1	D
7937H	571 Mbyte formatted fixed disk drive	HP-IB	Release 3.1	NS	Release 3.1	Release 1.0	D
7957A	81 Mbyte fixed disk drive	HP-IB	Release 3.1	NS	Release 2.05	Release 1.0	D
7958A	130 Mbyte fixed disk drive	HP-IB	Release 3.1	NS	Release 2.05	Release 1.0	D
7959B	304 Mbyte fixed disk drive	HP-IB	Release 3.1	NS	Release 2.05	Release 1.0	D
7962B	152 Mbyte fixed disk drive with upgrade capability	HP-IB	Release 3.1	NS	Release 2.05	Release 2.0	D
7963B	304 Mbyte fixed disk drive with upgrade capability	HP-IB	Release 3.1	NS	Release 2.05	Release 2.0	D
C2200A	335H formatted fixed disk drive	HP-IB	Release 3.1	NS	Release 2.05	Release 2.0	D
C2201A	670 FL formatted disk drive	HP-FL	Release 3.1	NS	Release 2.05	Release 2.0	B, CB, D
C2202A	670 Mbyte/XP Release 2.0	HP-IB	Release 3.1	NS	Release 2.05	Release 2.0	NB, D
C2203A	670H formatted fixed disk drive	HP-IB	Release 3.1	NS	Release 2.05	Release 2.0	NB, D
C2204A	1.3 FL formatted fixed disk	HP-FL	Release 3.1	NS	Release 2.05	Release 2.0	B, CB, D
C2281A	304 Mbyte embedded disk	HP-IB	NS	NS	922, 932 only	Release 2.0	NB, D
C2282A	670 Mbyte embedded disk	HP-IB	NS	NS	922, 932 only	Release 2.0	NB, D
C2461F/R	670F formatted SCSI-2 disk	SCSI	Release 3.1	Release 4.0	NS	NS	A, B
C2462F/R	1350F formatted SCSI-2 disk	SCSI	Release 3.1	Release 4.0	NS	NS	A, B
C2473F/R	677 Mbyte S.E. SCSI expansion	SCSI	Release 3.1	Release 4.0	NS	NS	A, B
C2473S	677 Mbyte S.E. SCSI expansion	SCSI	Release 3.1	Release 4.0	NS	NS	A, B
C2474F/R	1.3 Gbyte S.E. SCSI expansion	SCSI	Release 3.1	Release 4.0	NS	NS	A, B
C2474S	1.3 Gbyte S.E. SCSI expansion	SCSI	Release 3.1	Release 4.0	NS	NS	A, B
C3022T	1.0 Gbyte disk mini-tower	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3022R	1.0 Gbyte disk rackmount	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3027U	1.0 Gbyte disk drive expansion kit	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
A2245A	1.0 Gbyte disk drive integrated in SPU	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B

- A = CIO SCSI boot will only be supported on Series 950, 955, 960, 980 platforms.
 SCSI boot will **NOT** be supported on Series 920, 922, 932, 948, 958 with either CIO or NIO.
 CIO SCSI boot will **NOT** be supported on Series 925, 935, 949.
- B = Supported as boot device unless not a supported device.
- C = Configuration restricted, this device cannot share a SCSI card with HP SCSI devices.
- CB = Not supported as boot device on the 920, 922, 932, 948, 958 systems.
- D = Discontinued.
- G = Glitch controllers. These devices require a dedicated SCSI bus. For support purposes only.
- NB = Not supported as boot device on NIO.
- NS = Not supported.
- PS = Product supported by third-party vendor.
- R = Rackmountable.
- S = Not supported until September 1994.
- Z = No PBA-FL supported on Series 9x7LX.

Table 8.31 HP 3000 900 Series Disk Drive Support Matrix (cont'd)

Part Number	Description	Interface	1st MPE/iX Release and System Support				Notes
			HP-PB 9x7LX ² , RX, SX, 9x8LX, RX, 987/150RX, SX, CS 990, CS 991, CS 992, CS 995	HP-PB 920, 922, 932, 948, 958		HP-PB 925, 935, 949, 950, 955, 960, 980	
			(NIO)	(NIO)	(CIO)	(CIO)	
Disk Drives (cont'd)							
C3023T	2.0 Gbyte disk mini-tower	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3023R	2.0 Gbyte disk rackmount	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3023RZ	2.0 Gbyte disk rackmount only for factory integration	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3028U	2.0 Gbyte disk expansion kit	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
A2446A	2.0 Gbyte disk integrated in SPU	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3024T	Two 2.0 Gbyte disk mini-tower	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3024R	Two 2.0 Gbyte disk rackmount	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3024RZ	Two 2.0 Gbyte disk rackmount only for factory integration	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3028U	2.0 Gbyte disk drive expansion kit	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3040T	2.0 Gbyte 3 1/2" disk mini-tower	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3040R	2.0 Gbyte 3 1/2" disk rackmount	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3040RZ	2.0 Gbyte 3 1/2" disk rackmount only factory integration	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3044U	2.0 Gbyte 3 1/2" disk expansion kit	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
A3087A	2.0 Gbyte 3 1/2" disk integrated in SPU	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C3041T	Two 2.0 GB 3 1/2" disk mini-tower	SCSI	Release 4.0 w/ power patch	Release 4.0 w/o power patch	NS	Release 4.0 w/ power patch	A, B
C3041R	Two 2.0 GB 3 1/2" disk rackmount	SCSI	Release 4.0 w/ power patch	Release 4.0 w/o power patch	NS	Release 4.0 w/ power patch	A, B
C3041RZ	Two 2.0 GB 3 1/2" disk rackmount only factory integration	SCSI	Release 4.0 w/ power patch	Release 4.0 w/o power patch	NS	Release 4.0 w/ power patch	A, B
C3042T	Three 2.0 GB 3 1/2" disk mini-tower	SCSI	Release 4.0 w/ power patch	Release 4.0 w/o power patch	NS	Release 4.0 w/ power patch	A, B
C3042R	Three 2.0 GB 3 1/2" disk rackmount	SCSI	Release 4.0 w/ power patch	Release 4.0 w/o power patch	NS	Release 4.0 w/ power patch	A, B
C3042RZ	Three 2.0 GB 3 1/2" disk rackmount only factory integration	SCSI	Release 4.0 w/ power patch	Release 4.0 w/o power patch	NS	Release 4.0 w/ power patch	A, B

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SCSI boot will **NOT** be supported on Series 920, 922, 932, 948, 958 with either CIO or NIO.
CIO SCSI boot will **NOT** be supported on Series 925, 935, 949.
- B = Supported as boot device unless not a supported device.
- C = Configuration restricted, this device cannot share a SCSI card with HP SCSI devices.
- CB = Not supported as boot device on the 920, 922, 932, 948, 958 systems.
- D = Discontinued.
- G = Glitch controllers. These devices require a dedicated SCSI bus. For support purposes only.
- NB = Not supported as boot device on NIO.
- NS = Not supported.
- PS = Product supported by third-party vendor.
- R = Rackmountable.
- S = Not supported until September 1994.
- Z = No PBA-FL supported on Series 9x7LX.

Table 8.31 HP 3000 900 Series Disk Drive Support Matrix (cont'd)

Part Number	Description	Interface	1st MPE/iX Release and System Support				Notes
			HP-PB 9x7LX ² , RX, SX, 9x8LX, RX, 987/150RX, SX, CS 990, CS 991, CS 992, CS 995 (NIO)	HP-PB 920, 922, 932, 948, 958 (NIO)	(CIO)	HP-PB 925, 935, 949, 950, 955, 960, 980 (CIO)	
Fast/Wide Disks							
C3551T	2.0 GB 3 1/2" disk mini-tower	Fast/Wide SCSI	Release 5.0 w/ power patch	NS	NS	NS	A, B, S
C3551R	2.0 GB 3 1/2" disk rackmount	Fast/Wide SCSI	Release 5.0 w/ power patch	NS	NS	NS	A, B, S
C3552T	Two 2.0 GB 3 1/2" disk mini-tower	Fast/Wide SCSI	Release 5.0 w/ power patch	NS	NS	NS	A, B, S
C3552R	Two 2.0 GB 3 1/2" disk rackmount	Fast/Wide SCSI	Release 5.0 w/ power patch	NS	NS	NS	A, B, S
C3554U	2.0 GB 3 1/2" disk upgrade kit	Fast/Wide SCSI	Release 5.0 w/ power patch	NS	NS	NS	A, B, S
Optical Libraries							
C1700A	20 Gbyte rewritable optical disk library	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	Release 3.0	Release 3.0	G, D, C
C1703A	10 Gbyte rewritable opt. disk library	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	Release 3.0	Release 3.0	G, D, C
C1700T	40 Gbyte rewritable optical disk library	SCSI	Release 5.0 w/ power patch	Release 5.0 w/ power patch	Release 5.0 w/ power patch	Release 5.0 w/ power patch	S
C1708T	20 Gbyte rewritable optical disk library	SCSI	Release 5.0 w/ power patch	Release 5.0 w/ power patch	Release 5.0 w/ power patch	Release 5.0 w/ power patch	S
Disk Arrays							
C2252B	2.72 Gbyte disk array	HP-FL	Release 4.0	NS	Release 3.0 w/ power patch	Release 3.0 w/ power patch	B
C2252HA	2.72 Gbyte high availability disk array	HP-FL	Release 4.0	NS	Release 3.0 w/ power patch	Release 3.0 w/ power patch	B
C2254B	5.44 Gbyte disk array	HP-FL	Release 4.0	NS	Release 3.0 w/ power patch	Release 3.0 w/ power patch	
C2254HA	5.44 Gbyte high availability disk array	HP-FL	Release 4.0	NS	Release 3.0 w/ power patch	Release 3.0 w/ power patch	
C2258B	4.0 Gbyte disk array	HP-FL	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	Release 4.0 w/ power patch	B
C2258HA	4.0 Gbyte high availability disk array	HP-FL	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	Release 4.0 w/ power patch	B
C2259B	8.0 Gbyte disk array	HP-FL	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	Release 4.0 w/ power patch	
C2259HA	8.0 Gbyte high availability disk array	HP-FL	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	Release 4.0 w/ power patch	

A = CIO SCSI boot will only be supported on Series 950, 955, 960, 980 platforms.
 SCSI boot will **NOT** be supported on Series 920, 922, 932, 948, 958 with either CIO or NIO.
 CIO SCSI boot will **NOT** be supported on Series 925, 935, 949.

B = Supported as boot device unless not a supported device.

C = Configuration restricted, this device cannot share a SCSI card with HP SCSI devices.

CB = Not supported as boot device on the 920, 922, 932, 948, 958 systems.

D = Discontinued.

G = Glitch controllers. These devices require a dedicated SCSI bus. For support purposes only.

NB = Not supported as boot device on NIO.

NS = Not supported.

PS = Product supported by third-party vendor.

R = Rackmountable.

S = Not supported until September 1994.

Z = No PBA-FL supported on Series 9x7LX.

Table 8.32 HP 3000 900 Series Tape Drive and CD-ROM Support Matrix

		1st MPE/iX Release and System Support					
Part/Opt. Number	Description	Interface	HP-PB 9x7LX, RX, SX, 9x8LX, RX, 987/150RX, SX, CS 990, CS 991, CS 992, CS 995	HP-PB 920, 922, 932, 948, 958		HP-PB 925, 935, 949, 950, 955, 960, 980	Notes
			(NIO)	(NIO)	(CIO)	(CIO)	
1/2" Magnetic Tape							
7974A	1600 cpi streaming and start/stop tape drv.	HP-IB	Release 3.1	NS	Release 2.05	Release 1.0	B, D
7978A/B	6250/1600 cpi streaming tape drive	HP-IB	Release 3.1	NS	Release 2.05	Release 1.0	B, D
7979A	1600 cpi autoloader 1/2-inch tape drive	HP-IB	Release 3.1	NS	Release 2.05	Release 1.2	B
7979A Opt. 800	Adds 800 cpi	HP-IB	Release 3.1	NS	Release 2.05	Release 1.2	B
7980A	6250/1600 cpi autoloader 1/2-inch tape drv.	HP-IB	Release 3.1	NS	Release 2.05	Release 1.2	B, U
7980A Opt. 800	Add 800 cpi	HP-IB	Release 3.1	NS	Release 2.05	Release 1.2	B, U
7980S	1600/6250 bpi 1/2-inch tape drive	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch/NS	NS	Release 4.0 w/ power patch	A, B
7980S Opt. 800	Adds 800 bpi density	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch/NS	NS	Release 4.0 w/ power patch	A, B
7980SX	1600/6250/6250XC bpi 1/2-inch tape	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
7980SX Opt. 800	Adds 800 cpi NRZI	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
7980XC	6250XC/6250/1600 extra capacity tape drv.	HP-IB	Release 4.0	NS	Release 2.05	Release 1.2	B, U
CD-ROM							
A1999A	Standalone 600 Mbyte SCSI CD-ROM	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	D
C1707A	Standalone HP-IB CD-ROM	HP-IB					D
C2293U	600 Mbyte CD-ROM	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	D
C3560U	600 Mbyte CD-ROM	SCSI	Release 4.0	Release 4.0	NS	NS	
DDS DAT							
C2292A	1.3 Gbyte DDS upgrade kit	SCSI	Releases 3.1 and 4.0	Release 4.0	NS	NS	A, B, D
C2463F	1.3 Gbyte DDS expansion kit	SCSI	Releases 3.1 and 4.0	Release 4.0	NS	NS	A, B, D
C2463R	1.3 Gbyte DDS expansion kit	SCSI	Releases 3.1 and 4.0	Release 4.0	NS	NS	A, B, D
C1501A	Embedded DDS	HP-IB	Releases 3.1 and 4.0	NS	Release 2.05	Release 2.05	B, D
C1502A	Embedded 1.3 Gbyte DDS mechanism	SCSI	Releases 3.1 and 4.0	Release 4.0	NS	NS	A, B, D
C1503B	Embedded 2.0 Gbyte DDS	SCSI	Release 3.1 w/ power patch and 4.0	Release 4.0	NS	Release 4.0	A, B

- A = CIO SCSI boot will only be supported on Series 950, 955, 960, 980 platforms.
SCSI boot will **NOT** be supported on Series 920, 922, 932, 948, 958 with either CIO or NIO.
CIO SCSI boot will **NOT** be supported on Series 925, 935, 949.
- B = Supported as boot device unless not a supported device.
- C = Configuration restricted. This device cannot share a SCSI card with other HP SCSI devices.
- D = Discontinued.
- G = Glitchy controllers. These devices require a dedicated SCSI bus. For support purposes only.
- PS = Product supported by third-party vendor.
- R = Rackmountable.
- U = Upgrade kits available from HP-IB to SCSI (HP88707S).

Table 8.32 HP 3000 900 Series Tape Drive and CD-ROM Support Matrix (cont'd)

		1st MPE/iX Release and System Support					
Part/Opt. Number	Description	Interface	HP-PB 9x7LX, RX, SX, 9x8LX, RX, 987/150RX, SX, CS 990, CS 991, CS 992, CS 995	HP-PB 920, 922, 932, 948, 958		HP-PB 925, 935, 949, 950, 955, 960, 980	Notes
			(NIO)	(NIO)	(CIO)	(CIO)	
DDS DAT (cont'd)							
C1511A	Standalone 1.3 Gbyte HP-IB DDS format tape drive	HP-IB	Releases 3.1 and 4.0	NS	Release 2.05	Release 2.05	B, D
C1512A	Standalone 1.3 Gbyte SCSI DDS format tape drive	SCSI	Releases 3.1 and 4.0	Release 4.0	NS	NS	A, B, D, G
C1520B	Standalone 2.0 Gbyte DDS drive	SCSI	Release 3.1 w/ power patch and 4.0	Release 4.0	NS	Release 4.0	A, B
C1521B	Standalone up to 8 Gbyte datacompression DDS drive	SCSI	Release 4.0	Release 4.0	NS	Release 4.0	A, B
SCSI Storage System Rackmount (R) / Floor (F) Mini-Tower							
C2464R/F	2.0 Gbyte DDS	SCSI	Release 4.0	Release 4.0	NS	Release 4.0	A, B
C2465R/F	Two 2.0 Gbyte DDS	SCSI	Release 4.0	Release 4.0	NS	Release 4.0	A, B
C2466R/F	Up to 8.0 Gbyte datacompression DDS	SCSI	Release 4.0	Release 4.0	NS	Release 4.0	A, B
C2476R/F	600 Mbyte CD-ROM	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	A, B
C2478R/F	Up to 8.0 Gbyte datacompression DDS	SCSI	Release 4.0	Release 4.0	NS	Release 4.0	A, B
Expansion Upgrade (U) Kits for Rackmounted and Floor Mini-Tower Storage Systems							
C2477U	2.0 Gbyte DDS drive	SCSI	Release 4.0	Release 4.0	NS	Release 4.0	A, B
C2478U	Up to 8.0 Gbyte DDS-DC drive	SCSI	Release 4.0	Release 4.0	NS	Release 4.0	A, B
3480 Compatible 1/2-inch Cartridge Tape Drive from StorageTek							
4220	Tabletop, autoloader (single drive) StorageTek	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	@, R, C
4280 Opt. A01	Rackmount, autoloader (single drive) StorageTek	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	@, R, C
4280 Opt. A02	Rackmount, dual load (double drive) StorageTek	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	@, R, C
8 mm Tape from IEM							
6042s	Exabyte 8500 drive w/autofeeder	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	@, PS
6044s	Exabyte 8500c drive w/autofeeder	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	@, PS
4870s	5 GB drive (Exabyte 8500)	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	@, PS
4880s	5 GB drive (Exabyte 8500c)	SCSI	Release 4.0 w/ power patch	Release 4.0 w/ power patch	NS	Release 4.0 w/ power patch	@, PS

@ = Product not sold by HP.

A = CIO SCSI boot will only be supported on Series 950, 955, 960, 980 platforms.
SCSI boot will **NOT** be supported on Series 920, 922, 932, 948, 958 with either CIO or NIO.
CIO SCSI boot will **NOT** be supported on Series 925, 935, 949.

B = Supported as boot device unless not a supported device.

C = Configuration restricted. This device cannot share a SCSI card with other HP SCSI devices.

D = Discontinued.

G = Glitchy controllers. These devices require a dedicated SCSI bus. For support purposes only.

PS = Product supported by third-party vendor.

R = Rackmountable.

U = Upgrade kits available from HP-IB to SCSI (HP88707S).

Section 9. Networking

Network Links

LAN Links

802.3 LANIC Cards (ThinLAN Link)

Each Series 900 system is supplied with one 802.3 LAN Interface Channel (LANIC) required for connections to the Data-communications and Terminal Controller (DTC). The Asynchronous Serial Communication (ASC) software included with the FOS uses this card and the 802.3 LAN to communicate between the SPU and the DTC. Series 9x7LX/RX/SX and 9x8LS/RX systems come standard with a Multi-Function I/O card (MFIO) which has the 802.3 LANIC and a built-in ThinLAN Transceiver. Each Corporate Business System comes with a LAN/Console card which has the 802.3 LANIC and a built-in ThinLAN Transceiver. In addition,

both the Multi-Function I/O card and the LAN/Console card have 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.

An additional HP-Precision Bus (HP-PB) 802.3 LAN card is available for Series 9x7LX/RX/SX, 9x8LS/RX, and Corporate Business Systems. The card is a single-high HP-PB 802.3 LAN interface with a built-in ThinLAN Transceiver. An AUI connector is also available on the card for connection to an alternate Transceiver, such as a ThickLAN Transceiver or EtherTwist Transceiver. In order to use the second HP-PB card, MPE/iX Release 4.0 or later is required.

For system-to-system communication via an 802.3 LAN, the customer may either use the HP-PB 802.3 LANIC supplied with the system, or order a second HP-PB 802.3 LANIC. From a performance perspective, the 802.3 LANIC supplied with the system should be sufficient to meet the customers DTC and system-to-system traffic needs. However, there are circumstances where a second HP-PB 802.3 LANIC should be considered. For example, if the system-to-system traffic is high, the customer may want to use a second HP-PB card. Another possibility is that for topology reasons, a customer may want to split their DTC and system-to-system traffic. The ThinLAN Link product (36923A with the appropriate hardware and software options) provides the second HP-PB 802.3 LANIC card and the downloadable software for the LANIC to manage system-to-system traffic.

Table 9.1 802.3 LANIC Channel Card Summary

Systems	DTC Connection (supplied with system)	System-to-System Communication
9x7LX, 9x7RX, 9x7SX, 9x8LX, 9x8RX, and Plus systems	HP-PB 802.3 LANIC and ThinLAN Transceiver and AUI port included on MFIO card	Use MFIO card supplied with system or second 802.3 LANIC card Must order ThinLAN/iX (36923A) to receive TCP/IP transport and 802.3 driver software for system-to-system communication. Series 9x7 Plus systems include TCP/IP transport and 802.3 driver software for system-to-system communication. Must also order the appropriate networking service (i.e. NS, ARPA, etc.)
CS 990 DX and 992 DX	HP-PB 802.3 LANIC and ThinLAN Transceiver and AUI port included on LAN/Console card	Use LAN/Console card supplied with system or use second 802.3 LANIC card CS 990 DX and 992 DX SPUs include TCP/IP transport and 802.3 driver software for system-to-system communication. Must order the appropriate networking service (i.e. NS, ARPA, etc.)
CS 990 and 992	HP-PB 802.3 LANIC and ThinLAN Transceiver and AUI port included on LAN/Console card	Use LAN/Console card supplied with system or use second 802.3 LANIC card Must order ThinLAN/iX (36923A) to receive TCP/IP transport and 802.3 driver software for system-to-system communication. Must also order the appropriate networking service (i.e. NS, ARPA, etc.)

Table 9.2 Networking Services Supported Over 802.3 Link

Product Description	Product Number
NS 3000/iX Network Services	36920A
HP ARPA File Transfer Protocol	36957A
HP ARPA Telnet	J2070A option 004; J2080A; 2347A
NetWare for the HP 3000	32020A
LAN Manager/iX	32015A
AppleTalk Services for the HP 3000	J2244A
Resource Sharing/iX	B1718A
HP 3000 FTAM/iX	36972A
HP 3000 OTS/iX	36971A

The ThinLAN 3000/iX Link product (36923A) supports two LANIC cards with MPE release 5.0. The customer can configure two LAN Network Interfaces (LAN1, LAN2) on the same system. The system can be configured to have two NIs (LAN1 and LAN2) with two different IP addresses. With MPE/iX 5.0, the maximum number of LANICs supported on a system will be three, one for DTC and two for the ThinLAN 3000/iX Link. The minimum is one LANIC card that can be shared between the DTC and the ThinLAN 3000/iX Link. FTP, NS Services and all sockets applications are supported over the extra card. Telnet is not supported over the extra card. This new functionality applies only to 802.3.

Token Ring Network Link

The Token Ring 3000/iX Network Link product (J2167A) and the SNA/Token Ring Link/iX product (J2249A) provide a native Token Ring connection for Series 900 HP Precision Bus (HP-PB) systems (9x7LX/RX/SX, 9x8LS/RX, and Corporate Business Systems). These products can connect a

Series 900 HP-PB system to a Token Ring Network that is compatible with IBM Token-Ring. The Token-Ring 3000/iX Network link product (J2167A) provides a Token Ring connection for TCP/IP and SPX/IPX environments. The product includes the Token Ring HP-PB adapter, Token Ring driver, TCP/IP transport, and manuals. MPE/iX release 4.0 or later is required. The SNA/Token Ring Link/iX product (J2249A) provides a Token Ring connection for SNA environments. The SNA/Token Ring Link/iX product includes the Token Ring HP-PB adapter card, Token Ring driver, SNA Transport software, and manuals. Multiple transport stacks are supported, which means SNA services (using the SNA transport) and NS services (using the TCP/IP transport) can run concurrently over the same Token Ring card.

The Token Ring adapter is a single-high HP-PB card. A 9-pin D-type connector on the Token Ring adapter card is used to connect the adapter to the Token Ring network via a cable that plugs into a Multi-station Access Unit (MsAU). The Token Ring

adapter supports either 4Mbps or 16 Mbps link speeds over shielded twisted pair (STP) and 4 Mbps over unshielded twisted pair (UTP). For UTP, the customer will need to use a media filter which attaches to the DB-9 connector. Ring speed configuration is done on the card with a jumper. The default configuration is 4 Mbps. The card will not be able to connect to other systems on the Ring if the speed is not properly configured.

The customer is responsible for supplying their own cables and other Token Ring accessories (eg., MsAU, CAU/LAM, media filter). Supported IBM cable types are shown in **Table 9.3**.

The software (Token Ring driver and TCP/IP or SNA transport) provides the foundation for system-to-system communication between a Series 900 HP-PB system and another system over the Token Ring network. The appropriate networking service (i.e. NS, ARPA, SNA, etc.) must also be purchased for system-to-system communication to occur. The software included in the Token Ring product corresponds with layer 2 through 5 of the Open System Interconnection reference model.

FDDI Network Link

The FDDI 3000/iX Network Link product (J2245A) provides a Single Attach Station (SAS) connection to the ISO standard 9314 Fiber Distributed Data Interface (FDDI) network for

Table 9.3 IBM Cable Types Supported for Token Ring Link

Data Grade	AWG	Type
Type 1	2	2-wire shielded twisted pair
Type 2	22	2-wire shielded twisted pair or 4-wire unshielded twisted pair
Type 3 ¹	22, 24	unshielded twisted pair
Type 6	26	2-wire shielded twisted pair
Type 9	26	2-wire shielded twisted pair

¹Type 3 cabling supports only a 4Mbps link speed

Table 9.4 Networking Services Supported over 802.5 Link

Product Description	Product Number
NS 3000/iX Network Services	36920A
HP ARPA File Transfer Protocol	36957A
NetWare for the HP 3000	32020A
LAN Manager/iX	32015A
Resource Sharing/iX	B1718A

Table 9.5 SNA Services Supported over SNA 802.5 Link (J2249A) and SNA/SDLC Link/iX (30291A)

Product Description	Product Number
HP SNA NRJE/iX	30292A
HP SNA IMF/iX	30293A
HP LU6.2/PU2.1	30294A
HP SNA DHCF	36935A
HP SNA SNADS	32006A

Table 9.6 Network Services Supported Over FDDI Link

Product Description	Product Number
NS 3000/iX Network Services	36920A
HP ARPA File Transfer Protocol	36957A

The FDDI 3000/iX Link is a single-attach HP-PB adapter. There are no jumpers or switches. The adapter is connected to the FDDI network concentrator via fiber optic cabling, both ends terminated with MIC (Media Interface Connector). FDDI cables are not provided with the product. They may be purchased from HP or third-party vendor. Currently only one FDDI adapter is supported per system interface.

FDDI 3000/iX for Series 900s supports standard and de facto standard services including ARPA and NS services. The internet protocols TCP, UDP, IP, and ICMP are supported. Two application programmatic interfaces (APIs) are supported, Berkeley (BSD) sockets and HP Network Inter-Process Communication (NetIPC).

HP does not provide an FDDI concentrator. Several third-party vendor concentrators have been used and tested with the product and a report of this study is available over HPDesk Network HOTLINE.

It is expected that the customer should have all FDDI wiring installed by non-HP, third-party cabling vendors and that all networking appliances (FDDI Concentrator) will be correctly attached and configured. The customer must use multimode fiber optic MIC terminated cabling to connect the FDDI adapter to the FDDI concentrator. The customer must use a third-party vendor's FDDI concentrator to connect to the FDDI network.

HP 3000 Series 900 HP Precision Bus (HP-PB) systems. The FDDI 3000/iX product is fully compliant with the ISO 9314 standard, providing a fiber optic interface to the 100 Mbps FDDI network. The product includes a single double-high HP-PB adapter, FDDI driver,

TCP/IP Transport, and on-line diagnostics. FDDI 3000/iX for Series 900s is supported on the HP 3000 Model 9x7LX, 9x7, 9x7RX, 9x8LS/RX systems as well as the Corporate Business Systems. MPE/iX release 5.0 or later is required.

Point-to-Point and WAN Links

PSI

The hardware component for the SNA/SDLC Link (30291A), BSC Link (32007A), and NS point-to-point 3000 is the Programmable Serial Interface (PSI) card. The PSI card is included with each order of the appropriate Network Link product. PSI cards are not interchangeable among all Series 900 systems. Because different systems require different PSI cards, be sure to order the correct remote network link hardware option.

X.25 Network Link

X.25 and PAD communications are provided by the DTC/X.25 Network Link which is part of the same Datacommunications and Terminal Controller subsystem used for terminal and serial device communications. X.25 configuration requirements may be found later in this chapter.

Table 9.7 BSC Services Supported over BSC Link (32007A)

Product Description	Product Number
BSC RJE/iX	30295A

Table 9.8 Networking Services Supported over NS Point-to-Point Link

Product Description	Product Number
NS 3000/iX Network Services	36920A

Table 9.9 Networking Services Supported over X.25 Link*

Product Description	Product Number
NS 3000/iX Network Services	36920A
HP ARPA File Transfer Protocol	36957A
HP OTS 3000/iX	36971A
HP FTAM 3000/iX	36972A
SNA/X.25 Link	30298A

* Must have both X.25 System Access software (36939A) and a DTC/X.25 card to run the above networking services over X.25 link.

Datacommunications and Terminal Controllers (DTCs)

Description

The DTC is a modular and flexible LAN-based terminal server which provides asynchronous connectivity and PAD Support for local and remote terminals, PCs in terminal emulation mode and printers, to HP 3000 Series 900, HP 9000, HP 1000, or any Telnet/TCP/IP systems.

The DTC 72MX also implements Telnet Access and X.25 system-to-system networking for the HP 3000 Series 900. For more details on any of the products discussed in this section, refer to the appropriate datasheets or the

HP Networking Communications Specifications Guide (5091-9389E).

Figure 9.1 shows DTCs and multiple hosts on a LAN.

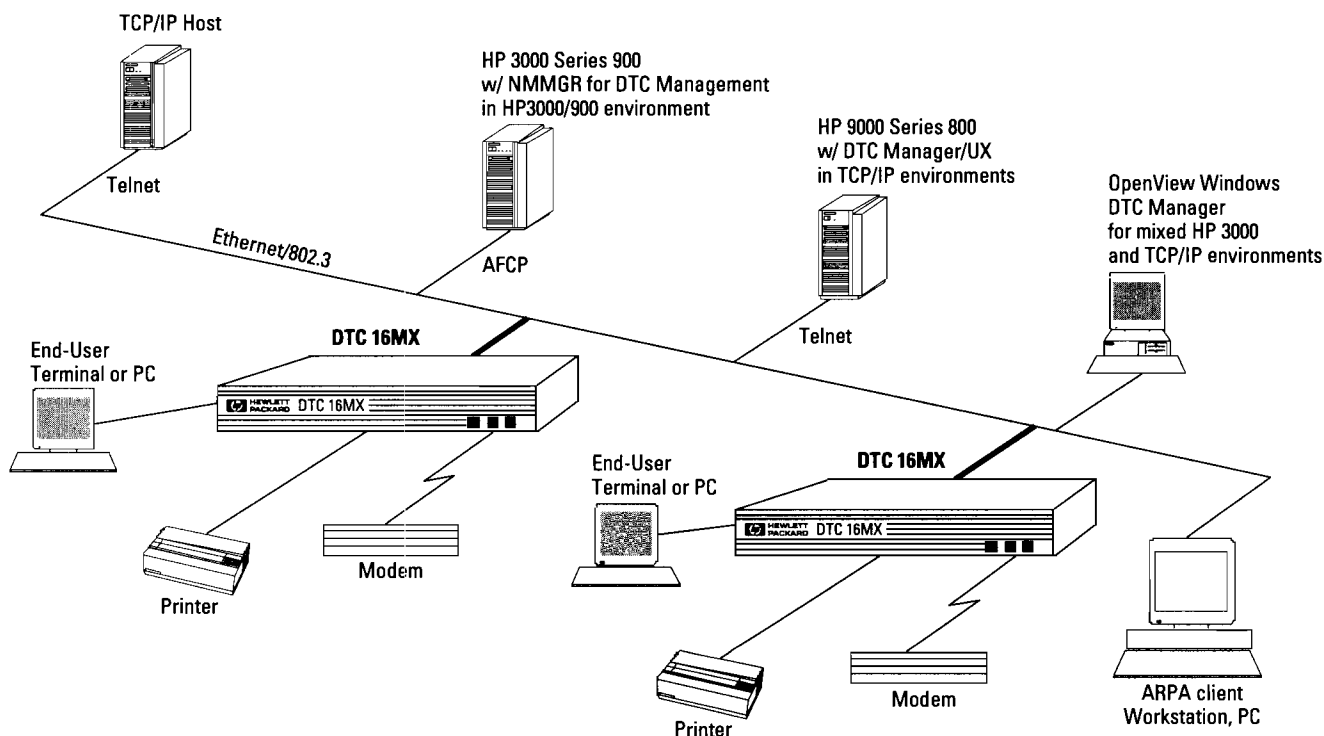
Models

- The DTC 16iX (J2062A) provides 16 asynchronous connections (RS-232 direct connect, RS-232 modem connect, and RS-423 direct connect). It is designed for single-system configurations using HP's optimized Avesta Flow Control Protocol (AFCP).
- The DTC 16MX (J2063A) allows up to 16 asynchronous connections (RS-232 direct connect, RS-232 modem connect and RS-423 direct connect). It offers multi-system connectivity and up to 38.4 kbps line speed.

- The DTC 16RX (J2064A), introduced on April 1, 1994, has the same features as the DTC 16MX except that it is managed from a UNIX platform and can be managed remotely over a routed network.

- The DTC 72MX (J2070A) provides up to 72 asynchronous connections (RS-232 direct, RS-232 modem connect, or RS-423 direct connect); up to three X.25 links supporting up to 256 virtual circuits at speeds up to 64 kbps; and/or one HP 3000 Telnet Access Board protocol converter. The DTC 72MX is a high-port-count terminal server that offers industry-leading performance for large system configurations, as well as multi-system/multi-session connectivity.

Figure 9.1 DTCs with Multiple Hosts on a LAN



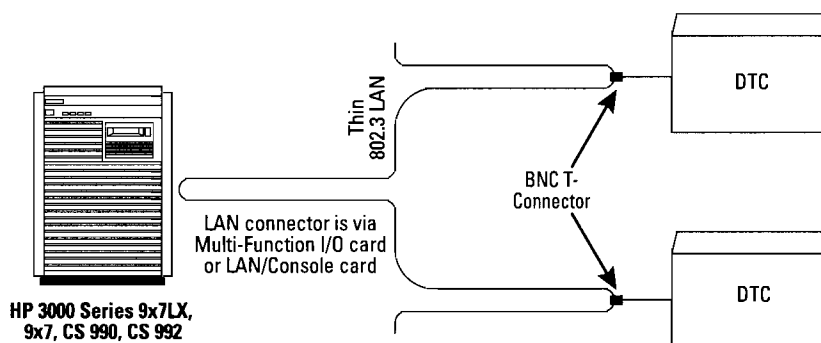
Connecting DTCs to HP 3000

The minimum required terminal communications subsystem for HP 3000 Series 900 systems consists of the 802.3 LANIC card installed in the SPU, the ASC software (Asynchronous Serial Communications software residing on the SPU), one DTC, and 802.3 cabling (ThinLAN, ThickLAN or EtherTwist). See **Figure 9.2**.

Each Series 9x7LX/RX/SX and 9x8LX/RX system is delivered with a Multi-Function I/O (MFIO) card and ASC software.

Each Corporate Business System comes standard with a LAN/Console card and ASC software. Each MFIO and LAN/Console card has a built-in 802.3 LANIC, ThinLAN Transceiver, and an integrated AUI port for optional connection to either a ThickLAN (30241A) or EtherTwist (28685B) Transceiver. The transceiver products must be ordered separately.

Figure 9.2 DTC-to-SPU Thin (10Base2) LAN Connection (via MFIO or LAN/Console with an Integrated LANIC and ThinLAN Transceiver)



Each Series 900 system can support multiple DTCs on the LAN. The number of active connections supported will be determined by the application load on the system. For details on numbers of DTCs supported and numbers of logged-on workstations supported for each SPU, see Business Systems at-a-Glance in Section 1.

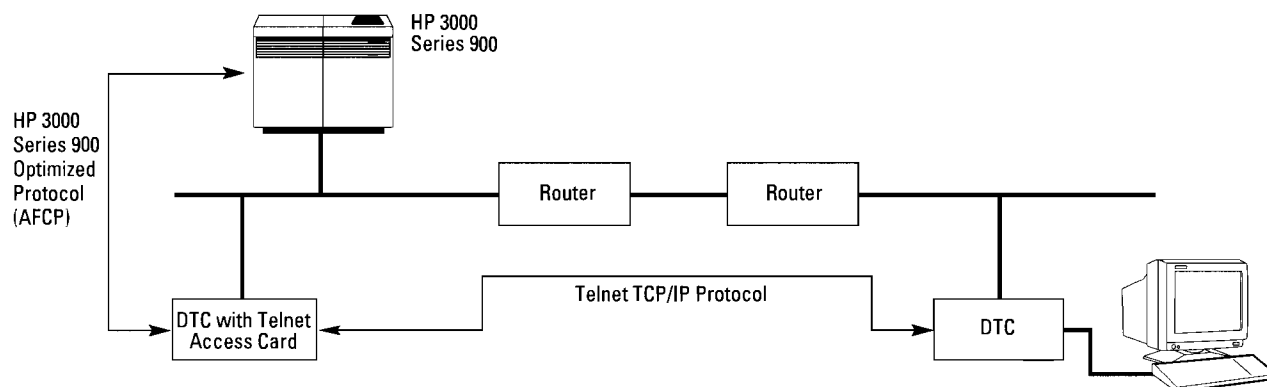
DTC in Extended LAN Configurations

The DTC supports extended LAN configurations with bridges (using the HP 3000 Series 900 optimized AFCP protocol) and level 3 IP

routers (using TCP/IP protocol). This means that a DTC user can access a system located on a remote segment of a LAN. When access is done through level 3 IP routers, the Telnet, TCP/IP protocol must be available on the remote system. In the case of an HP 3000 Series 900, the Telnet TCP/IP protocol would be provided by the DTC-based Telnet products.

Figure 9.3 diagrams a DTC connected user accessing an HP 3000 Series 900 on a remote LAN segment via level 3 IP routers.

Figure 9.3 HP 3000 Series 900 in Extended LAN



DTC Telnet Access

Telnet is available on the HP 3000 Series 900 and has been implemented in the DTC. There are two key features provided by Telnet:

- access to HP 3000 Series 900 applications from a Telnet host user
- access to applications on a Telnet host from a DTC-connected user

Access to HP 3000 Series 900 applications from a Telnet host requires Telnet hardware as well as HP OpenView DTC Manager. Two hardware packages are available for Telnet access:

- HP ARPA Telnet Access for DTC 72MX (J2070A, option 004 or J2080A)—a card which is installed in an open slot of a DTC 72MX and can provide up to a maximum of 80 concurrent Telnet sessions. All 80 sessions can be active if VPLUS applications are being accessed, fewer if character mode applications are being accessed (see DTC Datasheet 5091-3086E for more details). The disparity between the number of active sessions is due to the increased number of packets and DTC CPU overhead needed to process character mode applications. Only one Telnet Access card can reside in a given DTC 72MX.
- HP ARPA Telnet Access for DTC 48 (HP 2347A)—a card which is installed in an open slot of a DTC 48 and can provide up to a maximum of 40 concurrent Telnet sessions. Of these 40 sessions

logged on, up to 40 can be active if VPLUS applications are being accessed and up to 9 can be active if character mode applications are being accessed. There are a few rules to observe when installing the Telnet access card:

- If the DTC 48 to be used has a datecode less than 3110, a memory upgrade is required. This upgrade is available as an option to the Telnet Access product.
- Only one Telnet Access card can reside in a given DTC 48.
- The Telnet Access card and DTC/X.25 card CANNOT reside in the same DTC 48.

Access to applications on a Telnet host from a DTC 16, DTC 16MX, DTC 48, or DTC 72MX connected user does not require any additional hardware. Users connected to any of these DTCs can access remote hosts via the Telnet protocol provided the DTCs are managed by HP OpenView DTC Manager. The DTC 16 and DTC 48 require OpenView DTC Manager Release 10.5 or later, the DTC 72MX requires OpenView DTC Manager Release 14.0 or later, and the DTC 16MX requires OpenView DTC Manager release 14.1 or later. DTC 48s with a datecode less than 3110 require a memory upgrade. This upgrade is available as an option to the Telnet Access product or as a stand-alone product if the Telnet Access hardware is not needed.

For additional information on Telnet refer to the ARPA/iX datasheet in the *HP Networking Communication Specification Guide*.

DTC Management

An HP OpenView workstation running the HP OpenView DTC Manager Software (D2355A) is required for access to multiple systems or Telnet access to a non-HP 3000 Series 900 single system. Customers can use the same PC to manage other equipment (like HP's 2335A Asynchronous X.25 PAD, the HP Model 45 X.25 Multiprotocol Concentrator, HP's EtherTwist hubs, routers, and bridges). To ease ordering and installation, a fully configured, turn-key HP OpenView Windows Workstation (32054D) is available.

Currently, a PC-based HP OpenView DTC Manager is required on each segment of the LAN to download and manage the local DTCs except for the DTC 16RX.

A UNIX workstation and DTC 16RX manager software (J2496A) are needed to manage the DTC 16RX. One UNIX workstation can be used to manage multiple DTCs over a routed network.

Please refer to the DTC family datasheet in the HP Networking Communication Specification Guide (5091-9389E) for the complete list of requirements for the HP OpenView workstation. With software release 14.1, the DTCs will support an SNMP agent.

For single system environments, the DTC may be managed from the MPE/iX host rather than from the HP OpenView console. The system will download software to manage all the DTCs. Host-Based X.25 Management provides the

capability to manage an X.25 link from the MPE/iX host. The management software is included in the Fundamental Operating System (FOS).

Wide-Area Multiprotocol Access Products

DTC X.25/iX Network Link

The DTC/X.25 iX Network Link is provided as an X.25 card in the DTC. It provides access to public and private X.25 packet-switching networks for communication with remote systems and PAD devices.

The DTC 72MX supports up to three DTC/X.25 Network Access cards. The available DTC 72MX/X.25 Network Access cards include:

- DTC 72MX/X.25 Network Access card with RS-232 interface (J2070A option 1CW or J2079A option 1CW)
- DTC 72MX/X.25 Network Access card with V.35 interface (J2070A option 1CX or J2079A option 1CX)

X.25 System Access software (36939A) resides on the HP 3000 Series 900 SPU and makes system-to-system communication possible. System Access is NOT required for users who only need PAD support. See **Table 9.14** for ordering information.

X.25 PAD and Model 45

The HP X.25 Multiprotocol Access products family includes cost-effective, high performance products such as the HP 2335A Asynchronous PAD and the HP Model 45 Plus X.25 Multiprotocol concentrator which allows remote end-user access to central HP 3000 systems sites (see **Figure 9.4**).

These products provide HP 3000 users the following:

- Remote terminal access to HP 3000 systems
- Concentration of multiple X.25 access links in one location
- Turn-key solution to interconnect dispersed sites at very high speed, up to T1 (1.5 Mbps)

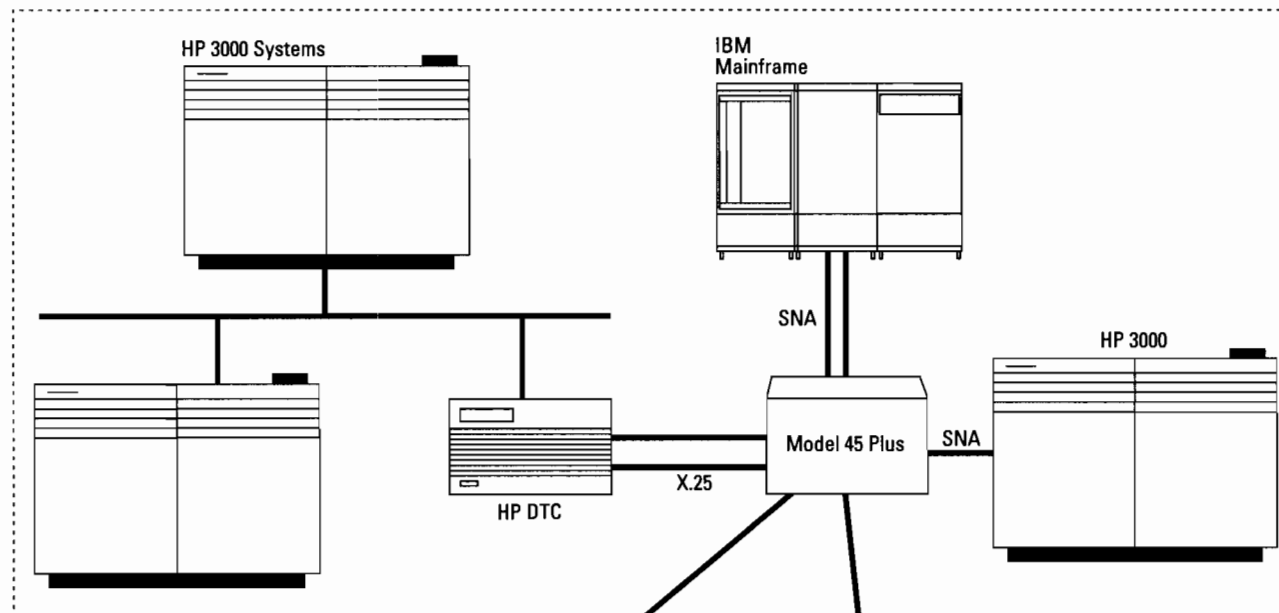
Both HP 2335A and HP Model 45 Plus are high performance products that can typically use the full physical line bandwidth at speeds up to 64 Kilobits-per-second. The HP Model 45 Plus is a high performance X.25 Multiprotocol concentrator which is able to switch up to 2500 data packets per second.

Many HP customers are also IBM customers. When they install HP 3000 systems, they often realize that they have to connect their HP 3000 systems to their IBM Mainframe through their X.25 backbone network. In this case, the HP Model 45 Plus performs very well where both X.25 and IBM SNA Wide-Area-Networking communication are needed.

The HP 2335A PAD and the HP Model 45 Plus are fully managed by HP OpenView Switch/PAD Manager, allowing customers to manage these devices from the same HP OpenView network management platform that manages HP's DTCs, hubs, bridges, and HP 3000 systems.

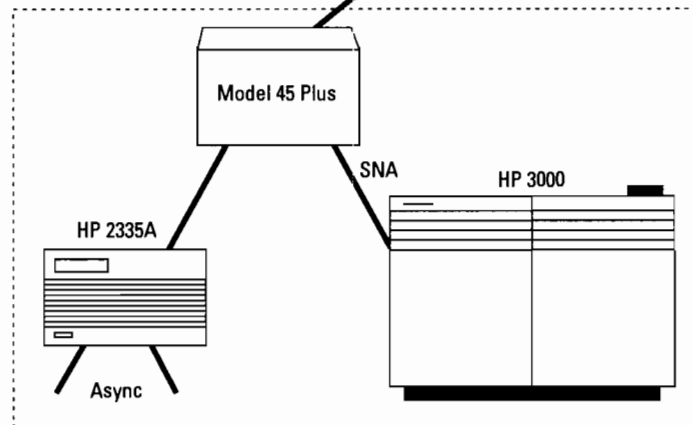
Figure 9.4 Model 45 (X.25 Switch)

Central Site

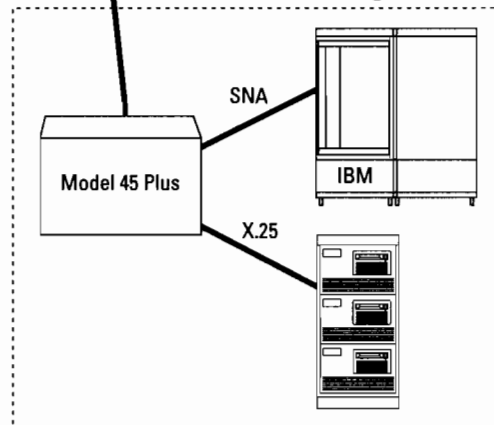


T1 Speed
(1.5 Mbps)

Branch Office



Regional Office



Configuring DTCs

Configuring the DTC 16iX, MX, RX

The DTC 16iX, MX, and RX provide 16 RS-232 direct, RS-232 modem, or RS-423 direct ports. They do not support X.25 or Telnet Access.

The DTC 16iX, MX, and RX include integrated ThinLAN (with BNC-T) and AUI interfaces. To connect to ThickLAN, order a ThickLAN MAU (30241A). To connect to EtherTwist, order an EtherTwist MAU (28685B).

Configuring the DTC 72MX

The DTC 72MX may be configured with up to three of the following cards in any combination:

- 24-port RS-232 Asynchronous Interface Card
- 24-port RS-423 Asynchronous Interface Card
- X.25 Network Access Card (up to three per DTC 72MX)
- Telnet Access Card (only one Telnet Access Card per DTC 72MX)

All of these cards may be ordered as options to the DTC 72MX or as standalone add-on products (see **Table 9.13** for ordering add-ons).

The DTC 72MX includes integrated ThinLAN (with BNC-T) and AUI interfaces. To connect a ThickLAN, order a ThickLAN MAU (30241A). To connect to EtherTwist, order an EtherTwist MAU (28685B).

Figure 9.5 DTC 16iX, MX, RX Configuration Example (shown with 16 RJ45 ports)

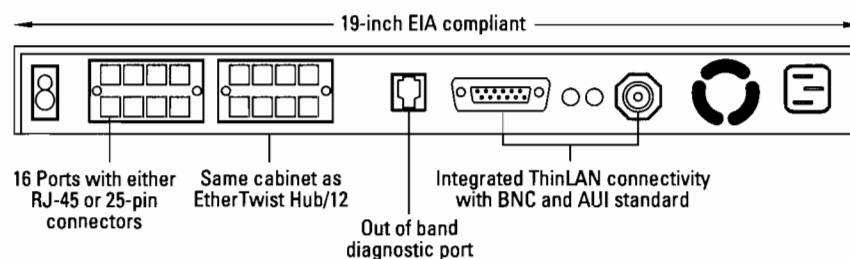
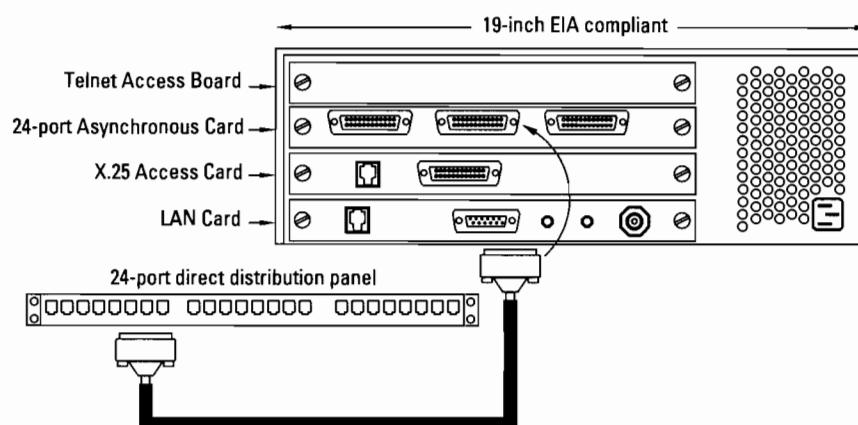


Figure 9.6 DTC 72MX Configuration Example (shown with 24-port RJ45 direct distribution panel)



Racking the DTC

The DTC 16iX, 16RX, 16MX, or 72MX can be racked in factory integrated or standalone HP cabinets (see **Table 9.15**).

EIA Units

An EIA unit is a unit of rack space as defined by the EIA (Electronic Industries Association). One EIA unit equals 1.75 inches of height. Each component occupies a specific number of EIA units. The 1.1 meter expansion cabinets hold 21 EIAs, and the 1.6 meter expansion cabinets hold 32 EIAs.

Factory Integrated DTCs

Customers may order cabinets with peripherals integrated (rack-mounted) at the factory. To indicate factory integrated DTCs, add a "Z" suffix to the product number. You do not need to order option 1AC (rack mounting kit) or rack mounting rails. However, for modem ports, you do need to order one of the modem distribution panel rack mounting hardware kits (C2792AZ, J2084AZ, or J2087AZ).

Remember to include a "Z" at the end of all DTC product numbers when ordering as factory integrated.

Current Consumption of the DTC 72MX

The current consumption of J2070A(Z) is 1.8 amps for the 120 V configuration and 0.9 amps for the 208–240 V configuration.

Figure 9.7 DTC 16 Configuration Example with 8 Direct Ports + 6 Modem Ports, Configured for ThinLAN

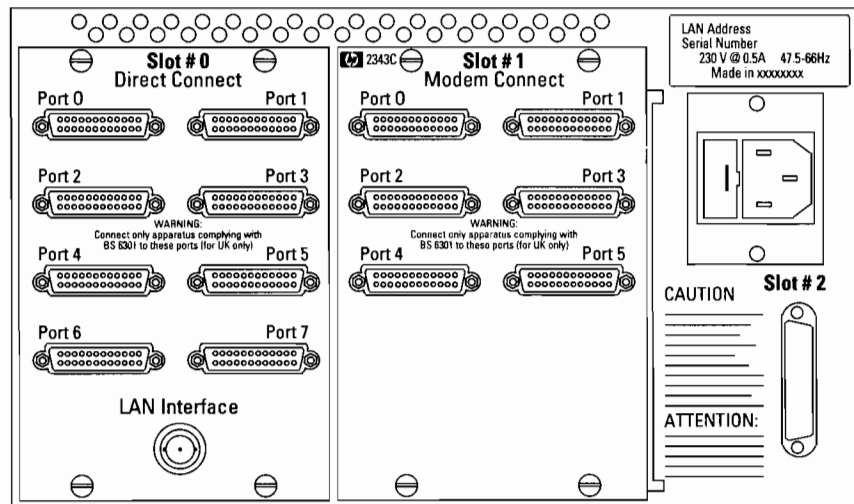


Table 9.10 Configuring the DTC in Your HP 3000 Series 900 System Environment

Service	DTC 16iX ²	DTC 16	DTC 16MX	DTC 16RX ¹	DTC 72MX ²	Network Management
Local end-user access						
Single HP 3000 Series 900	J2062A + async cards	2340A + async card + options	J2063A + async cards	J2064A + async card	J2070A + async card	Included in MPE/iX FOS tape (NMMGR, TermDSM)
Multiple systems						
HP 3000 Series 900 + access to non-4.0 TCP/IP hosts (back-to-back)	Not supported	2340A + async cards	J2063A + async cards	J2064A + async card	J2070A + async card	HP OpenView PC with D2355A release 3.0 or later
HP 3000 Series 900 + access to non-12.0 TCP/IP hosts (back-to-back) + HP 9000 access + multivendor connect	Not supported	2340A + async cards	J2063A + async cards + LAN options	J2064A + async card	J2070A + async card	HP OpenView PC with D2355A release 10.5 or later
Remote end-user access						
Single HP 3000 Series 900	Not supported	2340A + async cards + X.25 card	Not supported	Not supported	J2070A + X.25 card	Included in MPE/iX FOS tape (HBX.25)
HP 3000 Series 900 + HP 9000 + multivendor + access to non-TCP/IP hosts (back-to-back)	Not supported	2340A + async cards + X.25 card	Not supported	Not supported	J2070A + X.25 card	HP OpenView PC with D2355A release 10.5 or later
System-to-HP 3000 Series 900						
X.25 communications Single HP 3000 Series 900	Not supported	2340A + async cards + X.25 card	Not supported	Not supported	J2070A + X.25 card	Included in MPE/iX FOS tape (HBX.25)
X.25 communications Multiple HP 3000 Series 900	Not supported	2340A + async card + X.25 card	Not supported	Not supported	J2070A + X.25 card	HP OpenView PC with D2355A release 3.0 or later
Telnet services for HP 3000 Series 900	Not supported	Not supported	Not supported	Not supported	J2070A + Telnet card	HP OpenView PC with D2355A release 10.5 or later

¹ DTC 16RX can only be managed from HP-UX platform with DTC 16RX Manager Software (J2496A).² DTC 16iX, DTC 16RX, DTC 16MX, and DTC 72MX require MPE/iX FOS version 4.0 or later. DTC 72MX requires HP OpenView DTC Manager version 14.0 or later for those configurations requiring PC-based management. DTC 16MX and 16RX require DTC Manager 14.1 or later.

Ordering Information

Table 9.11 Ordering DTC 16iX, MX, RX

Description	Product/Opt. Number
DTC 16iX with 16 RS-232 direct ports	J2062A(Z)
DTC 16MX with 16 RS-232 direct ports	J2063A(Z)
DTC 16RX with 16 RS-232 direct ports	J2064A(Z)
Replace 8 direct ports with 8 modem ports	Option UG5
16 RS-423 direct ports	Option UG4
Racking kit to rack DTC in 1.1 or 1.6 m cabinet	Option 1AC

Note: Z suffix for factory integrated.

Table 9.12 Ordering DTC 72MX

Description	Product/Opt. Number
DTC 72MX	J2070A(Z)
24 RS-232 direct ports	Option 001
48 RS-232 direct ports	Option 002
72 RS-232 direct ports	Option 003
Replace 8 direct ports with 8 modem ports	Option UG5
Replace 24 direct ports with 24 modem ports	Option UG6
24 RS-423 direct ports	Option UG4
HP 3000 Telnet Access Card	Option 004
X.25/RS-232 Network Access Card	Option 1CW
X.25/V.35 Network Access Card	Option 1CX
Racking kit to rack DTC in 1.1 or 1.6 m cabinet	Option 1AC

NOTES:

The DTC 72MX 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 DTC 72MX is three. One Telnet Access Card is allowed per DTC 72MX.

Requires MPE 4.0 plus software update: P/N B3780AA or later.

Z suffix for factory integrated.

Table 9.13 Ordering DTC 16iX, DTC 16MX, DTC 16RX, and DTC 72MX Add-ons

Description	Product/Opt. Number
DTC connection accessories	J2085A
8-port RS-232 Modem Distribution Panel (MDP)	Option 101
8-port RS-232 Direct Connect Distribution Panel (DDP)	Option 102
24-port RJ45 Direct Connect Distribution Panel (DDP)	Option 103
8-port 3-pin Fan-Out Cable	Option 104
Racking kit for DTC 72MX	Option 105
Racking kit for DTC 16iX, 16MX, 16RX, or 16TN	Option 106

Table 9.14 Ordering X.25/iX Link Products

Description	Product/Opt. Number
DTC 72MX	J2070A
X.25/RS-232 Network Access Card	Option 1CW
X.25/V.35 Network Access Card	Option 1CX
Add on to DTC 72MX	J2079A
X.25/RS-232 Network Access Card	Option 1CW
X.25/V.35 Network Access Card	Option 1CX
X.25/iX System Network Access	36939A

NOTES:

Order 1 hardware product, either J2070A or J2079A.

Order 36939A only if system-to-system access is needed.

Table 9.15 Ordering Factory-integrated and Standalone HP Cabinets

Description	Product Number
1.1 meter factory integrated for HP 3000	A1883A
1.6 meter factory integrated for HP 3000	A1884A
1.1 meter factory integrated for HP 9000	A1896A
1.6 meter factory integrated for HP 9000	A1897A
1.1 meter standalone	C2785A
1.6 meter standalone	C2786A

Table 9.16 Ordering Wide-Area X.25 Multiprotocol Accesss Products

Description	Product/Opt. Number	Capabilities
X.25 PAD and Stat MUX	2335A	Connection of terminals and printers to public and private X.25 networks
4 modem connect ports	Option 123	Connection of terminals and printers to X.25 networks
Cable	40220A	Cable between HP 2335A and ATP/DTC printer ports
Cable	40221A	Cable between HP 2335A and ATP/DTC terminals ports
X.25 multi-protocol concentrator, Model 45 Plus Desktop, up to 18 ports	J2000B	Concentrate multiple X.25 connections into a central HP 3000 site. It includes X.25, Async, and SNA/SDLC. Two extra ALP 6-port card (J2004B) can be added.
X.25 multiprotocol concentrator, Model 45 Plus Tower, up to 30 ports	J2001B	Concentrate multiple X.25 connections into a central HP 3000 site. It includes X.25, Async, and SNA/SDLC. Up to four extra ALP 6-port card (J2004B) can be added.
Model 45 Plus additional 6-port ALP card	J2004B	Additional 6-port ALP card (includes X.25, Async, and SNA/SDLC software)
Model 45 Plus monitor package (optional)	J2007B	Optional package which includes VGA monitor and keyboard for HP Model 45 Plus configuration
Model 45 Plus RS-232 cable	J2030A	Six RS-232 port cable, DTE/DCE configurable per port
Model 45 Plus V.35 cable	J2031A	Two V.35/4 RS-232 cable DTC/DCE configurable port
Model 45 Plus X.21 cable	J2032A	Two X.21/4 RS-232 cable DTC/DCE configurable per port
Model 45 Plus RS-449 cable	J2033A	Rwo RS-449/4 RS-232 cable DTC/DCE configurable per port

Table 9.17 Ordering DTC Management Products

Product/Option	Description
HP D2355A	HP OpenView DTC Manager software
HP 32054D	HP OpenView Windows PC The HP OpenView Windows PC is a specially configured HP Vectra, with PC software already installed. It includes 2 Mbytes additional memory, an HP ThinkJet printer, MS-DOS, MS-Windows, ARPA Services 2.1, HP OpenView Windows, HP AdvanceLink for Windows software. It provides the required PC hardware and software to run the HP OpenView DTC Manager.
Opt. ABA–ABZ	Localization options (MUST ORDER) Network connection options (MUST ORDER ONE ; only one may be ordered per PC)
Opt. 101	ThinLAN connection
Opt. 102	ThickLAN connection
Opt. 103	EtherTwist connection
	Application options (MUST ORDER). Additional HP OpenView products such as the Switch/PAD Manager can be ordered via options to HP 32054B.
Opt. 201	HP OpenView DTC Manager software
HP J2496A	DTC 16RX Manager software
Opt. AA0	Software on 1/4-inch cartridge tape
Opt. AA1	Software on 1/2-inch magnetic reel tape 1600 bpi
Opt. AAH	Software on DDS cartridge tape
Opt. AA4	Software on QIC cartridge tape
Opt. AAU	Software on CD-ROM

NOTES:

The DTC 16iX, DTC 16MX, and DTC 72MX require MPE/iX FOS version 4.0 or later. The DTC 72MX requires OpenView DTC Manager 14.0 or later for those configurations using PC-based management. The DTC 16MX and SNMP agent require OpenView DTC Manager 14.1 or later if using PC, or MPE/iX FOS version 4.0 plus software update B.40.06.

DTC 16RX Manager (J2496A) requires HP-UX platform with HP-UX Release 9.x.

Section 10. Software Media and FOS Learning Products

MPE/iX Media Products

In this section we will address the software media for the HP 3000 and the Fundamental Operating System Learning Products.

For each HP 3000 system, you must order one MPE media product. There are two to choose from. If you're ordering a Corporate Business System or a "Plus" System, you should choose 51454B (see **Table 10.2**). If you're ordering any other HP 3000 system, you should choose 51453B (see **Table 10.1**).

The tables shown on this page and the next (**Table 10.1** and **Table 10.2**) show the options that are available for each MPE media product. Order one option from each group.

Group A

Select the database management system from Group A. (This will depend on the applications being used by the customer.)

Group B

Select the MPE Release from Group B. Once again, this will depend on the applications being used by the customer—most customers should order option 200 (latest platform release), unless there are specific application dependencies on a particular release. **Table 10.3** contains additional information about MPE/iX release options.

Table 10.1 Media (51453B) Options

	9x7LX, 908LX, 918LX, 928LX, 968LX	918RX, 928RX, 968RX, 978RX, 937RX, 947RX, 957RX, 967RX, 987/150RX	937SX, 947SX, 957SX, 967SX, 987SX, 987/150SX, 987/200	980/100, 980/200, 980/300, 980/400
Group A—FOS/Database				
Preconfigured system	812	810	811	811
IMAGE/SQL only	912	910	911	911
MPE/iX only	902	900	901	901
Group B—MPE release				
Latest platform release (240)	200	200	200	200
Minimum supported release	240	240	240	240
Release 4.5	245	245	245	245
Release 5.0	250	250	250	250
Group C—Media type				
DDS Cassette	AAH for all 900 Series systems AA1 for all 900 Series systems AA2 for all 900 Series systems			
1600 bpi				
6250 bpi				
Group D—Localized learning products				
English manuals	ABA for all 900 Series systems ABD for all 900 Series systems			
German manuals				
Subsystem preloading by factory				
	0D1	0D1	0D1	N/A
Supplied manual sets*				
	9x7LX Core 9x8	System Management Core	System Management Core and Core Plus	System Management Core and Core Plus

*Please see MPE/iX learning products later in this chapter for contents of these manual sets.

NOTE: For factory loading of subsystem products on the Series 9x7 and 9x8 families of systems, order option 0D1 or P/N 51453B.

Note that there are a variety of new applications and technologies that are **only** supported on release 5.0 (Option 250). These include:

- Series 991, 995, and 987/200 processors
- Fast/Wide SCSI I/O Card and various peripherals supported September 1994
- ALLBASE Release G.0 (Includes ODBC Support for new PC-based Decision Support Tools)
- POSIX "Smoothing" (Better integration of MPE open systems environment into the "traditional" MPE environment, as well as support of POSIX Links)
- FDDI Link (for high-speed networking)
- SNA Token Ring Link (for interoperability with IBM environments)
- NetWare/iX Version 3.11 (for using the 3000 as a NetWare file and print server)
- AppleTalk (for using the 3000 as a server for Apple Macintosh clients)
- MPE/iX Security Monitor
- SPIFF Print Management Utility (for compatibility with MPE/V's "SPOOK" Utility)

- **SETCLOCK** Command (for changing the system clock without taking down the system)
- **MPE/iX Threshold Manager** (for high availability)

Group C

Select the media type from Group C. This will depend on the type of tape device used by the customer.

Group D

Select the localized learning products from Group D. This will depend on the customer's native language.

Group E

Group E applies only to Corporate Business Systems and "Plus" Systems. The software bundles include a variety of system management and performance management tools.

One MPE media product (51454B) **MUST** be ordered with each Corporate Business System. Order one option from Group A, one option from Group B, one option from Group C, and one option from Group D.

NOTE: For factory loading of subsystem products, order option 0D1 or P/N 51454B. Refer to page 4-4 for information on factory preloading.

For Series 9x7LX/RX/SX, 9x8LX/RX, and Corporate Business Systems, the operating system can be installed at the factory and the software support tape and license will ship with the system.

Table 10.2 Media (51454B) Options

	Corporate Business System*	Corporate Business System DX*	918RX, 928RX, 968RX, 978RX, 947RX, 947SX, 957RX, 957SX, 967RX, 967SX, 987RX, 987SX, 987/150RX, 987/150SX, 987/200
Group A—FOS/Database			
Preconfigured system	Default	Default	Default
ALLBASE/SQL only	910	910	910
IMAGE/SQL only	915	915	915
MPE/iX only	920	920	920
Group B—MPE release			
Latest platform release	200	200	200
Minimum supported release	240	240	240
Release 4.5	245	245	245
Release 5.0	250	250	250
Group C—Media type			
DDS cassette	AAH	AAH	AAH
1600 bpi	AA1	AA1	AA1
6250 bpi	AA2	AA2	AA2
Group D—localized learning products			
English manuals	ABA	ABA	ABA
German manuals	ABD	ABD	ABD
Group E—software bundles			
Delete system software bundle	N/A	931	931
Delete performance software bundle	N/A	932	932
Basic system—no additional software	933 (must order)	N/A	N/A
Subsystem preloading by factory			
	0D1	0D1	0D1
Supplied manual sets¹			
	System Management Core and Core Plus	System Management Core and Core Plus	System Management Core and Core Plus

¹ Please see MPE/iX Learning Products later in this chapter for contents of these manual sets.

* Refer to page 4-4 for information on preloading.

Table 10.3

Media Option	MPE/iX Release
200	Latest platform release* (240)
240	Release 4.0*
245	Release 4.5
250	Release 5.0

* A Platform release is a release that will be shipped to the entire installed base, has bug fixes, is very stable, will have an extended support life, and will be the release that the majority of the installed base converge on and stay on. It is called a "platform" because additional pieces of select functionality will be provided on top of it without requiring the customer to roll their entire operating environment. These additional pieces of select functionality will be delivered by the Plus Releases. A Major release on the otherhand is driven by large, fundamental software changes that have many dependencies that require co-development, testing and certification.

Table 10.4

Product/Option Number	Description
A1153A	Add-on terminal support for servers—includes a class/concurrent license to use MPE/iX on specific 900 Series
Opt. 821	Upgrades Server 917LX
Opt. 822	Upgrades Server 927LX
Opt. 839	Upgrades Series 920, 922LX, 937LX, 937RX, 937SX
Opt. 814	Upgrades Server 922RX
Opt. 842	Upgrades Server 922, 925, 932
Opt. 852	Upgrades Server 935, 947LX, 947RX, 947SX, 948
Opt. 853	Upgrades Server 949, 957LX, 957RX, 957SX
Opt. 864	Upgrades Server 967LX, 967RX, 967SX, 987SX

Ordering FOS Separately

When ordering system option 930 (SPU hardware only), FOS licenses must be ordered separately.

Table 10.5 MPE Media Software Products (3265x)

Product Number	Description
32651B	Fundamental Operating System (FOS). Includes a class/concurrent license to use MPE/iX operating system, VPLUS, KSAM, tools, utilities, and English manual set.
32652A (ICON Only)	Preconfigured system software. Includes a class/concurrent license to use MPE/iX operating system, TurboIMAGE, ALLBASE/SQL, VPLUS, KSAM, tools, utilities, and English manual set.
32653B	IMAGE/SQL Upgrade for MPE-only and SQL-only system configurations. It adds a class/concurrent license to use IMAGE/SQL database software to these systems.
Option	
UA3	Eight user license
OAF	20 user license
UA7	32 user license
UCY	40 user license
UA9	64 user license
UBD	100 user license
UCN	160 user license
UAD	256 user license
UDW	384 user license
UAT	Unlimited user license

MPE/iX Learning Products

Table 10.6 outlines which manual sets are shipped with each 900 Series system. Additional sets may be ordered by using the corresponding product number in **Table 10.6**.

Series 9x7 System Core

These two sets of learning products allow for efficient operation of Series 9x7LX systems. The set is shipped automatically with 9x7LX systems. This is the only system documentation shipped with 9x7LX systems. The set consists of the learning products in **Table 10.7**.

Series 9x8 System Core

This set of learning products describes how to use and operate Series 9x8LX systems. It is the only system documentation shipped with 9x8LX systems and consists of the learning products described in **Table 10.8**.

Series 9x7RX and 9x8RX System Documentation

The System Management Core manual set (36367A) ships automatically with all HP 3000 Series 9x7RX/SX and 9x8RX systems. Additionally, the System Management Core Plus manual set (36368A) ships automatically with all HP 3000 RX and SX systems.

The manuals in **Table 10.9** are specific to the HP 3000 Series 9x7RX/SX and 9x8RX systems. Individual manuals may be purchased by using the corresponding order provided in **Table 10.9**.

Table 10.6 HP 3000 Series 900 System Documentation

Manual Set (order number)	9x7LX	908LX, 918LX, 928LX, 968LX	918RX, 928RX, 968RX, 978RX, 937RX, 947RX, 957RX, 967RX, 987/150RX	937SX, 947SX, 957SX, 967SX, 987SX, 987/150SX
Series 9x7 System Core (B3483A)	X			
System Management Core (36367A)			X	X
System Management Core Plus (36368A)				X
Series 9x8 System Core (B3813AA)		X		

Table 10.7 Series 9x7LX System Core

Learning Product	Order Number
Series 9x7LX System Documentation	B3483A
– Setting Up and Maintaining Your System	A1707-90001
– Understanding Your System	A1707-90003
– Using Your System	A1707-92002
– HP EasyTime/iX Quick Reference Pocket Card	Not orderable
– MPE/iX Day-to-Day Tasks Pocket Card	Not orderable
– Preparing Additional Software Products for Use on the HP 3000 Series 9x7LX	36123-90014

Table 10.8 Series 9x8LX System Core

Learning Product	Order Number
Series 9x8LX System Documentation	B3813AA
– Getting Started	B3813-90003
– Understanding Your System	B3813-90001
– Task Reference	B3813-90009
– Commands Reference	B3813-90011
– HP EasyTime/iX Quick Reference Pocket Card	Not orderable
– MPE/iX Day-to-Day Tasks Pocket Card	Not orderable
– HP 3000 and HP 9000 PA-RISC Customer Computer Support Log	A1707-96008

Table 10.9 Series 9x7RX/SX System Documentation

Learning Product	Order Number
HP 3000 and HP 9000 PA-RISC Customer Computer Support Log	A1703-90012
HP 3000 Series 9x7 PA-RISC Computer Systems/Operator Handbook	A1707-90010
MPE/iX HP 3000 Series 9x7 Software Startup Manual	36123-90015
HP 3000 9x7 Installation and Configuration Guide	A1707-96008

Series 99x System Documentation

Series 99x systems will automatically ship with manual sets as shown in **Table 10.11**.

Corporate Business Systems—System Management Core

CS customers will receive the System Management Core (36367A) and System Management Core Plus (36368A) sets. Special application, availability, and performance software documentation sets will be shipped if these products are purchased (**Table 10.12**).

Table 10.10 Series 9x8RX System Documentation

Learning Product Set	Order Number
System Management Core	36367A
HP 3000 Series 9x8 LX/RX Computer Systems Installation and Configuration Guide	A2051-90006

Table 10.11 Series 99x System Documentation

Learning Product Set	Order Number
System Management Core	36367A
System Management Core Plus	36368A

Table 10.12 Corporate Business Systems—System Documentation

Learning Product Set	Order Number
System Management Core	36367A
System Management Core Plus	36368A
System Dictionary Manuals	36371A
ALLBASE Manual Set	36372A
Availability Software Set	B2496A
Performance Software Set	B2493A



System Management Core 36367A

These learning products aid users in efficient operation of an MPE/iX system. This set ships with systems listed in **Table 10.6**. Additional sets can be ordered separately by using product number 36367A. Individual learning products (except where marked with an asterisk) can be ordered by using the corresponding order number provided in **Table 10.13**.

System Management Core Plus 36368A

This set provides additional detail for the management of complex MIS centers and large networks, as well as more advanced system management and administration tasks. This set ships automatically with the 900 Series systems listed in **Table 10.6**. Additional sets can be ordered separately by using product number 36368A. Individual learning products can be ordered by using the corresponding part number provided in **Table 10.14**.

Programming Core 36369A

This set is designed for basic programming environments. It describes the mechanics of compiling and linking as well as other MPE/iX programming techniques. This set does not ship with any system unless ordered separately by the customer. Use product number 36369A to order this set. Individual learning products can be ordered by using the corresponding order numbers provided in **Table 10.15**.

Table 10.13 System Management Core 36367A

Learning Product	Order Number
New Features of MPE/iX: Using the Hierarchical File System	32650-90351
Manager's Guide to MPE/iX Security	32650-90474
MPE/iX Commands Reference Manual (Volumes I and II)	32650-60115
MPE/iX Documentation Guide	32650-90144
MPE/iX Quick Reference Guide	32650-90032
Performing System Operation Tasks	32650-90137
Performing System Management Tasks	32650-90004
MPE/iX Error Messages Manuals (Volumes I, II, and III)	32650-60016
EDIT/3000 Reference Manual	03000-90012
TurboIMAGE/XL Database Management System Reference Manual	30391-90001
QUERY/V Reference Manual	30000-90042
KSAM/3000 Reference Manual	30000-90079
Using KSAM/XL	32650-90168
Native Mode Spooler Reference Manual	32650-90166
Up and Running with HP ALLBASE/SQL	36389-90011
Configuring Systems for Terminals, Printers, and Other Serial Devices	32022-61000
CI Programming Quick Reference Pocket Card	32650-90269
Managing Spooler Operations Quick Reference Pocket Card	32650-90268
MPE/iX Shell and Utilities Reference Manual (Volumes 1 and 2)	36431-60001

Table 10.14 System Management Core Plus 36368A

Learning Product	Order Number
User's Guide to MPE/iX Security	32650-90472
MPE/iX Glossary of Terms and Acronyms	32650-90146
FCOPY Reference Manual	32212-90003
SORT-MERGE/XL General User's Guide	32650-90082
MPE/iX System Utilities Reference Manual	32650-90081
System Startup, Configuration, and Shutdown Reference Manual	32650-90042
Volume Management Reference Manual	32650-90045
Using the Node Management Services (NMS) Utilities	32022-90041
Troubleshooting Terminal, Printer, and Serial Device Connections	32022-61002
Customizing Terminal and Printer Type Files, with the Workstation Configurator	5959-2870
MPE/iX Shell and Utilities User's Guide	36431-90002

Table 10.15 Programming Core 36369A

Learning Product	Order Number
Getting Started as an MPE/XL Programmer	32650-90008
HP Compiler Library/XL Reference Manual	32650-60014
HP Link Editor/XL Reference Manual	32650-90030
MPE Segmenter Reference Manual	32650-60026
Berkeley Sockets/iX Reference Manual	32650-90372
MPE/iX Shell and Utilities Reference Manual (Volumes I and II)	36431-60001

Programming Core Plus 36370A

This is a general reference set for larger, more advanced programming environments. This set does not ship with any system unless specified. It must be ordered separately by the customer. Use product number 36370A to order this set. Individual learning products can be ordered by using the corresponding order numbers provided in **Table 10.16**.

MPE/iX Developer's Kit 36430A

This manual set is an optional product that is written for programmers who plan to develop POSIX applications or use POSIX functions in programming applications on MPE/iX. The MPE/iX Developer's Kit comprises the manuals listed in **Table 10.17**.

ALLBASE Set 36372A

This set is designed for programmers who use ALLBASE, Hewlett-Packard's relational database management system. This set ships with CS systems only. For other systems, it must be ordered separately by the customer. Use product number 36372A to order this set. Individual learning products can be ordered by using the corresponding order numbers provided in **Table 10.18**.

System Dictionary Manuals

These manuals are designed for programmers who use the HP System Dictionary/XL product. These manuals are shipped with CS systems; other system customers can order individual manuals using the corresponding order numbers provided in **Table 10.19**.

Table 10.16 Programming Core Plus 36370A

Learning Product	Order Number
HP DTC Technical Reference Manual	5961-9820
Accessing Files; Trap Handling; and Data Types Conversion	32650-60010
Process Management, Resource Management, and Interprocess Communication Programmer's Guide	32650-60011
Native Language, Message Catalogs, and User Logging Kit	32650-60012
Data Entry and Forms Management System VPLUS Reference Manual	32209-60002
High Level Screen Management Intrinsic Library (Hi-Li) Reference Manual	32424-60001
MPE/iX Asynchronous Serial Communications Programmer's Reference Manual	32022-61001
MPE/iX Intrinsic Reference Manual	32650-90028
KSAM/3000 Reference Manual	30000-90079
Using KSAM XL	32650-90168
TurboIMAGE/XL Database Management System Reference Manual	30391-90001
MPE/iX Error Message Manuals (Volumes 1, 2, and 3)	32650-60016
Command Interpreter Access and Variables Programmer's Guide	32650-90011

Table 10.17 MPE/iX Developer's Kit 36430A

Learning Product	Order Number
MPE/iX Developer's Kit Reference Manual	36430-60001
Volume 1	36430-90001
Volume 2	36430-90002
HP C/iX Reference Manual	31506-90005
HP C Programmer's Guide	92434-90002
HP C/iX Library Reference Manual	30026-90001
The POSIX.1 Standard: A Programmer's Guide	36430-90003
MPE/iX Shell and Utilities Reference Manual (Volumes I and II)	36431-60001
MPE/iX Shell and Utilities User's Guide	36431-90002

Table 10.18 ALLBASE Set 36372A

Learning Product	Order Number
ALLBASE/SQL Pascal Application Programming Guide	36216-90007
ALLBASE/SQL COBOL Application Programming Guide	36216-90006
ALLBASE/SQL C Application Programming Guide	36216-90023
ALLBASE/SQL FORTRAN Application Programming Guide	36216-90030
ALLBASE/SQL Reference Manual	36216-90001
ALLBASE/ISQL Reference Manual for ALLBASE/SQL and IMAGE/SQL	36216-90096
ALLBASE/SQL Database Administration Guide	36216-90005
ALLBASE/SQL Message Manual	36216-90009
Up and Running with ALLBASE/SQL	36389-90011
ALLBASE/NET User's Guide	36216-90031
HP PC API User's Guide for ALLBASE/SQL and IMAGE/SQL	36216-90104
ALLBASE/SQL Performance and Monitoring Guidelines	36216-90102
ALLBASE/SQL Advanced Application Programming Guide	36216-90100

Table 10.19 System Dictionary Manuals

Learning Product	Order Number
Data Dictionary Managing Information Networks Primer	5958-8527
HP System Dictionary/XL Self-Paced Customer Training	32254-90001
HP System Dictionary/XL General Reference Manual Volume I	32256-90004
HP System Dictionary/XL General Reference Manual Volume II	32256-90005
HP System Dictionary/XL Intrinsic Reference Manual	32256-90002
HP System Dictionary/XL Utilities Reference Manual	32256-90003
HP System Dictionary/XL SDMAIN Reference Manual	32256-90001
HP System Dictionary/XL COBOL Definition Extractor Reference Manual	32257-90001

General Usage Set 36373A

This set provides additional basic information about the usage of MPE/iX systems. It is designed to help users speed through their learning curves with the system. This set does not ship with any system and must be ordered separately by the customer. Use product number 36373A to order this set. Individual learning products can be ordered by using the corresponding order numbers provided in **Table 10.20**.

Migration Set 30231A

This set is designed to aid in the migration from MPE V systems to MPE/iX systems. This set does not ship with any system and must be ordered separately by the customer. Use product number 30231A to order this set. Individual learning products can be ordered by using the corresponding order numbers provided in **Table 10.21**.

HP Open DeskManager Set B3606A

This set provides information about using HP Open DeskManager and HP Open DeskManagerPLUS for all users. The set can be ordered separately using the B3606A part number. Individual learning products can be ordered separately by using the corresponding order numbers listed in **Table 10.22**.

Language Learning Products

The learning products are supplied with language product orders or are purchased separately using the order numbers in **Table 10.23**.

Table 10.20 General Usage Set 36373A

Learning Product	Order Number
MPE/iX Quick Reference Guide	32650-90032
MPE/iX Commands Reference Manual (Volumes I and II)	32650-60115
Using the 900 Series HP 3000: Fundamental Skills	31126A Opt. 001
Using the 900 Series HP 3000: Advanced Skills	31126A Opt. 002
Using the 900 Series HP 3000: Setup Tape (1600 bpi)	31126A Opt. 003
Using the 900 Series HP 3000: Setup Tape (DAT)	31126A Opt. 004

Table 10.21 Migration Set 30231A

Learning Product	Order Number
MPE V to MPE/XL: Getting Started (self-paced training)	30367-60002
Introduction to MPE/XL for MPE V System Administrators	30367-90003
MPE/XL Language Migration Guides (PASCAL, FORTRAN, COBOL)	31502-60004
SPL to HP C/XL Migration Guide	30231-60001
Migration Process Guide	30367-90007
Switch Programming Guide	32650-60030
Introduction to MPE/XL for MPE V Programmers	30367-60004

Table 10.22 HP Open DeskManager Set B3606A

Learning Product	Order Number
HP Open DeskManager Set	B3606A
– HP Open DeskManager Administration Manual	B3606-90001
– HP Open DeskManager Customization Manual	B3606-90002
– HP Open DeskManager User Reference Guide	B3606-90003
– HP DeskMon Administrator's Guide	B3606-90004
– HP Open DeskManager Intrinsics	B3606-90005
Using HP Slate	36576-90043

Table 10.23 MPE/iX Language Learning Products

Learning Product	Order Number
HP RPG/XL Programmer's Guide	30318-60001
HP RPG/XL Reference Manual	30318-60002
HP RPG/XL Utilities Reference Manual	30318-60003
HP RPG/XL Pocket Guide	30318-90002
HP Pascal/iX Reference Manual	31502-90001
HP Pascal/iX Programmer's Guide	31502-90002
HP COBOL II/XL Compiler Manual	31500-90001
HP COBOL II/XL Programmer's Guide	31500-90002
HP COBOL II/XL Quick Reference Guide	31500-90003
HP FORTRAN 77/iX Reference	31501-90010
HP FORTRAN 77/iX Programmer's	31501-90011
HP Symbolic Debugger/iX User's Guide	31508-90003
HP C/iX Library Reference Manual	30026-90001
HP C Programmer's Guide	92434-90002
HP C/iX Reference Manual	31506-90005
HP Business BASIC/XL Reference Manual	32715-60001
HP Business BASIC/XL Migration Guide	32715-60002

Table 10.24 Networking

Learning Product	Order Number
Managing Host-Based X.25 Links Quick Reference Card	36939-61003
HP 3000/iX Network Planning and Configuration Guide	36922-90033
Configuring and Managing Host-Based X.25 Links	36939-61004
NS3000/XL NMMGR Screens Reference Manual	36922-90034
NS3000/XL Operations and Maintenance Reference Manual	36922-90035
NS3000/XL Error Messages Reference Manual	36923-90021
Using NS3000/iX Network Services	36920-90008
NetIPC 3000/XL Programmer's Reference Manual	36920-61005
NS Cross-System NFT Reference Manual	36920-61003
HP SNMP/XL User's Guide	36922-90036
HP SNA Server/Access User's Guide	30254-61000
SNA Link/iX Node Manager's Guide	30291-61000
SNA NRJE User/Programmer Reference Manual	30292-61001
SNA NRJE Node Manager's Guide	30292-61000
HP SNA Products Remote System Configuration Guide	J2220-61025
Using SNA IMF Pass Through	30293-61008
SNA DHCF/XL User Support Guide	36935-61001
SNA DHCF/XL Node Manager's Guide	36935-61002
SNA DHCF/XL Application Programmer's Manual	36935-61003
SNA DHCF/XL Diagnostic Message Manual	36935-61004
APPC Subsystem on MPE/iX Node Manager's Guide	30294-61002
HP SNADS/XL HPDesk Gateway Administrator's Guide	32006-61001
HP SNADS/XL Node Manager's Guide	32006-61002
HP SNADS/XL SNA/Distribution Services: Electronic Mail User Support Guide	32006-61003
HP SNADS/XL HP Desk User Support Guide	32006-61004
HP OpenView System Manager User's Guide	36936-61001
HP OpenView System Manager Manager's Guide	36936-61002
Using HP OpenView DTC Manager	D2355-90001
Installing and Managing HP ARPA File Transfer Protocol	36957-61001
Asian SNA/IMF/XL User Support Guide (Taiwanese)	30293-60211
Asian SNA/IMF/XL User Support Guide (Japanese)	30293-60221
Asian SNA/IMF/XL User Support Guide (Korean)	30293-60231
SNA IMF Programmer's Reference Manual	30293-61005
LU6.2 API Application Programmer's Reference Manual	30294-61000
RJE User/Programmer Reference Manual	30295-61001
RJE/XL Node Manager's Guide	30295-61002
Netware for the HP 3000 Installation	32020-90027
Netware for the HP 3000 system Administration	32020-61002
Netware for the HP 3000 User Basics for DOS Workstations	32020-61003
Netware for the HP 3000 Utilities Reference	32020-61004
Netware for the HP 3000 Concepts	32020-61005
Netware for the HP 3000 System Error Messages	32020-61006
Netware for the HP 3000 System Administration MPE/iX 4.0 Supplement	32020-61015
HP DeskManager Intrinsic	32006-61009

Table 10.25 Programmer Productivity Tools

Learning Product	Order Number
HP Toolset/XL Reference Manual	36044-60001
INFORM/V User's Guide	32246-60002
REPORT/V User's Guide	32245-60001
Getting Started With TRANSACT	32247-90007
HP TRANSACT Reference Manual	32247-60003
HP TRANSACT Quick Reference Guide	32247-90020
Virtuoso CDBOL Sample Library Reference Manual	30426-60001
Virtuoso Code Generator Reference Manual	30422-60001
HP EDIT Reference Manual	30316-90001
HP EDIT Quick Reference Guide	30316-90005
Learning HP EDIT	30316-90002
Getting Started with HP Software Revision Controller (SRC), Implementation Guide, User's Guide, Quick Reference Card	30234-60002
HP Browse/XL User's Guide	36384-90001
HP Search/XL User's Guide	36383-90001

Table 10.26 Other Learning Products Available

Learning Product	Order Number
HP Security Monitor/iX User's Guide	32650-90454
HP Security Monitor/iX Manager's Guide	32650-90455
Silhouette Reference Manual	30302-60003
Dictionary/3000 Reference Manual	32244-61000
SORT-MERGE/XL Programmer's Guide	32650-90080
System Debug Reference Manual	32650-90013
AutoRestart/XL User's Guide	36375-90001
SPU Switchover/XL User's Guide	36378-90001
VPLUS/Windows Programmer's Guide	36393-90002
Magneto-Optical Media Manager User's Guide	36398-90001
STORE and TurboSTORE/iX Reference Manual	30319-90001
Mirrored Disk/iX User's Guide	30349-90003
ALLBASE/DB2 CONNECT User's Guide	30700-90001
ALLBASE/TurboCONNECT Administrator's Guide	36385-90001
HP Motif/iX Programmer's Supplement	36394-90001
HP Motif/iX System Administrator's Supplement	36394-90002
TurboIMAGE/XL DBChange Plus User's Guide	36386-90001
ALLBASE/Query User's Guide	92534-90011
Getting Started with HP IMAGE/SQL	36385-90008
HP IMAGE/SQL Administrator's Guide	36385-90001
DB Change Plus User's Guide	36386-90001
HP CD Extensions for MPE/iX Installation and Administration Guide	B3683-90001

Section 11.

Customer Support Services

Hewlett-Packard's customer support services are designed to ensure long-term, productive use of the HP 3000 systems. Support is available throughout the life of a system to meet the needs of particular applications and working environment. HP offers a complete range of customer support services for HP 3000 systems:

- **HP System Support Options** provide basic hardware and software support during the first year of system ownership.
- **Personalized System Support** provides proactive technical support through a dedicated HP support team.

- **Premier Account Support** provides a premium level of complete service and support for Corporate Business Systems customers.

- **Site Design and Implementation Services** (in addition to HP System Support Options 0S4 and 0SZ), include Cabling, Relocation, Site Preparation, Staging and Distribution.

- **Management and Support Operations Services** are available to help customers manage systems and networks and to support end users. Capabilities also include disaster recovery planning and backup services to prepare customers for the unexpected.

- **HP System Support Solutions** provide scalable, integrated ongoing support coverage.

- Standardized and custom consulting services allow customers to develop tailored solutions to meet their application needs.

- Fundamental and advanced training courses help customers quickly take full advantage of their system's capabilities.

HP customer support is delivered by a worldwide network of systems support engineers (SSEs), customer engineers (CEs), and HP Response Center engineers and account advocates (RCEs/RCAAs). These extensively trained professionals work closely with HP sales representatives to provide customers with complete support for their HP 3000 products.

HP System Support Options

Hewlett-Packard offers a 1-year repair warranty with 72-hour on-site response time for hardware products. The HP System Support Options program supplements the warranty with improved hardware on-site repair response time and by adding software support.

The HP System Support Options Program offers customers hardware and software maintenance and installation support, upfront at time of product purchase, as standard product options for HP systems, integrated, standalone peripherals, and standalone software applications during the first year of system ownership.

Tailor-Made for Selling

HP System Support Options fit your ordering process. If you order HP products, you already know how to order support options. Key program features include:

- HP System Support Options are quoted and ordered as product options
- Provide standard hardware/software support for the first year
- Options are also available for installation and network configuration
- CPL price represents the total costs for the first year of hardware/software support during the one-year warranty period
- Sales representatives receive quota credit and commission

HP System Support Option Choices

Each support option represents a combination of hardware and software support for an HP product or an installation service.

Table 11.1 illustrates the deliverables of each HP System Support Option.

For on-going contractual support after the first year, talk to your HP Support Representative about System Support solutions which can be tailored to meet the customer's individual support needs.

Table 11.1 Deliverables for Each HP System Support Option

Less Urgent	Urgent	Critical
Option OS0 – License to use software updates – Updates* – Electronic access – Next day on-site response, M–F	Option OS1 – License to use software updates – Updates* – Electronic access – 4-hour on-site response, M–F	Option OS5 – License to use software updates – Updates* – Electronic access – 24 × 7 4-hour on-site response
Option OS2 – Phone-in software assistance – License to use software updates – Updates* – Electronic access – Next day on-site response, M–F	Option OS3 – Phone-in software assistance – License to use software updates – Updates* – Electronic access – 4-hour on-site response, M–F	Option OS6 – Phone-in software assistance – License to use software updates – Updates* – Electronic access – 24 × 7 4-hour on-site response
*Includes one copy of media and documentation updates for each media and documentation product ordered.		
Option OS4 – Installation and network configuration for product warranties that do not include installation.		
Option OSZ – Network configuration only for product warranties that include installation.		

New Simplified Support

Pricing: Quote one HP System Support Option for the SPU and one for the chassis. The sum price covers first year hardware and software support for the entire system, integrated peripherals, O/S, and data-bases (excluding terminals and rackmounts).

NOTE: Specific implementation of HP System Support Options varies from country to country. Consult with your country support manager for applicable details.

HP System Support Options are available for systems, integrated and standalone peripherals, and standalone software.

Systems

Now the HP System Support Option prices for the system cover the complete integrated system regardless of configuration and system software as well. To select the appropriate option on the customer's hardware, software and peripherals, follow these steps:

1. Determine the customer's desired response time for hardware repairs (next-day, 4-hour or 24 × 7).
2. Determine the level of software support that the customer desires for the environment of the systems. Phone-in software assistance or License-to-use (LTU) only.

Table 11.2

Feature	Delivery Specifications		
Warranty upgrade	Support services are added to the product warranty to provide either next-day, 4-hour or 24 × 7 on-site response for hardware problems.		
	Next Day	4 Hour	24 × 7
Coverage Hours	8 am–5 pm Mon–Fri	8 am–9 pm* Mon–Fri	24 hours 7 days per week
Response Time	Next day	Best response; not to exceed 4 hours	Best response; not to exceed 4 hours
*If service is requested before 5:00 pm, an HP engineer will respond on-site within 4 hours, if an on-site call is necessary.			
On-site repair	An HP engineer travels to the customer site and provides all labor, parts and materials necessary to maintain hardware products in good operating condition. Product malfunctions and failures are diagnosed and corrected.		
Phone-in software assistance	Unlimited, toll free access to the HP Response Center is provided for authorized callers. Response is immediate for critical calls and within 2 hours for all calls.		
License to use software updates	Customer can use and copy updates to HP software on each system covered by HP System Support Options.		
Updates	As HP releases updates to HP software, the latest revisions of the software and reference manuals are made available to the system manager. HP provides one copy of media and documentation updates for each media and documentation product ordered with HP System Support Options.		
Electronic access	HP SupportLine provides electronic access to a database of current product and support information. Includes new product information, software status bulletins, engineering and application notes, etc. HP SupportLine can also be used to submit Response Center calls.		
Installation/network configuration	Option 0S4 provides installation and network configuration for products whose purchase price does not include installation. Option 0SZ provides network configuration for products whose purchase price includes installation.		

If Phone-in software assistance is desired, it is ordered only for one system—the highest transaction-capable system (called the “central” system). On that single system, order HP System Support Option 0S2, 0S3, or 0S6.

If the system will be added to an existing group of supported HP 3000 systems, order HP System Support Option 0S0, 0S1, or 0S5.

For any other system not classified as the “central” system, order 0S0, 0S1, or 0S5.

If the customer does not require Phone-in software assistance, order 0S0, 0S1, or 0S5.

See **Table 11.1** for descriptions of HP System Support Options.

Integrated Peripherals*

The HP System Support Option prices have been reduced to \$0 for peripherals that are integrated with the system. Their support prices have now been rolled in with the HP System Support Option prices for the chassis and SPU.

Note that you still must order the HP System Support Option that provides the desired response time for repairs (next-day, 4-hour, or 24 × 7) for each of the integrated peripherals. Select the same option as you chose for the system with which the peripheral will be used. This will provide HP visibility to all items your customer wants supported.

Standalone Peripherals

Standalone peripherals (e.g. printers and end-user terminals) carry their own HP System Support Option price. You must quote separate HP System Support Options for the standalone peripherals. The ordering procedure for the HP System Support Options for standalone peripherals is the same as for integrated peripherals.

Standalone Software Applications

For standalone software applications:

- All HP System Support Options must match the HP System Support Option (support level) ordered on the system.

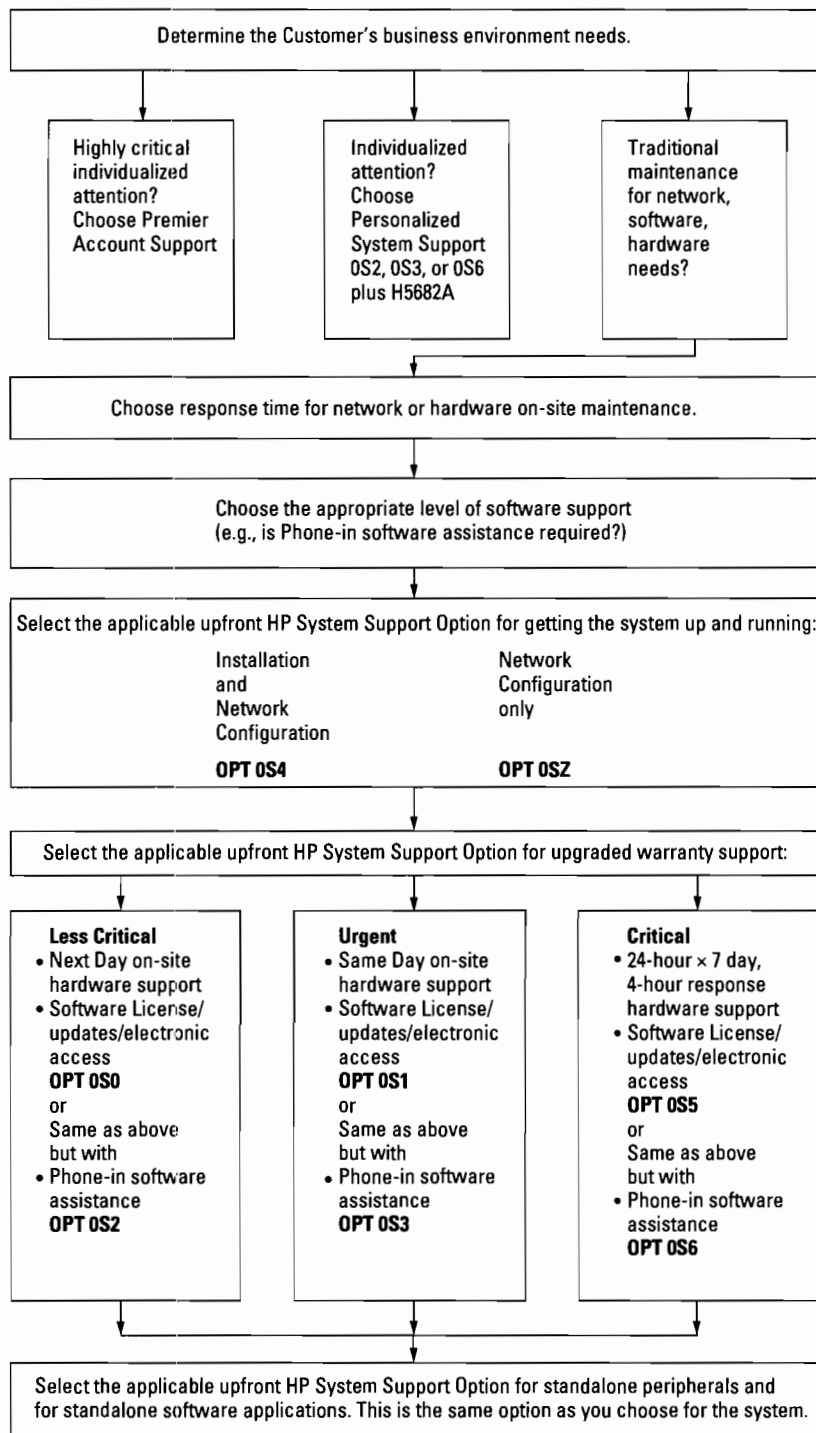
- HP System Support Options 0S2, 0S3, 0S6 are ordered for software support on “central” systems where Phone-in software assistance is desired.

- HP System Support Options 0S0, 0S1, 0S5 are ordered for all other systems where Phone-in software assistance is not required.

NOTE: 0S0, 0S1, 0S5 license-to-use (LTU) level extends phone-in support from a “central” system to these LTU systems and their software.

* Note: All integrated peripherals on a given system must use the same HP System Support Options.

Figure 11.1 How to Select the Right Support for Your Customer



Corporate Business System Support Options

NOTE: Corporate Business Systems 991 through 995 have standard HP System Support Options 0S0 through 0S6. Corporate Business Systems 990/992 (A1809A, A1811A) require HP System Support Options 0SA–0XD. The support deliverables for 0SA–0XD are the same as those for 0S0–0S6.

To order the correct HP System Support Option, use **Table 11.3**.

1. Select appropriate processor option (820–839).
2. Determine desired level of support.
3. Choose one of the HP System Support Options associated with that processor option.

Each 0SA–0XD HP System Support Option description will specifically reference the processor option the support is being purchased for.

Table 11.3 System Support Options—Corporate Business Systems 990/992

Order w/Prod. Number	Prod. Opt.	These options equivalent to:					
		0S0 LTU/ND	0S1 LTU/4HR	0S2 TEL/ND	0S3 TEL/4HR	0S5 LTU/24	0S6 TEL/24
A1809A	820	0SA	0SB	0SC	0SD	0TA	0TB
	821	0SE	0SF	0SG	0SH	0TC	0TD
	822	0SJ	0SK	0SL	0SM	0TE	0TF
	823	0SN	0SP	0SQ	0SR	0TG	0TH
	824	0SS	0ST	0SU	0SV	0TJ	0TK
	825	0TL	0TM	0TN	0TP	0TQ	0TR
	826	0TS	0TT	0TU	0TV	0TW	0TX
	827	0TY	0TZ	0UA	0UB	0UC	0UD
	828	0UE	0UF	0UG	0UH	0UJ	0UK
	829	0UL	0UM	0UN	0UP	0UQ	0UR
	830	0US	0UT	0UU	0UV	0UW	0UX
	831	0UY	0UZ	0VA	0VB	0VC	0VD
	832	0VE	0VF	0VG	0VH	0VJ	0VK
	833	0VL	0VM	0VN	0VP	0VQ	0VR
	834	0VS	0VT	0VU	0VV	0VW	0VX
	835	0VY	0VZ	0WA	0WB	0WC	0WD
	836	0WD	0WF	0WG	0WH	0WJ	0WK
	837	0WL	0WM	0WN	0WP	0WQ	0WR
	838	0WS	0WT	0WU	0WV	0WW	0WX
	839	0WY	0WZ	0XA	0XB	0XC	0XD
A1811A	820	0SA	0SB	0SC	0SD	0TA	0TB
	821	0SE	0SF	0SG	0SH	0TC	0TD
	822	0SJ	0SK	0SL	0SM	0TE	0TF
	823	0SN	0SP	0SQ	0SR	0TG	0TH
	824	0SS	0ST	0SU	0SV	0TJ	0TK
	825	0TL	0TM	0TN	0TP	0TQ	0TR
	826	0TS	0TT	0TU	0TV	0TW	0TX
	827	0TY	0TZ	0UA	0UB	0UC	0UD
	828	0UE	0UF	0UG	0UH	0UJ	0UK
	829	0UL	0UM	0UN	0UP	0UQ	0UR
	830	0US	0UT	0UU	0UV	0UW	0UX
	831	0UY	0UZ	0VA	0VB	0VC	0VD
	832	0VE	0VF	0VG	0VH	0VJ	0VK
	833	0VL	0VM	0VN	0VP	0VQ	0VR
	834	0VS	0VT	0VU	0VV	0VW	0VX
	835	0VY	0VZ	0WA	0WB	0WC	0WD
	836	0WD	0WF	0WG	0WH	0WJ	0WK
	837	0WL	0WM	0WN	0WP	0WQ	0WR
	838	0WS	0WT	0WU	0WV	0WW	0WX
	839	0WY	0WZ	0XA	0XB	0XC	0XD

0S0: LTU SW/Next Day HW
 0S1: LTU SW/Same Day HW
 0S2: Phone-in SW/Next Day HW
 0S3: Phone-in SW/Same Day HW
 0S5: LTU SW/24 × 7 HW
 0S6: Phone-in SW/24 × 7 HW

Personalized System Support

Personalized System Support consists of an assigned team of support experts to provide ongoing individualized account attention.

The Personalized System Support solution includes all of the underlying hardware and software support features. Customers receive network support if they purchase the network coverage option or have an all-HP network. In addition, this solution includes support management and planning activities. Personalized System Support is available for the following platforms: HP 1000, HP 3000, HP 9000, and PC-local area network (PC-LAN) systems.

Customers who purchase HP System Support Options 0S2, 0S3, or 0S6 can upgrade their support to Personalized System Support (P/N H5682A).

To order Personalized System Support upfront, you must order HP System Support Options 0S2, 0S3, or 0S6 on all the hardware, software, and network products to get hardware and software support. In addition, you must order product number H5682A with the appropriate 0Tx option to get the account management deliverables of Personalized System Support. See **Table 11.4** to order the correct H5682A option.

Table 11.4 Personalized System Support H5682A 0Tx Options

Option	Processor
0T1	918, 927, 937, 947
0T2	928, 957, 967, 968
0T3	978, 987RX–987/150SX, 990, 992
0T4	987/200RX and SX, 991, 995/100
0T5	995/200, 995/300
0T6	995/400, 995/500
0T7	995/600, 995/700, 995/800

Features

All hardware, software, and network* support features plus:

- An account-assigned system support engineer (SSE)
- An assigned HP Response Center advocate
- An assigned contract administrator
- Patch management assistance
- Scheduled operational reviews
- System release planning seminars
- Software update installation

The last entry in **Table 11.9** plus **Table 11.10** provide a description of these features.

Benefits

- Increased system availability through proactive maintenance
- Faster and more precise problem resolution
- Increased productivity through personalized assistance
- Smooth new software release integration
- In-depth account knowledge

Personalized System Support targets new and existing customers who want proactive and personalized maintenance from HP. It is applicable to large and small customers (A, B, and C sales accounts).

All new HP customers should be primary targets for HP's Personalized System Support. They include new customers who need assistance learning about their systems and working with the HP support organization; small customers with little or no support staffs or with unsophisticated staffs; and large customers with large and highly technical support staffs who view support as insurance.

New customers can purchase Personalized System Support upfront with their system purchase in conjunction with HP System Support Options. Sales representatives receive quota credit and commission, and customers receive applicable sales discounts.

Personalized System Support is also available for ongoing contractual support through HP System Support Solutions.

*Network features are excluded if network support is not ordered.

Premier Account Support

HP System Support service for premier accounts provides HP's highest level of hardware, software, and network support for HP 3000 Series (and HP 9000 Series) corporate business systems. It ensures the customer's success by providing a designated HP premier support team to keep your customer's system running smoothly. In addition, this service provides customers with immediate problem-resolution activities to get their system up and running if a problem arises.*

Features

All Personalized System Support solution features plus:

- An account-assigned system support engineer (SSE)
- Immediate access to an account-assigned RCE
- An assigned technical consultant (when selected)
- Enhanced patch management assistance
- Implementation assistance (when selected)

Benefits

- Maximum system availability
- Comprehensive coverage and better resource planning
- Technology advances that create competitive advantages

Premier Account Support is a proactive, structured, yet flexible support offering for high-end customers. There are two target markets for premier account support service: new corporate business system or server (Emerald) accounts, specifically those replacing a large HP system or large non-HP system; and installed-base, high-end customers with Emerald systems in a data center environment.

There are two ways to sell premier account support: a fixed-price upfront solution or the flexible system support solution. All of the solutions offer HP's highest level of complete maintenance coverage.

The fixed-price upfront solutions, designed for the sales force to sell up front with the corporate business system or server sale, are available as three fixed-price packages:

- Package 1 includes an enhanced level of complete maintenance, operations assistance (for example, disaster recovery, performance, and network management reviews), and customer education. Order product number H5897AA with appropriate processor option.

- Package 2 includes an enhanced level of complete maintenance and additional SSO implementation assistance. Order product number H5677A with appropriate processor option.
- Package 3 includes an enhanced level of complete maintenance. Order product number H5678A with appropriate processor option.

Since some customers do not need the full content of package 1 (for example, operations assistance or education), packages 2 and 3 are viable alternatives.

The simple packages make selling support easy, and the support coverage can be integrated into a customer's ongoing contract during the renewal process. Sales representatives receive quota and commission for the fixed price HP Premier Account support service package sold up front with the system.

NOTE: The fixed price upfront Premier Account Solutions are sold in place of HP System Support Options.

*Unless the customer does not select the immediate response hardware service level.

HP System Support Solutions

HP System Support Solutions provide ongoing contractual support outside the terms of the product warranty. As with System Support Options, the HP System Support Solutions program provides a framework to create and sell a solution tailored to the customer's individual needs. Descriptions for HP System Support features are described below.

Hardware Service Levels

While these service levels meet the needs of most customers, HP also has the flexibility to individualize service for you.

Table 11.5 Hardware Service Level Selection Guide

Environment	Required Coverage Hours*	Required Response Time	HP Hardware Service Level	Support Suffix
Highly critical	24 hours a day 7 days a week	Best response; not to exceed 4 hours	Priority Plus (24 x 7)	02G
Urgent	8:00 am–9:00 pm, Monday–Friday, excluding HP holidays**	Best response; not to exceed 4 hours (typically same working day)	Priority (same day)	02A
Less Critical	8:00 am–5:00 pm Monday–Friday, excluding HP holidays	Next working day	Next Day	02C

* Outside the United States, hours are subject to local availability.

** Service requests before 5:00 pm, bring an HP engineer on site within 4 hours if necessary.

Table 11.6 Hardware Support

Feature	Delivery Specification
On-site hardware support	HP travels to your site and provides all labor, parts, and materials necessary to maintain your hardware products in good operating condition. HP diagnoses and corrects products malfunctions and failures. Replacement parts are new or equivalent to new; replaced parts become the property of HP.
Work to completion	Once an HP engineer arrives at your site, the engineer continues service, uninterrupted, until your products are operational or as long as reasonable progress is being made. Work may be temporarily suspended if additional parts or resources are required, but resumes when they become available. With the Scheduled support service level, work resumes on the following business day.
Engineering improvements	HP installs appropriate engineering improvement on your system to ensure maximum performance and maintain compatibility with HP-supplied hardware replacement parts.
Escalation management (hardware)	HP has established formal escalation procedures to solve very complex hardware problems. Local HP management coordinates problem escalation, rapidly enlisting the skills of key problem-solving experts throughout HP.
24-hour hardware call submittal	If you've selected a hardware service level that only provides coverage during normal business hours, you can still place an after-hours service call. The HP Response Center logs the call and notifies your local office the following business day.*
Preventive hardware maintenance	An HP engineer visits your site at regularly scheduled intervals to perform diagnostics on your system, adjust mechanical or electronic system components as needed, and replace worn or defective parts if necessary.
Remote hardware support	Prior to any necessary on-site assistance, an HP engineer may initiate and perform remote diagnostics to facilitate problem resolution. By using an HP-qualified support modem to resolve problems remotely, HP can have your system up and running more quickly. HP performs remote support only upon receipt of your authorization.

* Subject to local availability outside the United States.

Phone-in Software Assistance, Information, and Updates

Includes the features of software license, information, and updates, plus:

Table 11.7 Phone-in Software Assistance, Information, and Updates

Feature	Delivery Specification
Phone-in software assistance	Remote assistance is available for software problems. Unlimited, toll-free access to the HP Response Center is available to authorized callers. Response is immediate for critical calls and within 2 hours all calls. Assistance is available from Monday through Friday, excluding HP holidays, during normal HP Response Center hours for all HP and select non-HP software products. Extended-hours support is available for operating system, subsystem, and application software products. Refer to the HP SupportLine database for details of products and coverage hours.
Electronic software call submittal	Authorized callers can submit calls electronically to the HP Response Center via HP SupportLine electronic support and request a call back within 2 hours (or the next business day if after normal hours) or a written electronic response the next business day.
Escalation management (software)	At HP's discretion, the HP Response Center may dispatch an HP service representative to the customer's site to assist with critical software problem resolution. In most cases, resources arrive within 1 working day if the site is within 100 miles of the nearest HP support office.
Remote software support	Prior to any necessary on-site assistance, an HP engineer may initiate and perform remote diagnostics to facilitate problem resolution. By using an HP-qualified support modem to resolve problems remotely, HP can have the customer's system up and running more quickly. HP performs remote support only upon receipt of authorization from the customer.

Table 11.8 Software License, Information, and Updates

Feature	Delivery Specification
License for software updates	Customers may use and copy updates to HP software on each system covered by HP System Support service as described in HP Terms and Conditions of Sale and Service, Exhibit 5, HP System Support Service.
Software media and documentation	As HP releases updates to your HP software, the latest revisions of the software and reference manuals are made available to the customer's system manager. Media types available for software and documentation updates include tape, disk, paper, electronic, and CD-ROM. HP value-added businesses (VABs) may request priority delivery of software releases.
HP SupportLine electronic support	HP SupportLine provides electronic access to a database of current product and support information. HP SupportLine includes new product information, software status bulletins, engineering and application notes, and information about available software patches. Keyword search and browse capabilities make it easy to locate appropriate information. HP SupportLine is available Sunday through Friday from 2:00 am to midnight, and Saturday from 2:00 am to 9:00 pm eastern time (U.S.). Outside the U.S., hours are subject to local availability.

Table 11.9 Network Support (requires hardware/software support)

Feature	Delivery Specification
Network support	Resolution of a network problem begins within 2 hours of the customer's call to the HP Response Center. Network specialists isolate the problem remotely and, if HP deems necessary, HP sends a support engineer to the site. Since the HP Response Center can manage the resources required to solve multivendor and multisite problems, HP can cover the entire network. To efficiently solve problems, HP may contact select vendors directly or work with the customer to contact the appropriate vendor.
Complete network documentation	Customer-specific network documentation for all of the customer's sites is updated annually by an HP representative. The customer's network map is included in the HP Response Center's database.
Assigned contract administrator	An account-assigned contract administrator serves as the customer's single point of contact for contract administration.

Table 11.10 Personalized System Support

Feature	Delivery Specification
Assigned system support engineer	The customer's assigned system support engineer (SSE) coordinates all hardware, software, and network on-site maintenance services, schedules operational reviews, installs software updates, and ensures that all appropriate HP resources are made available. The SSE is available during normal HP business hours, excluding HP holidays.
Assigned HP Response Center account advocate	An assigned HP Response Center account advocate (RCAA) understands the customer's computing environment and acts as an advocate to ensure that customer support needs from the HP Response Center are met. The RCAA monitors calls placed to the HP Response Center for software assistance to help identify trends and potential problems. The RCAA contacts the customer immediately if a class problem arises and works with the customer to implement a solution that minimizes system disruptions. Assistance is available Monday through Friday, 8:00 am to 5:00 pm local HP Response Center time, excluding local HP Response Center holidays.
Patch management assistance	Patch management assistance consists of patch analysis and proactive notification of new patches. The RCAA provides a full patch analysis twice a year as a scheduled activity. The RCAA also proactively notifies the customer when a new HP PowerPatch tape for supported MPE V and MPE/iX systems is released. Assistance is available Monday through Friday, 8:00 am to 5:00 pm local HP Response Center time, excluding local HP Response Center holidays.
Operational reviews	The customer's SSE schedules two operational reviews per year, covering review topics mutually agreed to. Possible topics include review of operational procedures such as system security; plans for add-on hardware, software, and network products; and review of HP Response Center calls. Operational reviews are provided during normal HP business hours.
System release planning seminars	In system release planning seminars, HP support representatives review changes to new software releases—including new features and functions, problem fixes, and performance implications; new hardware, software, and network products supported by new releases; hardware needs; and impact on system and network configurations. System release planning seminars are provided for major releases only, generally one per year. HP schedules meetings 1 month in advance at an HP office, with one seminar for each major release.
Installation of software updates and add-on hardware products	The SSE installs one operating system update per year on the customer's central system. Installation is available 7 days a week, 24 hours a day, excluding HP holidays. Installation must be scheduled at least 1 week in advance at a mutually agreed-upon time, and the customer's system manager or alternate must be present during the installation. Additional HP hardware products purchased directly from HP and added to the HP System Support service agreement are installed at no additional charge. This applies to select products and does not apply to hardware that is designated as customer-installable.

Site Design and Implementation Services

HP Site Design and Implementation (SD&I) services are available to assist customers in implementing their computing environment. HP's comprehensive set of capabilities ranges from physical preparation of the computing environment and the equipment to the installation and configuration of hardware, software, and networks. The services specifically address the needs of customers who are either in the process of implementing a computing environment for the first time or significantly expanding or changing their existing environment.

SD&I services can be sold as standardized services or custom projects, depending on the complexity of the implementation project. Implementation product options OS4 and OSZ are available for selling basic installation and network configuration at time of product purchase, as part of the HP System Support Options.

Implementation services should be quoted on a custom basis when the project involves multiple site coordination or when the customer requirements exceed the standard deliverables included in the implementation options. In these situations, a solution composed of the various SD&I capabilities can be developed and customized to meet the implementation requirements. You should

contact your support sales representative colleague to assist in scoping and pricing the project.

Effective February 1, 1994, quota and commission were extended to SD&I services (PL6L) that are sold on a custom quote basis. Quota and commission will be awarded for qualified leads in which the net order is worth a minimum of \$50,000 excluding maintenance contracts, equipment sales, and pass-through product procurement sales.

Site Design and Implementation Capabilities

SD&I capabilities fall within two major areas, Site Infrastructure Implementation and Network Implementation.

Site Infrastructure Implementation

- Cabling
- Computing environment preparation

Network Implementation

- Staging and distribution
- On-site installation and network configuration
- Relocation

Benefits

- Increased computing environment effectiveness
- Access to technical and project management expertise
- Reduced implementation risk
- Focus of in-house resources on the core computing function

Cabling

HP's cabling capability helps design and build network cable systems. With this capability, HP provides single-vendor responsibility for the design and implementation of the cable infrastructure. The cabling capability can provide an entirely new cable system or expand or modify an existing network. This service is scaled to fit a customer's network environment and size.

Features

- Expert cabling design
- Quality cabling installation
- Comprehensive cabling documentation
- Complete activity coordination
- Media verification and certification
- Cable tracking and management systems and services (subject to local availability)

Benefits

- Built-in modularity that satisfies current and future requirements
- Documentation for ongoing support
- Simplified implementation
- Verified cabling functionality

Computing Environment Preparation

HP offers site planning bundled into select systems. HP conducts on-site surveys and provides a set of general recommendations that the customer should implement before HP installs the new system.

With computing environment preparation, HP can go beyond this set of recommendations and offer requirements analysis, design, and implementation services. A customer can request a two-stage process in a computing environment preparation project:

- Design stage—Includes the requirements analysis, proposed alternatives, and recommended design. The design phase is a chargeable service composed of HP labor. The deliverable might be a request for proposal (RFP) to obtain bids for the implementation stage.
- Implementation stage—Includes implementing the design. The following list includes the computing environment areas and possible deliverables available as part of HP computing environment services:
 - Mechanical
 - Power quality
 - Electromagnetic
 - Site design
 - Room security
 - Computer room security

Staging and Distribution

HP's staging and distribution capability provides customers with installation-ready multivendor PCs, workstations, laptops, portables, and peripherals.

Features

- Inventory management
- Reporting
- Program coordination
- Hardware and software integration
- Packaging

- Shipping
- Database management (optional)

Benefits

- Ensured inventory integrity
- Ensured process controls
- Single point of contact
- Increased productivity
- Enhanced system usability
- Improved overall project coordination
- Complement to customer's tracking activities

On-site Installation and Network Configuration

HP can coordinate the installation, configuration, and testing of systems, devices, and networks.

HP brings a new system or network on-line or adds new connections to an existing network, scaling the solution to fit the customer's system and network requirements.

Features

- Single-vendor coordination of on-site implementation activities
- System installation and configuration
- Network configuration
- Verification
- Documentation

Benefits

- Timely and coordinated implementation
- Quality installation and configuration of systems and networking components
- Verified system and network operation
- Assured ongoing supportability

Relocation

HP can provide full management of equipment relocation at a known, fixed cost. HP coordinates the activities and the necessary resources and assumes all equipment-related responsibilities and risks.

Features

- Single-vendor coordination of all activities related to the equipment relocation
- Complete site survey of new location
- Professional equipment handling
- Damage and loss insurance on relocated equipment

Benefits

- Minimize the impact of the relocation on the customer's organization
- Ensure an effective operating environment for equipment
- Protect investment through proper equipment handling
- Minimize financial risk

Management and Support Operations Services

There are several HP Operations Services available to help customers manage systems and networks. These services complement traditional maintenance to provide on-going support solutions to customers in open system client/server computing environments.

As customers face increasing competition and pressure to downsize and increase service levels, they are interested in combining in-house and vendor resources to meet IT needs. HP's selective outsourcing approach is to encourage customers to target specific functions or technical areas for which the customer does not have staff or expertise to support. This way the customer retains control of their IT environment but at the same time can take advantage of HP's resource for on-going management. Sales representatives receive quota and commission for orders greater than \$50,000 per year.

Operations Services Capabilities

- Systems Management
- Network Management
- Business Recovery

Benefits

- Access to technical expertise
- Reduced operating costs
- Focus of in-house resources toward meeting business objectives
- Flexibility in staffing

In addition to these capabilities, outsourcing deals frequently include consulting, education, help desk, and implementation services.

HP Systems Management

HP Systems Management services provide full or partial administration and management of the customer's computing environment. The services are designed to fit within the customers' environments and meet business needs. HP delivers the services with remote and/or on-site assistance. HP Systems Management is for customers that run multivendor, client/server systems and for customers that run centralized HP multiuser systems.

Features

- Configuration management
- Performance management
- Application management
- Fault management
- Operations management
- Storage management
- Accounting management
- Security management
- Print management

Benefits

- Improved service levels based on customer's business requirements
- Increased user productivity
- Increased system availability
- Cost reduction

Network Management

HP Network Management services provide customers with multivendor service for every phase of the network life cycle. These services are delivered remotely using HP and third party tools. HP can effectively monitor and operate customers' networks twenty-four hours per day, seven days per week whether located on a single site or distributed over diverse geography. HP can manage TCP/IP internets, X.25 networks, and many others.

Features

- Fault management
- Coordination of multivendor interfaces
- Implementation and change management
- Network documentation maintenance
- Status and performance reporting
- Real-time monitoring

Benefits

- Increased network availability
- Simplified service interfaces
- Minimized disruptions due to change
- Enhanced supportability

HP Backup

Disasters will happen, but customers can take steps to minimize the disruption. HP can typically provide a hardware backup recovery solution that no other single vendor can match. The availability of HP Backup on specific equipment, the delivery method, and the specifications of the Backup service will vary by country. It is important that you check with your local SSO to determine if Backup can be delivered on your customer's configuration. The equipment on which Backup is offered may include HP 9000 Series 800 and HP

3000 Series 900 multiuser systems and HP 9000 Series 700 workstations and associated peripherals.

Features

- Immediate access to fully-equipped computing resources
- Access to systems and personnel
- Access to private and public x.25 networks (check for local availability)
- Extensive HP resources available during a disaster
- Disaster site restoration assistance
- Training and rehearsal resources

Benefits

- Cost-effective and flexible recovery solutions for critical applications
- Backup of computers and data communications equipment
- One call to HP ensures initiation of the service
- Downtime minimized; expedited priority equipment delivery
- Technical expertise from HP's worldwide support organization
- Test, review, and audit recovery plans to verify effectiveness

The delivery method will vary by country and is often driven by geography.

Section 12. Database and System Software

HP ALLBASE/SQL and HP IMAGE/SQL Configuration Guidelines

HP IMAGE/SQL and ALLBASE/SQL are HP's databases for the HP 3000 providing

- Superior price/performance
- High quality
- Single vendor sale and support
- Leading third-party tools and applications
- Interoperability with third-party databases
- Preloaded bundle on HP 3000 that offers savings of 40% or greater

HP IMAGE/SQL

Product Description

HP IMAGE/SQL is a high-performance database management system for online transaction processing applications and batch jobs on HP 3000 Series 900 computers. In addition, it offers a full read/write SQL interface for client/server decision support, executive information systems and graphical user interface (GUI) application development.

IMAGE data can be accessed and manipulated using standard SQL protocols without data conversions. IMAGE/SQL supports a wide selection of client/server tools for decision support, executive information systems and application development.

Existing IMAGE applications can operate concurrently with applications using the SQL interface. There are no changes required to existing applications.

Figure 12.1 Interoperability between HP 3000s and HP 9000s with HP Databases for HP ALLBASE/SQL and HP IMAGE/SQL

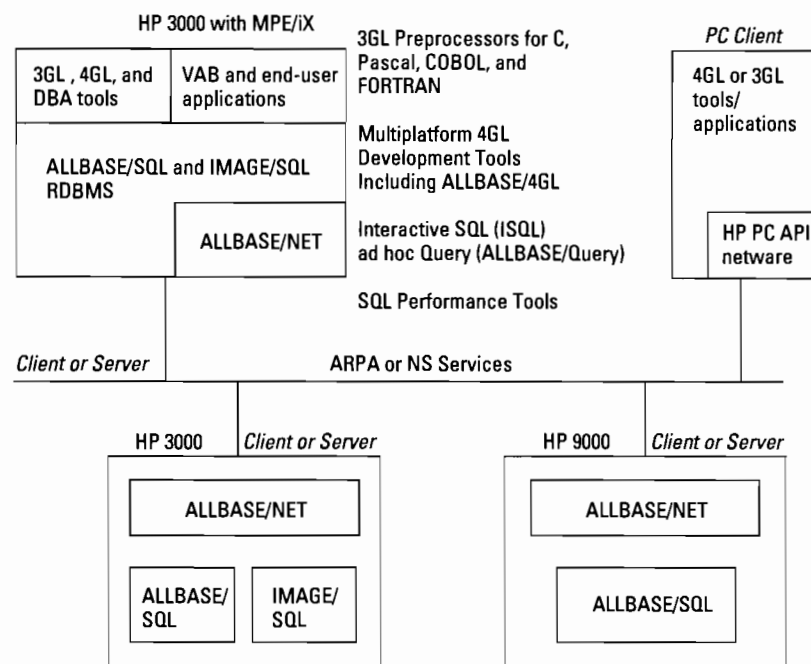


Table 12.1 IMAGE/SQL Documentation

Product	Product Number
Getting Started with IMAGE/SQL	36385-90008
HP IMAGE/SQL Administrator's Guide	36385-90001
TurboIMAGE/iX DBMS Reference Manual	30391-90001
ISQL Reference Manual for ALLBASE/SQL and IMAGE/SQL	36216-90096
ALLBASE/NET User's Guide	36216-90031
HP PC API User's Guide	36216-90104

- IMAGE/SQL includes:
- IMAGE intrinsics and database engine
 - ALLBASE/NET
 - HP PC API
 - IMAGE/SQL administrative utilities

- Interactive Structured Query Language (ISQL)
- SQL Preprocessors for COBOL, C, and Pascal

HP ALLBASE/SQL

Product Description

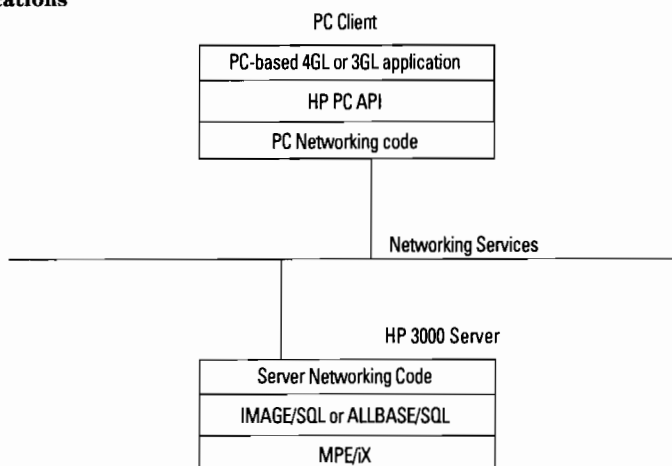
ALLBASE/SQL is Hewlett-Packard's high-performance relational database management system (RDBMS) for all MPE/iX and HP-UX systems. Key benefits include:

- Excellent OLTP performance for mission-critical applications on HP servers
- Leading features such as stored procedures, rules and triggers, row-level locking, database shadowing, Microsoft ODBC API, and built-in referential integrity
- Costs anywhere from 50–80% less than third-party alternatives.
- Only RDBMS on HP-UX offering full read/write between SQL and IMAGE databases

The ALLBASE/NET client/server remote database access product is bundled with IMAGE/SQL and ALLBASE/SQL on the Series 900 and is backward-compatible for client systems running earlier versions of MPE. Read/write access from an HP-UX system to IMAGE/SQL data on a target MPE/iX system is provided by using IMAGE/SQL.

ALLBASE/SQL and IMAGE/SQL for MPE/iX provide 3GL pre-processors for using embedded SQL in C, Pascal, and COBOL

Figure 12.2 Client-Server Architecture for IMAGE/SQL and ALLBASE/SQL Applications



applications. They support more than 20 third-party multiplatform 4GL development tools. Minimum system requirements are 4 Mbytes RAM and 20 Mbytes disk space.

HP PC API

HP PC API is a software product that provides a programmatic interface from PC-based applications to IMAGE/SQL and ALLBASE/SQL databases on an HP 3000 Series 900 server OR to ALLBASE on an HP 9000 Series 700 workstation or 800 server. It includes both Gupta and Microsoft (ODBC) APIs and comes bundled at no extra cost. The applications and development tools reside on the client MS Windows environment while the DBMS is on the server. This allows application developers and end-users to exploit the graphical

capabilities and extra processing power of the PC and at the same time, rely on the security, integrity and DBMS capabilities of ALLBASE/SQL (HP 3000 or HP 9000) and IMAGE/SQL on the HP 3000.

Required Hardware

Client PC

- 386, 486 IBM-compatible PC, including Windows Client
- LAN card
- Mouse for Microsoft Windows
- 4 MB minimum memory (8 MB recommended)
- 2 MB disk for Gupta API and/or 500 KB for ODBC API (PC API, more needed for Windows, 4GL, networking)

Server (HP 3000)

- HP 3000 Series 900

Required/Optional Software

PC Client

- MS-DOS 5.0 or later (required)
- Microsoft Windows 3.1 (required)
- 4GL environment or 3GL application PLUS any of the listed networking products (required)
 - PC ARPA+ NS 2.1 for MS-DOS, Microsoft LAN Manager
 - NS 2.1/MS-DOS
 - Novell LAN Workplace for DOS 4.1
 - NetManage Chameleon
 - FTP PC TCP/IP
- For ODBC application development must order Microsoft developer network level 2 product from Microsoft
 - NetWare 3.11
 - Walker Richer Quinn

Server (HP 3000)

- MPE 5.0 or higher
- ALLBASE/SQL (G.0)
- IMAGE/SQL (G.0)

Some 4GLs/Decision Support Tools for ALLBASE/SQL and IMAGE/SQL*

- PowerSoft PowerBuilder
- PowerSoft PowerMaker
- PowerSoft PowerViewer
- Gupta Express Windows
- Gupta SQL Windows
- Gupta SQL Talk/Windows
- Gupta ReportWindows
- Gupta Quest
- Cognos Impromptu
- Cognos PowerHouse 4GL
- Lotus 1-2-3 v 4.01
- Microsoft Excel v 5.0
- Microsoft Visual Basic
- Microsoft Access
- Speedware 4GL
- HP Information Access
- HP ALLBASE 4GL and Query
- ASK/Ingres 4GL

- IBI Focus 4GL
- Progress 4GL
- Uniface 4GL
- Trinzic Forest and Trees
- Q+E ODBCpack
- Q+E Database Editor

Third Party Contacts

- Gupta Technologies Inc.
1-800-876-3267
- PowerSoft Corporation
1-800-395-3525
- Trinzic
603-427-0444
- Q+E Software
1-800-876-3101

- Cognos, Inc.
1-800-426-4667
- Microsoft
1-800-227-4679
- Information Builders, Inc. (IBI)
1-800-969-INFO
- ASK/Ingres
1-800-446-4737
- Uniface
1-510-748-6145
- Progress
1-800-477-6473
- Speedware
1-800-447-0745
- Lotus
1-800-386-8600

Table 12.2 Software Matrix for ALLBASE/SQL for the HP 3000 Series 900

Description	Product No./Option No.
HP ALLBASE/SQL RDBMS V. G.0 for Series 900 Significant price savings when purchased as part of Series 900 systems/software bundle.	30368B
For use by 1–8 concurrent users	Opt. UA3
For use by 1–20 users	Opt. 0AF
For use by 1–32 users	Opt. UA7
For use by 1–40 users	Opt. UCV
For use by 1–64 users	Opt. UA9
For use by 1–100 users	Opt. UBD
For use by 1–128 users	Opt. UAB
For use by 1–160 users	Opt. UCN
For use by 1–256 users	Opt. UAD
For use by 1–384 users	Opt. UDW
For use by unlimited users	Opt. UAT
Credit for 8–user license add-on license when upgrading	Opt. UB3
Credit for 20–user license add-on license when upgrading	Opt. UD8
Credit for 32–user license add-on license when upgrading	Opt. UB7
Credit for 40–user license add-on license when upgrading	Opt. UCZ
Credit for 64–user license add-on license when upgrading	Opt. UB9
Credit for 100–user license add-on license when upgrading	Opt. UD9
Credit for 128–user license add-on license when upgrading	Opt. UBA
Credit for 160–user license add-on license when upgrading	Opt. UDV
Credit for 256–user license add-on license when upgrading	Opt. UBV
Credit for 384–user license add-on license when upgrading	Opt. UDX

*Some of these tools *do not* require HP PC API. Check with tool vendor for specifics.

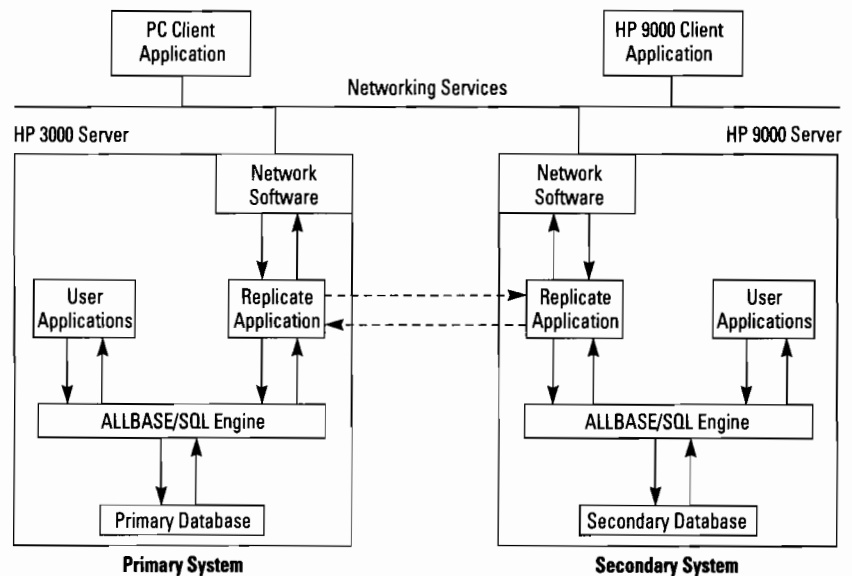
ALLBASE/REPLICATE Configuration Guidelines

ALLBASE/REPLICATE is a product that allows ALLBASE users to maintain shadow copies of ALLBASE databases (or subsets of databases). The REPLICATE mechanism allows shadow copies to stay synchronized with any updates to the primary copy of the data. In the simplest case, a **replicated** environment may consist of a primary database with one or more shadow or secondary databases. The REPLICATE mechanism allows a shadow (or secondary) database to extract relevant update operations from the primary database and then apply them to itself.

Key Benefits

- **Disaster Recovery.** If a primary environment becomes unavailable for some reason, user applications may switch to one or more secondary environments.
- **Performance.** Since secondary environments are available AND may be kept up-to-date, user applications that are read-only may be offloaded to one or more secondary sites for decision support thereby freeing the primary environment for OLTP.
- **Data Warehousing.** A single database (at one site) can contain replicated data from multiple databases on the network for data warehousing and global decision support.

Figure 12.3 Architecture of ALLBASE/REPLICATE



- **Remote, unattended backup operations.** This product is a great fit for environments that desire to be operatorless and/or do not have a local backup device. The REPLICATE mechanism may serve as an online or offline remote backup mechanism.
- **Heterogeneous Operations.** ALLBASE/REPLICATE also allows for replication between HP 3000 and HP 9000 (Series 700 or 800) ALLBASE environments.

Architecture of ALLBASE/REPLICATE

- The REPLICATE engine
- The REPLICATE application

Please refer to the architecture diagram in **Figure 12.3**. The REPLICATE application has two components: one running on the primary and one on the secondary.

The REPLICATE Application

The ALLBASE/REPLICATE product comes with a REPLICATE application. Users should note that they can create a REPLICATE application in one of the following ways:

- Users may directly use the REPLICATE application or custom-build it to suit their requirements (source code is made available on the product tape)
- Users may write their own REPLICATE application. A **REPLICATE API** is on the product tape

Table 12.3 Product Matrix for ALLBASE/REPLICATE V.G.0

Product Number	Option	Description
B2494B		ALLBASE/REPLICATE for HP 3000 Series 900
	AA1	1/2-inch magnetic tape (1600 bpi)
	AAH	Digital Audio Tape
	AAU	CD-ROM (Release 8.02 and 9.0 only)
	AA4	QIC media

Hardware/Software and Networking Requirements

- HP 3000 Series 900 system
- ALLBASE/SQL G.0 or greater
- Minimum 20 Mbytes of disk space required
- NS software
- ALLBASE/REPLICATE G.0 or greater

Table 12.4 ALLBASE Documentation

	CO#	MFG#
MPE/iX		
ALLBASE/SQL Reference Manual	36216-90001	36216-90094
ISQL Reference Manual for ALLBASE/SQL and IMAGE/SQL	36216-90096	36216-90095
ALLBASE/SQL Database Administration Guide	36216-90005	36216-90097
ALLBASE/SQL Message Manual	36216-90009	36216-90098
ALLBASE/NET User's Guide	36216-90031	36216-90101
ALLBASE/SQL Advanced Application Programming Guide for MPE/iX	36216-90100	36216-90099
ALLBASE/SQL C Application Programming Guide	36216-90023	36216-90080
ALLBASE/SQL FORTRAN Application Programming Guide	36216-90030	36216-90079
ALLBASE/SQL COBOL Application Programming Guide	36216-90006	36216-90081
ALLBASE Pascal Application Programming Guide	36216-90007	36216-90082
HP ALLBASE PC API User's Guide for ALLBASE/SQL and IMAGE/SQL	36216-90104	36216-90105
ALLBASE/SQL Performance & Monitoring Guideline	36216-90102	36216-90103
HP-UX and MPE		
Up and Running with ALLBASE/SQL	36389-90011	

For more information please call your local HP Sales Response Center.

Mirrored Disk/iX

Product Overview

Mirrored Disk/iX (30349A) eliminates application downtime from disk failure and dramatically increases application uptime by virtually eliminating downtime during data backup.

Hardware Configuration

Mirrored Disk/iX can be configured on all HP 3000s that run MPE/iX and requires disk drives equipped with either fiber optic links, or SCSI interfaces. To mirror disks, you must mirror them with drives that have the same model number as the drive being mirrored. This ensures that the capacity of the two disks is equal.

SCSI disk mirroring is supported with MPE/iX release 4.0 and later. A string of SCSI drives must be mirrored by a string of SCSI drives (again the rule that you have to mirror with identical model numbers). Fast/Wide SCSI supported with MPE/iX Release 5.0, supported in September 1994. However, you can mix SCSI and HP-FL drives on one system by configuring a string of SCSI drives to mirror a string of SCSI drives, and a string of HP-FL drives to mirror a string of HP-FL. In other

words, you can have both SCSI and HP-FL on one system, but the SCSI drives cannot mirror the HP-FL drives and vice versa.

Each string of drives should be allocated its own dedicated SCSI or HP-FL interface card in order to maximize data protection. Mirroring the internal drive on a Series 9x7/xx system is not supported because the SCSI interface supporting that drive is also supporting the DDS device.

AutoRestart/iX

Product Overview

AutoRestart/iX is a software product that performs automatic system restart in the event of a soft failure. System recovery time is minimized and system state information is automatically saved for later analysis.

Hardware Configuration

AutoRestart/iX is supported on all HP 3000s that run the MPE/iX operating system (release 2.1 or later).

When a soft failure occurs, AutoRestart/iX automatically saves the system state information to disk (or tape) prior to restarting the system. You can preallocate

disk space so you're assured of sufficient space to save the system state. So the question of how much added disk to configure on the system to accommodate this potential need sometimes arises. The following is a guideline for this purpose:

1. Assuming that each user on the system will generate 3 processes, estimate the typical or maximum number of users and jobs and multiply by three. This gives you a number of active processes.

2. If the number of active processes is between 3-200, multiply that number by 1.5 MB disk. If the number is 200 or above, multiply it by 1.0 MB disk.

3. Now add in the amount of main memory.

4. Now add in 96 MB of "fudge factor."

5. Multiply this total number by .4

This resulting number is the amount of disk space you should allocate to receive the dump containing the system state. This is a general guideline.

SPU Switchover/iX

Product Overview

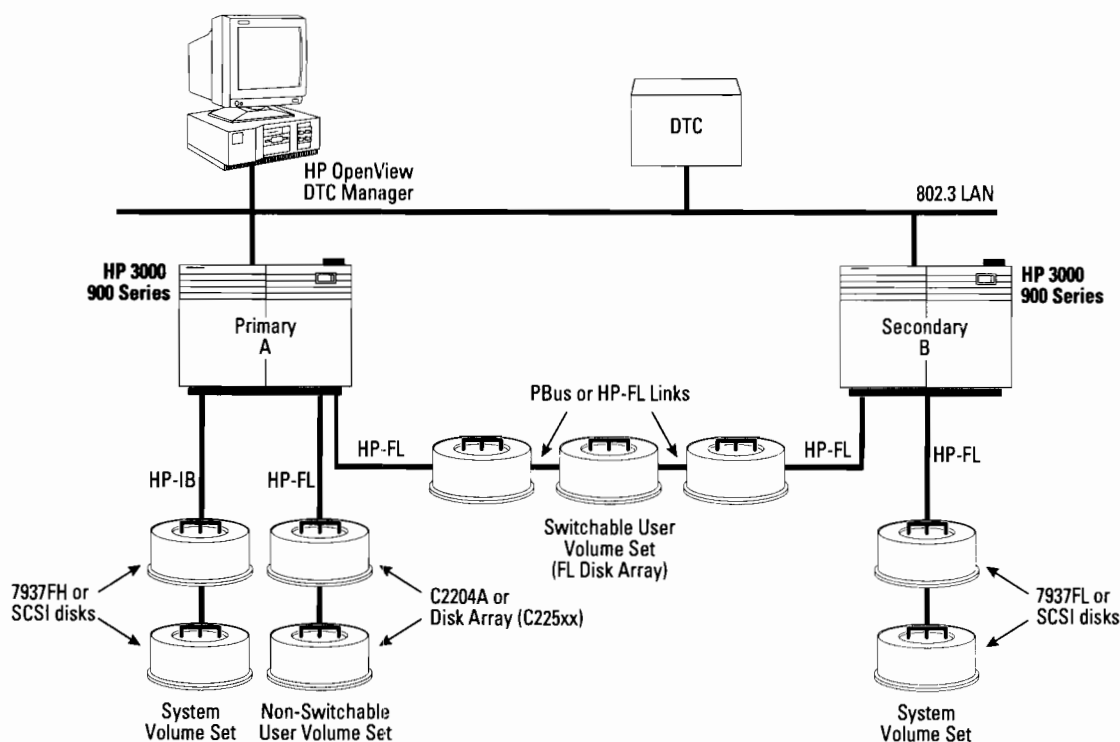
SPU Switchover/iX (36378A) automatically detects system failures and allows the system operator to initiate switchover between a pair of processors. A key part of the switchover process is the full recovery of user data (including flat files, TurboIMAGE, ALLBASE/SQL and third party databases). In typical situations, this switchover can be accomplished in less than 30 minutes. In this manner, the product enables customers to avoid down time due to scheduled system maintenance or hardware failures.

Hardware Configuration

SPU Switchover/iX is configured to run on a pair of HP 3000 Series 9xx processors. Any combination of Series 9xx processors can be used. When configuring a switchover pair, special consideration must be given to balancing the processing load between the two systems. In a switchover configuration, applications can be running on both the primary and secondary systems. After switchover, applications on the primary are switched over onto the secondary. In this situation, the increased workload on the secondary system can result in degraded system performance.

Hardware configuration for SPU Switchover/iX is shown in **Figure 12.4**. In the configuration shown one processor (shown here as system "A") is designated as the primary and the other (system "B") is designated as the secondary. Both machines must have system volume sets. In a switchover configuration, there must be at least one user volume set which is connected to both the primary and secondary systems. In addition, either system can have non-switchable user volume sets. Note that for the purpose of determining maximum disk configurations, drives in switchable user volume sets must be considered as belonging to both the primary and secondary systems.

Figure 12.4



An additional restriction is that all the disk drives in the chain connected between the two systems must be configured as members of a switchable volume set. In the example shown (**Figure 12.5**), all three disk drives must be part of a switchable set. Because of this restriction, disk drives in switchable user volume set(s) must be connected to separate HP-FL adapter cards. Disk drives for switchable and non-switchable user volume sets cannot be connected to the same HP-FL adapter card.

The use of the HP OpenView DTC Manager product (D2355A) is required in the hardware configuration. The OpenView DTC Manager facilitates the reestablishment of terminal and serial printer connections from the primary to the secondary system after switchover.

In a switchover configuration, only the switchable user volume set(s) can be switched between systems. Disk drives in the switchable volume set(s) must contain all the critical user data and applications that are intended to be switched between the two systems. It is not possible to switch data contained in system volumes or non-switchable user volumes between the two systems.

System volume disk drives for each processor can be connected via HP-IB, HP-FL, or SCSI disk drives. Non-switchable user

volume sets (those that are local to a single system) can be connected via either HP-IB or HP-FL. As noted above, disk drives in switchable user volume sets must be connected via HP-FL.

NOTE: SCSI disk drives are not currently supported as the switchable user volume set.

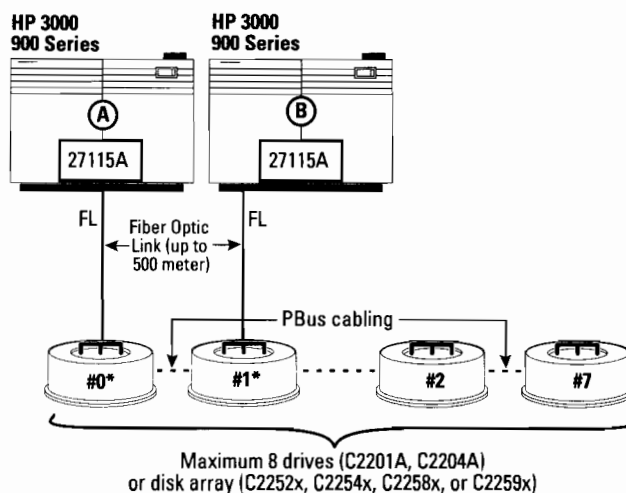
All switchable volume sets must consist of at least one chain made up of 2-8 fiber optic based disk drives (refer to **Table 8.31** for a list of supported disk drives). Disk drives in a chain need not all be of the same type. Both ends of the chain for a switchable volume set must be connected via a fiber optic link to a HP-FL device adapter card in the primary and secondary systems. Disk drives that are not at the ends of a chain can be connected by P-bus or HP-FL links.

NOTE: Care must be taken when ordering C220x drives for a switchover configuration. C220x drives can be ordered from FRD with option 1BG which deletes fiber optic circuitry. SCSI drives are currently not supported. Drives ordered with this option cannot be field upgradable to the fiber optic interface.

Software Configuration

Only one software license is needed for SPU Switchover/iX to run on a pair of HP 3000 900 Series systems. The SPU Switchover product requires MPE/iX 3.0 or a subsequent release. Note that both processors in a pair must have the same operating system software release revision. Additional information on software setup and configuration is provided in the SPU Switchover/iX User's Guide (36378-90001).

Figure 12.5 Illustration of Switchable User Volume Set



*Must have fiber optic interface

SharePlex/iX

SharePlex/iX (B3482A) is a multisystem wide-area clustering approach that will work with older MPE/V, as well as MPE/iX HP 3000 systems. SharePlex/iX has the following features:

- 1) single-system administration and network management via OpenView;
- 2) data shadowing (ALLBASE/SQL and IMAGE/SQL databases, flat files, KSAM, etc.) for remote-site disaster recovery;
- 3) network scalability to 124

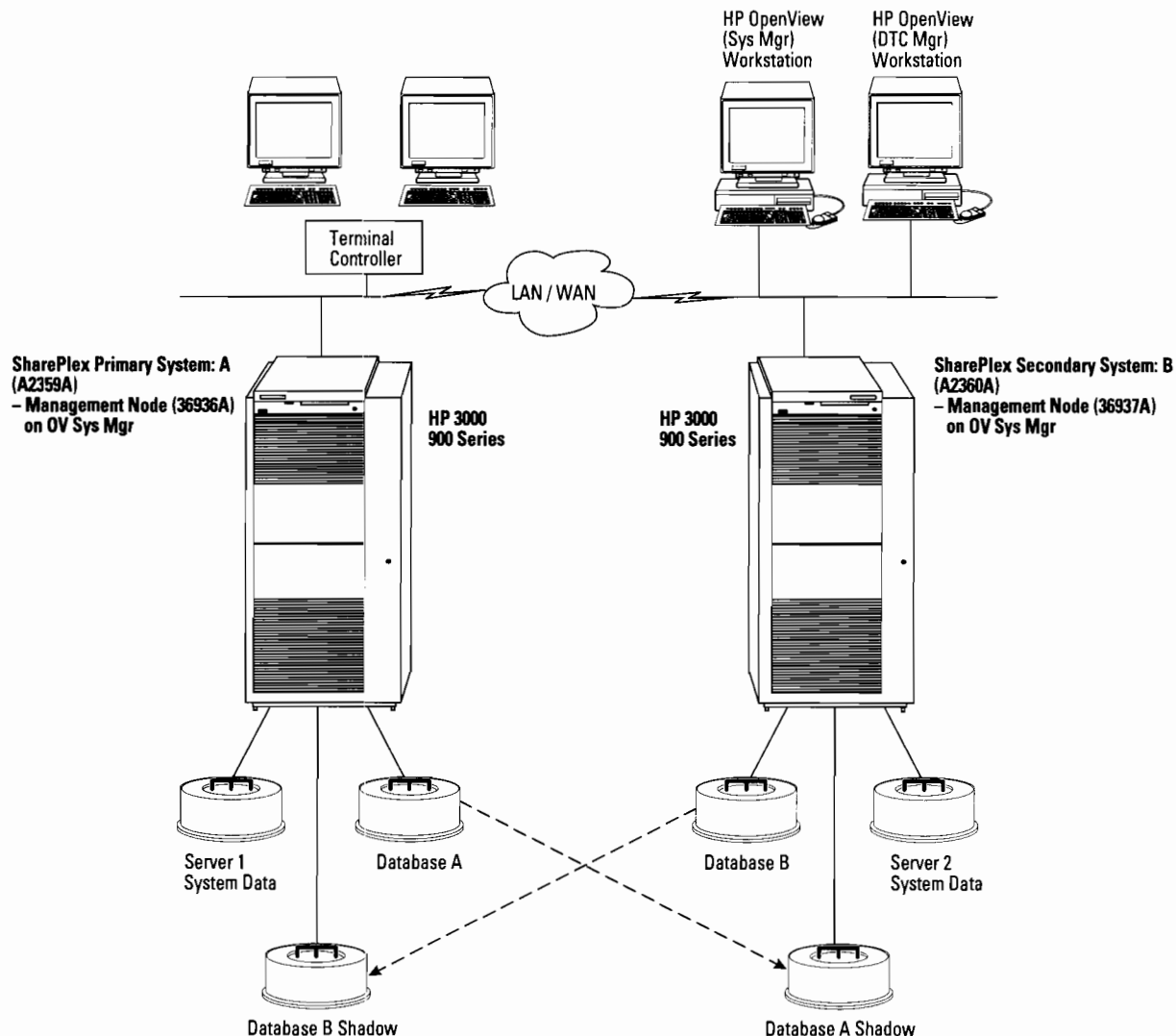
nodes; 4) shared/clustered applications across the network featuring a central file system for distributed systems; and 5) shared remote resources for peripherals such as print queues and batch submissions. Enhanced OpenView System Manager is also available. It now picks up where OpenView Node Manager leaves off and provides the framework for an integrated approach to systems and network management including HP management applications and a facility for third-party

applications. SharePlex/iX is also compatible with HP OpenView OperationsCenter.

Key components in SharePlex/iX solution include:

- Netbase node coupling software from QUEST, which provides network file access, print spooling, shadowing to replicate data or application across a LAN or WAN and AutoRPM for transparent execution of networked applications, and statistics.

Figure 12.6 SharePlex Solution



- OpenView System Manager provides cluster-wide monitoring from a single point.
- OpenView Distributed Terminal Controller provides central management and switchover capabilities of all terminal controllers.

In **Figure 12.6**, you can see an example of the SharePlex solution using both the OpenView System Manager and DTC Manager to control the cluster. The OpenView System Manager can control up to 64 HP 3000s or Management Nodes on the network.

HP OpenView Network Management is an important option to SharePlex/iX because of its ability to identify system faults down to a functional block (such as a file system) on a specific node of the cluster. From a single location in the cluster, OpenView can monitor each of the nodes.

SharePlex/iX will address the following user requirements:

1) an additional system to balance transaction-processing capacity limits as well as for backup and program-development flexibility with common systems management framework; 2) increased high availability for HP databases (ALLBASE, TurboImage, KSAM and flat files) and HP System hardware components; 3) a disaster-tolerant solution.

HP 3000 SharePlex/iX is an umbrella architecture for a number of integrated products. The key technologies are OpenView System Manager, which provides central management and control of the cluster, and Netbase, a set of software products providing loose coupling of multiple HP 3000s.

OpenView System Manager is a Windows-based PC workstation product that works in conjunction with the HP 3000, providing an easy-to-use graphical user interface. The workstation can graphically show all the clustered systems on a single screen, allowing every node in the cluster to be viewed by one operator. The workstation can also be divided (up to 10 workstations) so that particular tasks like tape management, I/O control, etc. can be automatically directed to a given workstation. These workstations also have full console control over any system in the cluster, so an operatorless environment is possible for remote nodes.

Netbase is the second key technology in SharePlex. Networking products (local or wide areas) physically connect the nodes within the cluster, and Netbase can be considered the "glue" that logically couples the nodes together. It is a software product that resides between the applications and the operating system on each HP 3000 node. This software intercepts application requests on

the operating system and decides which node within the cluster owns the resource. Various caching and prefetching techniques are used to greatly improve remote access performance.

Netbase has four fundamental components:

- Network File Access (NFA)—a central file system to provide file and database access transparent to users and applications.
- Shadowing, which allows local or wide area network replication of data structures, programs, JCL, etc.
- NBSpool Plus, a master print manager and router to give users and applications seamless access to any printer in the cluster.
- AutoRPM, which gives end users transparent access and execution capabilities to any program or application in the cluster.

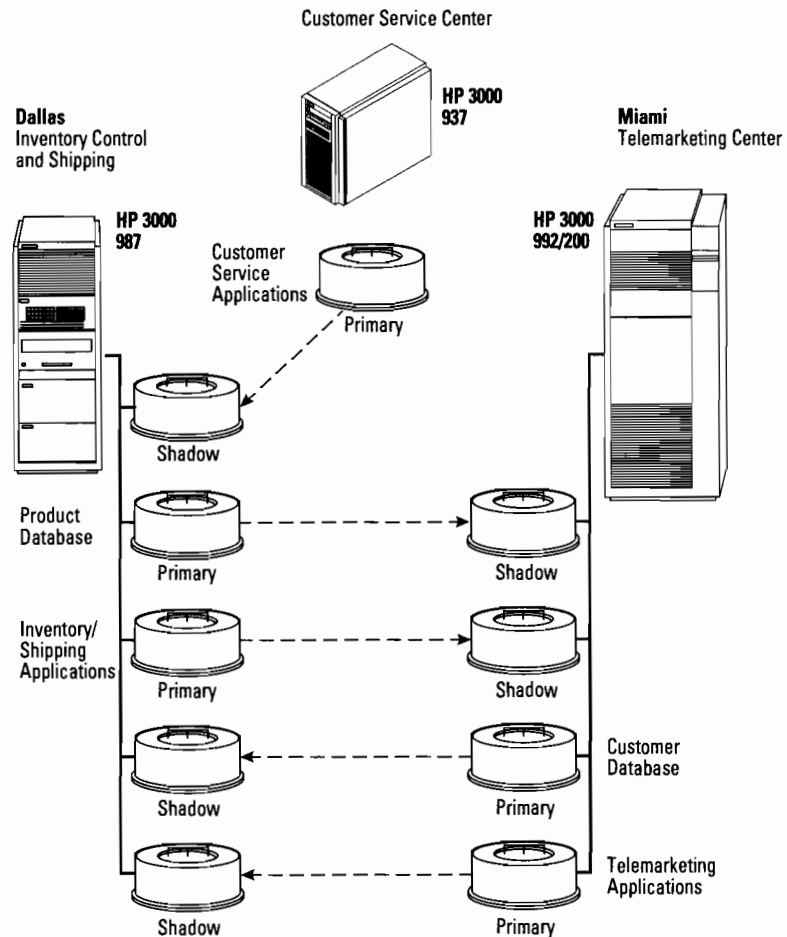
SharePlex also leverages the strengths of other HP 3000 software and related products. For example, ALLBASE/SQL's features—dynamic log switching, online backup, online database restructuring, etc.—contribute to overall data availability. Products such as OpenView DTC manager allow single workstation management of all the Distributed Terminal Controllers.

• **SharePlex Disaster User**

License—When SharePlex is installed, the HP Support Team will ensure that in the event of a disaster on the Primary System, the Secondary System will already have the System User License for both systems. For example, if the Primary System had an Unlimited User License and the Secondary System had a 120 User License, in the event of a disaster on the Primary System the Secondary System would be set up to support Unlimited Users.

In **Figure 12.7**, you can see an example of how a typical telephone-based mail-order business uses the SharePlex solution. The 992/200 in Miami is the Telemarketing Center which shadows both the customer database and the telemarketing application environment onto the Shipping and Inventory Control Facility in Dallas with a 987. Likewise, the 987 in Dallas shadows the product/inventory database and the complete shipping/inventory application environment to Miami. By splitting up the application this way and utilizing the SharePlex configuration, the order throughput of the Telemarketing has exclusive use of the 992/200 so telephone orders are completed quickly. The Query/Quiz reports are offloaded to the 987 node in Dallas.

Figure 12.7 One of many ways to divide up the application environment for load balancing and redundancy. Customer service center and applications environment example.



HP OpenView System Manager

Product Description

HP OpenView System Manager allows operators to monitor and control multiple networked HP 3000s from a central console. As networks of systems grow increasingly large and complex, the number of technical people needed to manage those systems also grows. In order to control costs and simplify operations, businesses are making efforts to centralize management of their networked systems. By consolidating operations control and expertise, HP OpenView System Manager allows businesses to increase operator efficiency while reducing operations cost.

Managing systems in both local and wide area networks, HP OpenView System Manager consists of two main components: HP OpenView console, the central controlling node, and Managed (or Remote) Nodes, which are controlled by HP OpenView console. HP OpenView System Manager is part of the HP OpenView family of network and systems management products.

Features and Benefits

Graphical User Interface

Allows operators to monitor all of their networked HP 3000s at a glance through an intuitive graphical network map on the HP OpenView console. Systems on the network map change color to reflect their current status. Easy to learn and use, the HP OpenView Windows user interface significantly reduces operator training time.

Immediate System Status Notification

Provides faster fault detection by notifying operators of the status of all networked HP 3000s via a central HP OpenView Windows graphical network map.

Management by Exception

Increases operators' efficiency by freeing them from monitoring every system console message. Instead, operators are notified only of the problems they are truly interested in via the HP OpenView Windows network map. Operations departments define which problems to track, eliminating unnecessary notification.

Automated Responses

MPE commands or command files (scripts) can automatically respond to events, which reduces the amount of events that require operator attention. This further increases the productivity of the operations staff, making the systems more "self-healing and self-managing." This feature is very flexible.

Operators can decide whether or not they want the events that took care of themselves with automated responses to show up in the event log. They can choose to see everything that went on, even if they did not have to intervene, or they can choose to simply see the events that required operator help.

Centralized System Console Control

Provides system control including shutdown and restart of all managed HP 3000s from a central console. Increases system uptime by providing faster problem resolution. Improves level of operations service by making centralized systems management expertise available to all systems. Reduces operator cost by minimizing technical expertise required at distributed sites.

Centralized Application Monitoring and Control

Expands fault detection/resolution capabilities by allowing operators to centrally monitor and control HP-supplied, user-written, or third-party applications.

Task-based Filtering of Events

Enables customers to categorize messages based on groups represented by predefined icons on the screen. Customers can view all the disk-related events under the disk icon, all the printer-related events under the printer icon, etc. The icons can be put on one central console, or they can be distributed across a maximum

of five different consoles. Icons and events can be viewed as they relate to each system, or viewed at a higher overall network level.

Partnership with Existing Applications

Allows operators to capitalize on the expertise of other systems management applications such as job scheduling and disk space utilization applications. HP OpenView System Manager can consolidate the status and centralize control of these applications on HP OpenView console.

Application Monitoring and Control

HP OpenView System Manager also allows operators to monitor and control HP-supplied, user-written, and third-party applications. Applications generate a status and send that status to HP OpenView console's graphical network map.

Link to Other Applications

MPE/iX contains a message catalog that many applications use to generate their messages. It contains in the neighborhood of 10,000 different messages. A subset of 500–1,000 of these messages that are especially relevant to system managers has been identified and adjusted so that as they occur, they will automatically show up as an event to OpenView console. This feature minimizes the amount of time needed to install and use the product.

Functional Description

HP OpenView System Manager gives operators the choice of monitoring their networked HP 3000s at several different levels of detail. When monitoring their systems, operators have the ability to go from a high level overview of system status to a detailed description of each system incident. If necessary, operators can then take corrective action on one or more managed nodes all from a central HP OpenView console. HP OpenView System Manager consolidates operations of networked HP 3000s by providing the following functionality:

Continuous System Status Notification

The HP OpenView Workstation displays a graphical network map which allows operators to check the status of all of their HP 3000s at a glance. Each system on the map changes color to reflect its current status. Operators can monitor the status of operating systems, all subsystems, job streams, and applications.

Console Message Review

For more detailed information, HP OpenView System Manager allows operators to see a summary of outstanding system events as well as their associated console messages. At the first level of detail, HP OpenView System Manager summarizes how many events of a particular severity occurred on each system. For further details, operators may

selectively review actual console messages either by system or by event severity.

Trouble Tracking

For trouble tracking purposes, HP OpenView System Manager provides a message annotation feature. After reviewing an event message, the message annotation feature allows operators to append the message with a note describing any additional information about that message. This feature is particularly useful for multi-shift operations where it is often difficult to track problems during shift changes.

Console Control

Once a problem has been detected that requires action, HP OpenView System Manager provides operators with full console access to one or more of their distributed HP 3000s from a central console. Operators can execute any console command and receive console messages just as if they were sitting in front of the local system console.

Console Message Logging and Reporting

For long-term problem detection, HP OpenView System Manager logs all console messages in a database residing on the controlling HP OpenView console node. Operations staff may generate customized reports from this log for selective trend analysis.

Configuration Description

HP OpenView System Manager is a distributed application which runs on up to five HP OpenView Workstations, an HP OpenView console (HP 3000, MPE/iX system), and one or more Managed Nodes (HP 3000, MPE/V, and iX systems). A single HP OpenView console supports up to 64 managed nodes and the product manages systems over any NS network. The main application resides on the HP OpenView console. The HP OpenView Workstation provides a user interface to the management node functionality and uses HP OpenView Windows, Microsoft Windows, AdvLink for Windows, and NS (Network Services) 2.1.

HP OpenView System Manager employs two connections between the HP OpenView console and each managed node. The primary connection is used for all status monitoring and control capabilities. The primary connection consists of an NS-X.25, NS-LAN, or NS-Point-to-Point network. The secondary connection is used as a safety feature for the rare occasions when the network or systems go down. When this happens, the secondary connection allows HP OpenView System

Manager to continue providing full console access. The secondary connection consists of either one of the following:

- An X.25 connection to the managed node's ldev 20 hardware console port via an X.25 PAD, or
- A back-to-back modem or DTC connection to the managed node's ldev 20 hardware console port over a LAN or Point-to-Point topology.

Product Requirements

The following hardware and software are required for HP OpenView System Manager (version numbers are current as of 2/1/93):

HP OpenView Workstation

- HP Vectra PC running Microsoft Windows 3.1 (must be bought outside HP)
- HP OpenView Windows 5.0, 6.0
- AdvLink for Windows A.03.12
- NS (Network Services) 2.1, 2.5

HP OpenView Windows Workstation (32054x)

- HP Vectra PC and all required pre-installed PC software
- option 202
- option 101, 102, or 103
- localization option

HP 3000 OpenView console (Management Node)

- HP 3000 Series 9xx
- MPE/iX operating system release 4.5 or later
- ThinLAN 3000/iX Link (36923A)
- NS3000/iX Network Services (36920A)

If using an X.25 secondary connection, the following is required:

- HP OpenView Windows Workstation dedicated for DTC Manager (32054B, option 201)
- DTC (2345A or 2340A) with DTC/X.25 Network Access card
- X.25 iX System Access (36939A)

PAD hardware:

- X.25 PAD (HP2334A or HP2335A recommended), or Model 45 switch (J2000A/J2001A)
- HP40261A PAD modem connect ports for HP2334A (each card provides 4 PAD ports)
- HP40262A PAD modem connect ports for HP2335A (each card provides 4 PAD ports)
- HP40230A cables (1 per managed HP 3000 with 3 pin direct connect port)
- HP13242G cables (1 per managed HP 3000 w/25 pin modem connect port)

NOTE: One PAD connection is required for each managed node console port which will be connected through the network to the management node. The HP2334A and HP2335A PADs can support up to 16 managed nodes provided they are in close enough proximity to one another that they can all be cabled to the same PAD.

If using a LAN or Point-to-Point secondary connection, the following is required:

- Hayes or Hayes compatible modem (assumes presence of an existing support modem on ldev 21), or
- DTCs, depending on configuration, and HP OpenView Windows Workstation dedicated for DTC Manager (32054C, option 201)

When the MANAGED NODE is an MPE V system:

- HP 3000 Micro family or Series 37-70.
- MPE V Operating System (U-MIT or later)

- NS X.25 3000/V Network Link (24405A) or ThinLAN 3000/V Link (30240A) or NS Point-to-Point Network Link (30284A, 30285A)
- NS3000/V Network Services (32344A)
- See "note" below

When the MANAGED NODE is an MPE/iX system:

- HP 3000 Series 9xx
- MPE/iX Operating System (Release 2.1 or later)
- DTC X.25 iX Network Link (2345A, 2346D/E/F/G, 2355A, 36939A) or ThinLAN 3000/iX Link (36923A) or NS Point-to-Point Network Link (36922A)
- NS3000/iX Network Services (36920A)

NOTE: The NMEvent API feature is supported on MPE V Operating System platform 1P or later, and on MPE/iX Operating System release 2.2 or later.

Ordering Information

New functionality requires MPE/iX Release 4.5.

Part Number	Description
HP 36936A ¹	HP OpenView console (HP Management Node and PC software. Must order one copy for EACH management node.)
	Select one processor option for each management node.
HP 36937A	Managed Node/iX software. Must order one copy for EACH MPE/iX managed node. Managed node software is not required for the 36936A HP OpenView console.
HP 36938A	Managed Node/V software. Must order one copy for each MPE/V managed node.

¹ PC software—One copy of the HP OpenView System Manager PC software is required for each HP OpenView workstation. One to five HP OpenView workstations may be run per management node. There are two ways to order the HP OpenView System Manager PC software: 1) order 36936A which includes HP OpenView System Manager Management Node and PC software. All other required PC software must be purchased separately, 2) order the HP OpenView Windows Workstation (32054B option 202 plus connect and localization options). This includes all required PC software pre-installed on an HP Vectra PC.

Applied Computerized Telephony (ACT)

ACT Products

An ACT installation requires one ACT Server and one ACT API for each application processor.

The ACT Call Processing Server is a pre-configured server bundle (hardware and software) that is customer installable. It is based on an HP-UX processor although the customer does not need to know HP-UX at all.

The ACT Server communicates with the APIs over a LAN connection, therefore you will need to insure that the HP 3000 and/or HP 9000 has a LAN link connection. Because ACT utilizes standard TCP/IP sockets/NETIPC upper level networking services are not required.

The ACT Architecture is based on a client/server model. All of the switch specific code and interfaces are localized in the ACT Server. The APIs are switch independent. The key value added of the architecture is to make it easy for the customer to implement, support and to protect their investment in the application. When a standard switch to computer interface becomes available the server can be updated and the API/application is buffered from this evolution.

Shipment outside North America is currently restricted. Contact factory for more information.

Figure 12.8 ACT Products

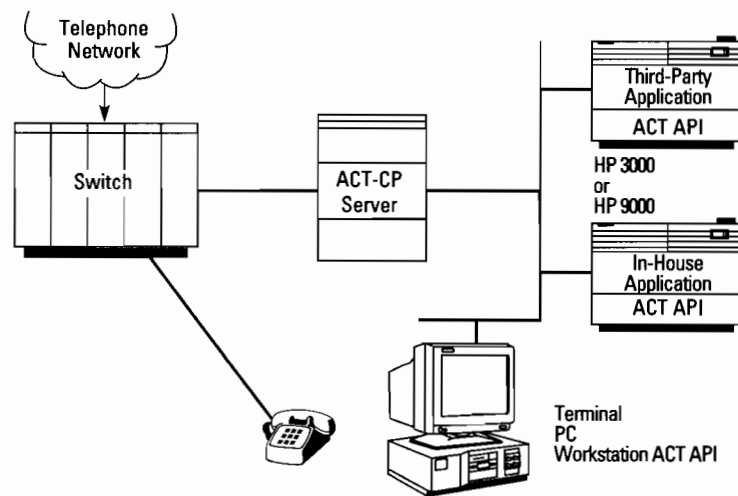


Figure 12.9 ACT—CP Architecture

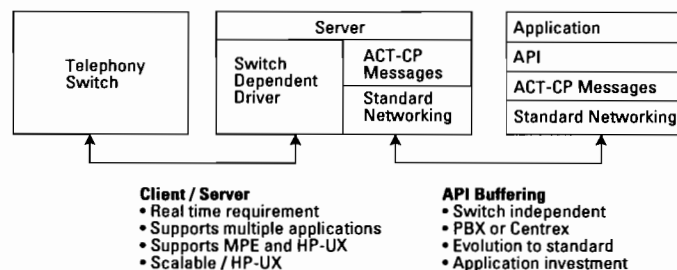


Table 12.5 ACT Servers

Product No.	Description
32044B	ACT Server for Northern Telecom PBX
32045B*	ACT Server for Northern Telecom CO
J2122A	ACT Server for AT&T PBX

*Contact Factory before ordering

Table 12.6 HP 3000 API

Product No.	Description
HP32077A	ACT CP API for HP 3000/iX
opt. 310	System License for HP 3000 Tier 1 SPU
opt. 315	System License for HP 3000 Tier 2 SPU
opt. 320	System License for HP 3000 Tier 3 SPU
opt. 330	System License for HP 3000 Tier 4 SPU
opt. 335	System License for HP 3000 Tier 5 SPU
opt. 340	System License for HP 3000 Tier 6 SPU
opt. 350	System License for HP 3000 Tier 7 SPU
opt. AA1	1/2" mag tape 1600 bpi
opt. AAH	DDS cartridge tape
opt. OCD	Upgrade credit for opt. 310, Tier 1
opt. OGJ	Upgrade credit for opt. 315, Tier 2
opt. OCE	Upgrade credit for opt. 320, Tier 3
opt. OCF	Upgrade credit for opt. 330, Tier 4
opt. OGL	Upgrade credit for opt. 335, Tier 5
opt. OGM	Upgrade credit for opt. 340, Tier 6

ACT Support Products

There are three basic categories of support products related to the ACT products.

- Initial Purchase Support Products
- Mutivendor Network Support
- Ongoing Support Products

Initial Purchase Support Products

The first category is *Initial Purchase Support Products* which are available only at the time of the initial purchase. These are options to the ACT products. In addition to providing a simple way to quote and order support, you also earn commission on them. These should always be quoted and sold with every ACT product.

Add the options listed in **Table 12.7** to the 32044B and J2122A ACT Server products.

Add the options listed in **Table 12.8** to the 32046A and 32077A ACT API products.

Multivendor Network Support

The second category is *Multivendor Network Support* which is available anytime; however it too should be included with every quote. If the customer does not purchase multivendor support you should clearly set their expectations that they are assuming responsibility for multivendor fault isolation and problem management. See **Table 12.9**.

Table 12.7 Initial Purchase Support Products—
Add these options to the 32044B and J2122A ACT Server products

Opt 0S0	License / Next Day System Support—1st year
Opt 0S1	License / 4-hour System Support—1st year
Opt 0S5	License / 24 × 7 System Support—1st year
Opt 0S2	Telephone / Next Day System Support—1st year
Opt 0S3	Telephone / 4-hour System Support—1st year
Opt 0S6	Telephone / 24 × 7 System Support—1st year
Opt 0S4	Installation—System and Network

Table 12.8 Initial Purchase Support Products—
Add these options to the 32046A and 32077A ACT API products

Opt 0S1	License to Use System Support—1st year
Opt 0S3	Telephone Assist System Support—1st year
Opt 0S6	Telephone / 24 × 7 System Support—1st year
Opt 0S4	Installation—System and Network

Table 12.9 Multivendor Network Support

		Product No.
NetStartup:	ACT Server for NT PBX	32044B+16A*
	ACT Server for AT&T PBX	J2122A+16A*
	PBX Network Startup	50052P+16A

*These are included in ACT Server purchase with option 0S4.
NOTE: Be sure to quote NetStartup for each application system LAN link.

NetAssure:	ACT Server for NT PBX	32044A+16B
	ACT Server for NT PBX	32044B+16B
	ACT Server for AT&T PBX	J2122A+16B
	PBX Network Connection	50052P+16B
	PBX Network Connection(24/7)	50052P+16K

NOTE: Be sure to quote NetAssure for each application system LAN Link.

Table 12.10 Ongoing Support Product—Hardware

	Product/Opt. No.
1. Installation:	
ACT Server for NT PBX	32044B+17A
ACT Server for AT&T PBX	J2122A+17A
NOTE: These are included in ACT Server purchase with option OS4.	
2. ACT Server Hardware (select one):	
Priority Plus (24 hours)	32044A+02G
Priority (8 am–9 pm)	32044A+02A
Next Day (8 am–5 pm)	32044A+02C
Scheduled	32044A+02L
Priority Plus (24 hours)	32044B+02G
Priority (8 am–9 pm)	32044B+02A
Next Day (8 am–5 pm)	32044B+02C
Scheduled	32044B+02L
Priority Plus (24 hours)	J2122A+02G
Priority (8 am–9 pm)	J2122A+02A
Next Day (8 am–5 pm)	J2122A+02C
Scheduled	J2122A+02L
3. An active HP hardware support contract on the HP 3000 or HP 9000 application system.	

Ongoing Support Products

The third category is *Ongoing Support Products* which are used to provide support after the initial year or if support was not ordered with the product. See **Tables 12.10, 12.11, and 12.12.**

**Table 12.11 Ongoing Support Product—Software Update Service**

	Product/Opt. No.
1. ACT Server Software Update Service	H2089A+S00
ACT Server for NT PBX	Opt 101
ACT Server for AT&T PBX	Opt 102
1/4" tape cartridge	Opt AA0
DAT cartridge	Opt AAH
2. ACT API Software Update Service	H2088A+L00
ACT Server for NT PBX	Opt 101
ACT Server for AT&T PBX	Opt 102
3. An active HP Software Update Service for the HP 3000 or HP 9000 application system.	

Table 12.12 Ongoing Support Product—Service Level

	Product/Opt. No.
1. ACT Server Response Line Support	H2087A+H00
ACT Server for NT PBX	Opt 101
ACT Server for AT&T PBX	Opt 102
2. ACT API Response Line Support	H2087A+H00
MPE-XL API Low-End	Opt 200
MPE-XL API Mid-Range	Opt 201
MPE-XL API High-End	Opt 202
MPE V	Opt 203
HP-UX API Series 300/400/700	Opt 300
HP-UX API Low-End 800S	Opt 301
HP-UX API Mid-Range 800	Opt 302
HP-UX API High-End 800S	Opt 303

ACT Consulting Services

ACT consulting services should be quoted if the customer wants HP to provide these services. If they are not purchased, make sure that the customer has contracted with another entity to provide them (VAR, Systems Integrator or Telecom Vendor). If the customer is planning to do these functions themselves, make sure that expectations are properly set.

It is highly recommended that these be quoted with every ACT quote. There is an "ACT Implementation—Multivendor Coordination" work sheet that will help you position and sell these services. There are also ACT Consulting data sheets available to help you describe in detail what each service provides. Prices are on a custom quote basis.

ACT Assessment is used to identify all of the details of each component (ACT, computer systems, data networks, switches, voice network and application) and to provide a complete coordinated requirements assessment. Try and sell this with the other products. You may find that you will need to deliver this before the customer will purchase the rest of the products. Use ConsultLine H2355A Module N.

ACT Project Management is used to provide the overall project coordination between the different parties and provides a final sign off for the ACT installation, not including the application. Use ConsultLine H2355A Module 9.

ACT Application Assistance is used to provide the application developer with application design assistance. There are three

general areas where this consulting can be sold. First, to help developers with high level system design. Second, to help the developer with detailed design for specific programming implementations. Third, to provide on-going application assistance. Use ConsultLine H2405A Module N.

ACT Technical Training is a class offered by HP (factory) to train application developers and technical support individuals on the ACT products. A data sheet is available.

There is an ACT data sheet called *ACT Ongoing Support* which can be used to set customer expectations and position product support, multivendor support (NetAssure) and application assistance as the total support requirements.

ISDN Communication

Introduction

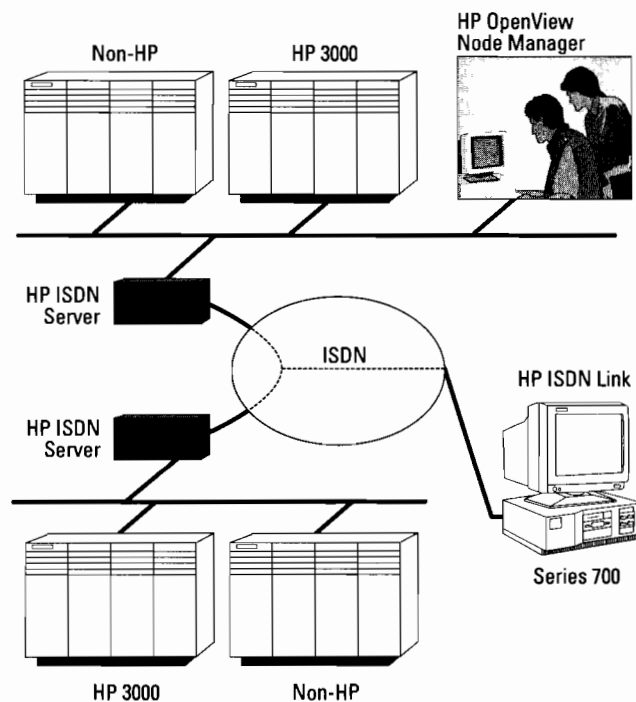
The new HP ISDN product family is another living example of Hewlett-Packard's commitment to open, standard-based, wide-area communication. It includes the HP ISDN Server and HP ISDN Link products. It allows HP 3000s and non-HP systems located in widely dispersed locations to transfer data over ISDN as if they were on the same LAN.

The HP ISDN Server allows for cost-effective interconnection of remote LANs over an ISDN network, in a transparent way, for any application running on top of the standard TCP/IP protocol. The HP ISDN Server can host up to three Basic Rate Interface cards for a maximum total throughput of 384 kbps.

The HP ISDN Server is based on powerful 3700 workstations, EISA Basic Rate Interface cards, and TCP/IP to ISDN gateway software (J2104A, J2105A, J2108A, and J2109A products).

The telephone-like tariff structure of ISDN services makes the HP ISDN products very attractive for TCP/IP based applications that require LAN-to-LAN large file transfers. Such applications include: image management, batch file transfers, and ARPA FTP services.

Figure 12.10



Typical customer environment includes at least 2 or 3 of the following characteristics:

- Multiple, geographically dispersed sites with LAN-to-LAN connectivity needs
- Standalone, remote workstations needing access to central hosts or servers for file/database transfers
- On-demand, high transmission bandwidth requirements for infrequent file transfers
- TCP/IP, multivendor based computing environments

For further technical information for ISDN products, please refer to the HP Networking Communications Specification Guide (P/N J2104A, J2105A, J2108A, and J2109A).

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