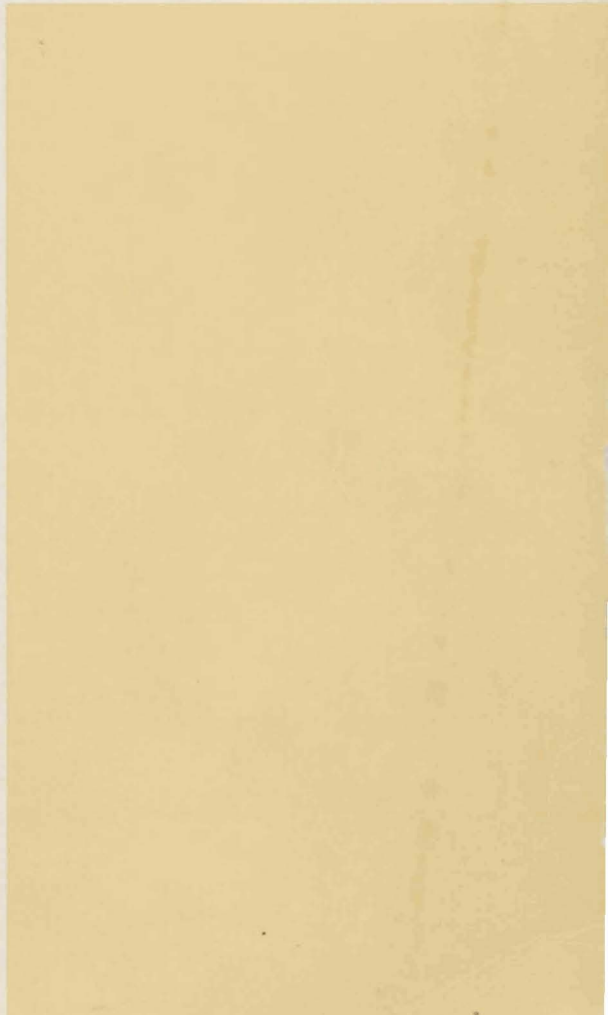
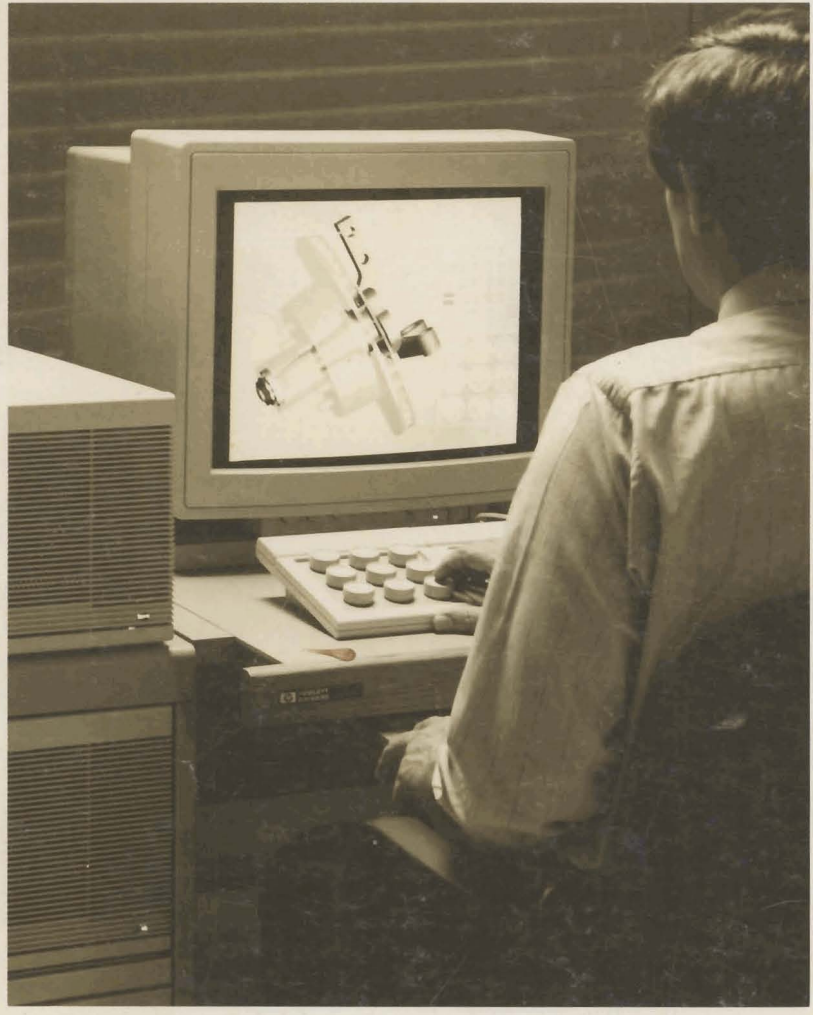


File

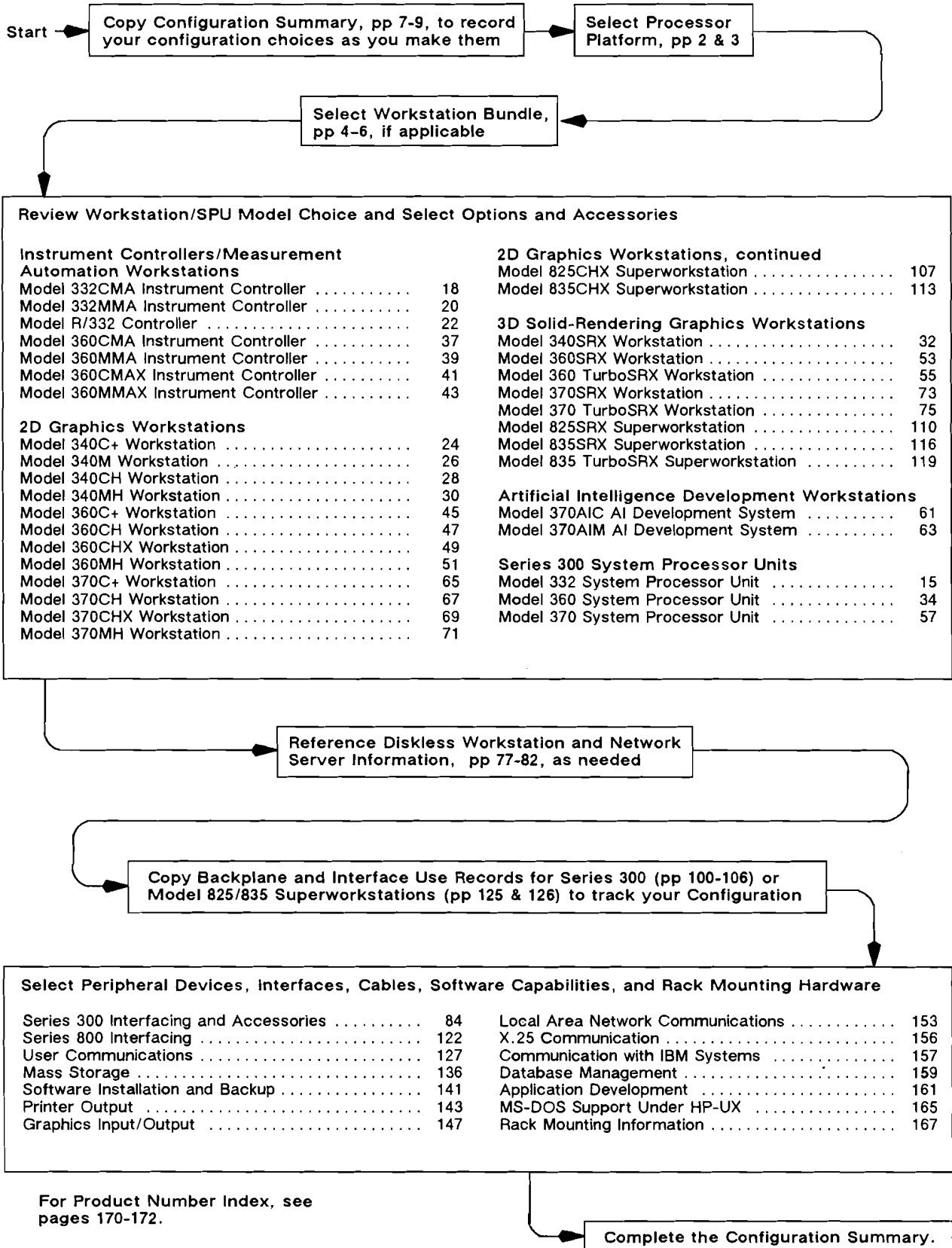


HP 9000 Workstations Configuration Guide

Effective April 2, 1989



Mapping Your Way to Configuration Success



HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

About This Guide



Guidemap and Configuration Record

A guidemap, facing, provides a page-referenced recommended sequence for configuration selection. A configuration summary on pages 7 through 9 can be copied to record your configuration.

System Selection

An Overview and Workstation Bundle Choices summary sections are provided on pages 2 through 6. Individual, Model-specific System Processor Unit (SPU), Workstation, Network Server, and Superworkstation description sections illustrate bus relationships and backplane organization and summarize the SPU, Workstation, Network Server, or Superworkstation, and list its options, and accessories.

Series 300 Operating Systems Information

A Series 300 operating systems section compares Series 300 operating systems and gives ordering information for them.

National Versions Information

A section is provided that gives information on ordering national versions of workstations, keyboards, and peripheral devices intended for use outside of the United States.

Interfacing

Separate sections discuss interfacing of Series 300 systems and Model 825 and 835 Superworkstations. Interfacing-oriented worksheets are provided that can be copied for summarization of the peripheral devices and cables that are required for the configuration. This includes sheets for summarizing the usage of multi-device interfaces, such as multiplexers, HP-IB, and HP-FL interfaces.

Capabilities-Oriented Organization

Following the interfacing sections, this Guide is organized by capabilities, such as user communication, mass storage, software installation and backup, printer output, graphics input/output, etc. Each capabilities section is illustrated with appropriate diagrams and lists the peripheral devices (and connecting cables and software if required for use in the system). Where applicable, prerequisites for capabilities, such as program development and data base management, are described prominently and clearly, to facilitate the listing of a complete, successful configuration.

New Products in This Guide

Model 332 SPU and Instrument Controllers.

HP 36940A and 36941A X.25 Communications Links.

HP 9262B and 9263B Removable Winchester Disk Drives.

Deleted Products

Model 310, 318, 319, 320, 330, and 350 and related products, which have been superseded by the Model 332, 340, 360, and 370 products, have been omitted from this guide. For that reason, users needing reference information on those products should keep the HP 9000 Series 300 Configuration Guide dated November 1, 1988, HP Literature Stock Number 5952-6342.

Other Information

Other important information on HP 9000 Series 300 systems and Model 825 and 835 Superworkstations and related products is provided in the following publications:

- HP 9000 Series 300 data sheet, 5952-6344*.
- HP 9000 Model 825CHX and 835CHX data sheet, 5951-6811*.
- HP 9000 Model 825SRX and 835SRX data sheet, 5951-6812*.
- HP 9000 Model 835 TurboSRX data sheet, 5952-6698*.
- HP 9000 Series 800 Computer Systems Interface Cards, 5954-9912*.
- HP 9000 Series 300 Computer Systems Pricing Information, 5952-6349D*.
- HP 9000 Series 800 Computer Systems Pricing Information, 5954-9829D*.
- HP AdvanceNet Specification Guide, 5956-4144, 11/88*.

* Or a later revision.

Overview

Description

HP 9000 Workstations are based on two different processor families. The Model 825 and 835 Superworkstations use HP Precision Architecture (HP-PA) processors. The Model 332, 340, 360, and 370 workstations use the Motorola MC68030 32-bit microprocessor and its companion MC68882 Floating Point Processor. The relative processing performance and capacities (memory and I/O of the respective processors are summarized on the facing page.

Application-Oriented Workstation Bundles

For configuration and ordering convenience, the various processors are offered with different graphics subsystems to meet the requirements of specific types of applications. In fact, the Model 825 and 835 Superworkstations and the Model 340 workstations are offered only in bundles. The following types of application-oriented bundles are available.

Instrument Control/Measurement Automation Bundles

Seven Model 332 and 360 processors bundles are offered for BASIC-programmable instrument control or measurement automation uses. The Model 332/360 CMA/MMA and R/332 configurations provide a single-user HP BASIC/WS operating system and medium-resolution 512 by 400 color or monochrome monitor. The more capable Model 360CMA/MMA configurations provide BASIC/UX in the multi-user HP-UX operating system and high-resolution 1024 by 768 color or monochrome displays. See the summary on page 4.

2D Graphics Bundles for Mechanical Design, Electronic or Printed Circuit Design, and Desktop Publishing

Fourteen Model 340, 360, 370, 825, and 835 processor bundles are offered with 2D graphics capability as required for mechanical design, electronic or printed circuit design or desktop publishing. These bundles include a License to use HP-UX and related software, high resolution 1024 by 768 or 1280 by 1024 color or monochrome monitor, keyboard, and a two-button HP mouse for pointing and picking. See the summary on page 5.

3D Solid-Rendering Graphics Bundles for Solid Modelling, Imaging, or Mapping

Eight Model 340, 360, 370, 825, and 835 processor bundles are offered with 3D graphics as required for solid modelling, imaging, or mapping. These bundles include a License to use HP-UX and related software, high resolution 1280 by 1024 color monitor, keyboard, and a two-button HP mouse for pointing and picking. See the summary on page 6.

Artificial Intelligence Development Workstations

Two Model 370 processor bundles are offered with Common LISP II software for development of artificial intelligence applications. These bundles include HP-UX, high-resolution 1280 by 1024 color (Model 370AIC) or monochrome (Model 370AIM) monitor, keyboard, and a two-button HP mouse for pointing and picking. See pages 61 through 64 for details.

Network Servers and Diskless Workstations

Model 340, 360, and 370 workstations can be linked via a Local Area Network to a Network Server, such as the Model 15NS or Model 25NS Network Server. The Network Server provides disk storage and software installation and backup support to the connected workstations, enabling them to function without a local disk or purchase of software media. This reduces the cost per seat and improves coordination within the supported work group. See pages 77 through 82 for details.

Series 300 System Processor Units

Model 332, 360, and 370 processors are offered as a basic System Processor Unit (SPU) without software, display, or keyboard for customers who need to tailor a configuration to meet requirements not supported by the available bundles. Customers configuring a system from an SPU should see pages 10 through 12 for operating system selection and the respective SPU sections on pages 15 (Model 332), 34 (Model 360), and 57 (Model 370).

Processor Performance – Capacity Summary

Base Processing Speed (MIPS)	Model 835		14
	Model 825	8	
	Model 370	8	
	Model 360	5	
	Model 340	4	
	Model 332	4	

Double-Precision Floating Point Speed (MFLOPs)	Model 835		2
	Model 825	0.65	
	Model 370	0.3*	
	Model 360	0.2*	
	Model 340	0.14	
	Model 332	0.14	

RAM, Base-Max. (MB)	Model 835	8	-	96
	Model 825	8	-	96
	Model 370	8	-	48†
	Model 360	4	- 16	
	Model 340	4	- 16	
	Model 332	1-8		

Available I/O Slots, Base-with Expander(s)	Model 835	4	-	12
	Model 825	4	-	11
	Model 370	1	-	16
	Model 360	1	-	16
	Model 340	1	Expansion is not available with Model 340.	
	Model 332	1	-	12

Included Interfaces	Model 835	HP-IB Disk, LAN, and HP-HIL
	Model 825	HP-IB Disk, LAN, and HP-HIL
	Model 370	HP-IB Disk, Std HP-IB, LAN, HP-HIL, and RS-232
	Model 360	Std HP-IB, LAN, HP-HIL, and RS-232
	Model 340	Std HP-IB, LAN, HP-HIL, and RS-232
	Model 332	Std HP-IB, HP-HIL, and RS-232

* 98248B Floating Point Accelerator approximately doubles this floating point speed.

† 48 MB is maximum for ECC memory; maximum parity memory in Model 370 is 32 MB.

Series 300 Instrument Controller Bundles

Bundle Identifier	CMA	MMA	CMAX	MMAX	R/332	
For Model 332, See PN/Page	Model 332CMA 98581C/18	Model 332MMA 98580C/20	Not Available	Not Available	Model R/332 A1303A/22 A4305A/22 A1307A/22	
For Model 360, See PN/Page	Model 360CMA 98581W/37	Model 360MMA 98580W/39	Model 360CMAX 98581WX/41	Model 360MMAX 98580WX/43	Not Available	
Display: Monitor P/N Resolution Video Board	Type	Color	Monochrome	Color	Monochrome	Monochrome
	Size	12-inch	12-inch	16-inch	17-inch	9-inch
		35741A	35731A	98785A (332) 98789A (360)	98786A	built-in
		512 by 400	512 by 400	1024 by 768 (332) 1280 by 1024 (360)	1024 by 768	512 by 400
		98543A	Built-in (332) 98542A (360)	98549A (332) 98550A (360)	Opt 544 (332) 98544A (360)	Built-in
Operating System	BASIC/WS, single-user, single-task system.		HP-UX, multi-user, multiprogramming system.		BASIC/WS single-user, single-task system	
Programming Language	BASIC, supported by BASIC/WS system		BASIC/UX operating under HP-UX system.		BASIC, supported by BASIC/WS system.	
Base Memory	1 megabyte		4 megabytes		1 megabyte	
Included Peripheral Interfaces	Std HP-IB, HP-HIL, and RS-232 (plus LAN interface in 360)		High-speed HP-IB, Std HP-IB, HP-HIL, and RS-232 (plus LAN interface in 360)		Std HP-IB, HP-HIL, and RS-232	
Included User Comm. Devices	Keyboard (46021x)		Keyboard (46021x) and HP Mouse (46060A)		Hinged, removable ITF keyboard	
Operational Requirements	3.5-inch or 5.25-inch flexible disk		1. 81 MB or larger Hard (system) disk. 2. Cartridge tape subsystem for software installation and backup.		Includes all items needed for operation.	

2D Graphics Workstation Bundles

Bundle Identifier	C+	CH	CHX	M	MH	
For Model 340, See PN/Page	Model 340C+ 98564C/24	Model 340CH 98564G/28	Not available	Model 340M 98563E/26	Model 340MH 98563C/30	
For Model 360, See PN/Page	Model 360C+ 98583W/45	Model 360CH 98588W/47	Model 360CHX 98588WX+556/49	Not available	Model 360MH 98589W/51	
For Model 370, See PN/Page	Model 370C+ 98583G/65	Model 370CH 98588G/67	Model 370CHX 98588G+556/69	Not available	Model 370MH 98589G/71	
For Model 825, See PN/Page	Not available	Not available	Model 825CHX A1008A/107	Not available	Not available	
For Model 835, See PN/Page	Not available	Not available	Model 835CHX A1050A/113	Not available	Not available	
Display:	Type	Color	Color	Color	Monochrome	Monochrome
	Size	16-inch (340/360) 19-inch (370)	16-inch (340/360) 19-inch (370)	16-inch (360) 19-inch (370-835)	17-inch	19-inch
	Monitor P/N	98785A (340/360) 98751A (370)	98789A (340/360) 98752A (370)	98789A (360) 98752A (370-835)	98786A	98788A
	Resolution	1024 by 768	1280 by 1024	1280 by 1024	1024 by 768	1280 by 1024
	Video Board	WS Specific (340) 98549A (360/370)	WS Specific (340) 98550A (360/370)	98550A (360/370) A1017A & A1020H (825/835)	WS Specific (340)	WS Specific (340) 98548A (360/370)
	No. of Planes	6 for 64 colors or 4 planes for 16 colors and 2 overlay planes	8 for 256 colors or 2 sets of 4 planes for double- buffered inter- active pan-zoom of 16-color images.	8 for 256 colors or 2 sets of 4 planes for double- buffered inter- active pan-zoom of 16-color images.	1	1
	Accelerator	Not applicable	Supports optional addition of 98556A accelerator	98556A 2D Integer-based accelerator approximately triples graphics writing speed	Not applicable	Not applicable
Operating System	I-P-UX, multi-user, multiprogramming system. Series 300 Models include license-to-use; media and manuals must be purchased separately for workstation with its own local disk and software installation/backup device, but not for diskless workstation supported by a network server. Model 825CHX and 835CHX include license to use, media, and manuals.					
Programming Language	FORTRAN 77, Pascal/HP-UX, C/HP-UX, BASIC/UX, and Ada. Most of which must be purchased separately. See the Application Development section, page 161.					
Base Memory	4 megabytes in Series 300, 8 megabytes in Model 825CHX and 835CHX.					
Included Peripheral Interfaces	Std HP-IB, HP-HIL, LAN, and RS-232 in Series 300 (plus High-speed HP-IB disk interface in Model 370C+/CH/CHX/MH. HP-IB disk, HP-HIL, and LAN interfaces in Model 825CHX and 835CHX.					
Included User Comm. Devices	Keyboard (46021x) and HP Mouse (46060A)					
Operational Requirements	<p>1. 81 MB (Series 300) 132 MB (Model 825CHX or 835CHX) or larger Hard (system) disk.</p> <p>2. Cartridge tape subsystem (or magnetic tape unit in Model 825CHX/835CHX Superworkstation) for software installation and backup.</p> <p>Or, for Series 300 diskless workstation, comparable support from a LAN-connected network server system (see pages 77-82).</p>					

3D Solid Rendering Graphics Workstation Bundles

Bundle Identifier	SRX	TurboSRX
For Model 340, See PN/Page	Model 340SRX 98573C/32	Not available
For Model 360, See PN/Page	Model 360SRX 98587W/53	Model 360 TurboSRX 98587T/55
For Model 370, See PN/Page	Model 370SRX 98587G/73	Model 370 TurboSRX 98587H/75
For Model 825, See PN/Page	Model 825SRX A1005A/110	Not available
For Model 835, See PN/Page	Model 835SRX A1045A/116	Model 835 TurboSRX A1055A/119
Display:	Type	Color
	Size	16-inch (340/360) 19-inch (370/825/835)
	Monitor P/N	98789A (340/360) 98752A (370/825/835)
	Resolution	1280 by 1024
	Video	WS Specific + 98720A (340) 98725A + 98720A (360/370) A1017A + 98720A (825/835)
	No. of Planes	4 for 16 colors, expandable to 32 planes plus 4 overlay planes which can be configured in a variety of ways to support windowing, hidden surface removal, pan, and zoom, etc.
	Accelerator	Included 98721A Accelerator supports 180,000 coordinate calculations/sec, 16 million pixels/second scan conversion, 125 million pixels/sec raster operations.
		Color
		19-inch
		98752A
		1280 by 1024
		98726A + 98730A (360/370) A1017A + 98730A (835)
		8 for 256 colors plus 4 overlay planes, expandable to 24 planes plus 4 overlay planes, which can be configured in a variety of ways to support hidden surface removal, pan, and zoom, etc.
		Optional 98732A Accelerator provides 3 to 10 times the graphics speed of the 98721A.
Operating System	HP-UX, multi-user, multiprogramming system. Series 300 Models include license-to-use; media and manuals must be purchased separately for workstation with its own local disk and software installation/backup device, but not for diskless workstation supported by a network server. Model 825SRX and 835SRX/TurboSRX include license to use, media, and manuals.	
Programming Language	FORTRAN 77, Pascal/HP-UX, C/HP-UX, BASIC/UX, and Ada. Most of which must be purchased separately. See the Application Development section, page 161.	
Base Memory	4 megabytes in Series 300, 8 megabytes in Model 825SRX and 835SRX/TurboSRX.	
Included Peripheral Interfaces	Std HP-IB, HP-HIL, LAN, and RS-232 in Series 300 (plus High-speed HP-IB disk interface in Model 370SRX/TurboSRX. HP-IB disk, HP-HIL, and LAN interfaces in Model 825SRX and 835SRX/TurboSRX.	
Included User Comm. Devices	Keyboard (46021x) and HP Mouse (46060A)	
Operational Requirements	<ol style="list-style-type: none"> 1. 81 MB (Series 300) 132 MB (Model 825SRX or 835SRX/TurboSRX) or larger Hard (system) disk. 2. Cartridge tape subsystem (or magnetic tape unit in Model 825SRX or 835SRX/TurboSRX) for software installation and backup. <p>Or, for Series 300 diskless workstation, comparable support from a LAN-connected network server system (see pages 77-82).</p>	

Configuration Summary

Please copy this page and pages 4 and 5 to record your configuration as you select it.

Product, Option, or Part Number	Qty	Name/Description			
---------------------------------	-----	------------------	--	--	--

SPU, Instrument Controller, Workstation, Network Server, or Superworkstation, Options, and Accessories

Operating System or Operating System Bundle, including License Product and Media Option

System Console and User Communications Terminals, Cables, HP-HIL Devices, and Bar Code Readers

Configuration
Summary, continued

Product, Option, or Part Number	Qty	Name/Description			
---------------------------------------	-----	------------------	--	--	--

System Disk and Mass Storage

Software Installation and Backup (Cartridge Tape Subsystems and Mag Tape Units and Cables)

Printer Output (Printers and Cables)

Graphics Input/Output (Plotters and Cables)

Local Area Networks (Links, Higher-Level Software, Adapters, and Cables)

Product, Option, or Part Number	Qty	Name/Description			
---------------------------------	-----	------------------	--	--	--

Communication with IBM Systems (Links and Higher-Level Software)

X.25 Communication (Links and Higher-Level Software)

Database Management

Application Development

Interfaces and Expanders

Rack Mounting Cabinets and Accessories

Series 300 Operating Systems

Operating Systems Summary and Requirements

See Table 1, facing.

Series 300 Operating System Choices

Three different operating systems are available for HP 9000 Series 300 systems, instrument controllers, and workstations. These are described in the following paragraphs.

HP BASIC/WS Language System

The HP BASIC/WS Language System is a single-user, single-task operating system. It is available in either RAM-based or ROM-based interpreter versions and may execute interpreted or compiled BASIC programs. Its CSUB utilities support execution of subprograms compiled in stand-alone Pascal or MC68000 assembly language that have been prepared in the HP Pascal workstation environment. See the *BASIC Language System* technical data sheet (5954-9388 or a later revision) for details of the HP BASIC/WS Language System. The HP BASIC/WS Language System is included in HP 9000 Series 300 Instrument Controllers and may be purchased separately for Series 300 System Processor Units used in single-user, single-task applications.

HP-UX Operating System

The HP-UX Operating System is a multi-user, multiprogramming operating system. It provides the maximum operating system capability available for HP 9000 Series 300 systems. This includes support for an extensive array of programming languages, subsystems, and applications. A license to use the HP-UX Application Execution

Environment (AXE) and Programming Environment (PE) is included in HP 9000 Series 300 Workstations. The software and documentation is purchased separately for workstations that are not supported by a server. The license to use HP-UX, software, and documentation can also be purchased separately for Series 300 System Processor Units requiring multi-user, multi-task capability.

HP Pascal/WS Language System

The HP Pascal/WS Language System is a single-user, single-task operating system. The *HP 9000 Series 200 and 300 Pascal 3.2 Language System* technical data sheet (5954-9374 or a later revision) contains specifications of the Pascal Language System. The *Pascal System Internals Documentation* data sheet (5953-9534) describes the manual set available for system programmers. The HP Pascal Language System may be purchased separately for Series 300 System Processor Units or Instrument Controllers used in single-user, single-task applications.

Ordering Information

Refer to the HP 9000 Series 300 Computer Systems Pricing Information for detailed ordering information.

HP BASIC/WS Products

98603B ROM-based HP BASIC/WS 5.1 - includes ROM card*, software media, license to use, and documentation.

98616A RAM-based HP BASIC/WS 5.1 - includes software media, license-to-use, and documentation.

* The ROM card uses one DIO Accessory or I/O slot.

98616-11x40 HP BASIC/WS Compiled Subprograms (CSUB) Utilities - includes software media, license to use, and documentation.

98618A HP BASIC/WS Compiler - includes software media, license to use, and documentation.

HP-UX Products

98594L 2-user license-to-use bundle - includes 98515L Applications Execution Environment, 98597L Programming Environment, 50952L NS-ARPA, 50969L NFS, and X11 X-Window system.

98594A Media† and documentation for 98594L, which is prerequisite. (Must order Opt. 022 for 1/4-inch cartridge tape media.) Must order 98794A HP-UX Programmer's Documentation Set separately.

98794A HP-UX Programmer's Documentation Set.

98597L HP-UX Programming Environment license to use - includes commands, C compiler, MC680x0 assembler, symbolic debugger, RS-232C data communications, and device I/O library.

98597C Media† and documentation for 98597L, which is prerequisite. (Must order Opt. 022 for 1/4-inch cartridge tape media.)

98515L 2-user license to use Applications Execution Environment - includes HP-UX kernel, essential commands, and X11 X-Window system.

† Only one media product is required for all the licensed systems at a site.

Table 1. HP 9000 Series 300 Operating Systems

Operating System	BASIC/WS	HP-UX	Pascal/WS
Execution Medium	RAM or ROM	RAM	RAM
No. of Users Supported	1	1 to 32, as licensed	1
No. of Concurrent Processes	1	Configurable (how many can be supported depends upon size of installed RAM)	1
Minimum Total RAM	768 KB (256 KB if ROM-based)	3.0 MB	512 KB
Additional RAM per text processing user	Not Applicable	0.25 MB	Not Applicable
Additional RAM per software development user	Not Applicable	0.75 MB	Not Applicable
Maximum RAM	48 MB	48 MB	48 MB
Minimum Disk Memory	2 x 1.6 MB (flexible disk)	81 MB (fixed disk) for AXE	2 x 1.6 MB (flexible disk)
Disk Memory for software development	Not Applicable	152 MB (fixed disk) for PE	Not Applicable
Additional Disk Memory per 2nd through Nth Users	Not Applicable	5 MB per user	Not Applicable
Maximum Disks	8 (4.568 GB)	16 (9.136 GB)	8 (4.568 GB)
Device I/O and Real-Time Capability	Standard	Standard	Standard
National Language Support	8-bit	8/16-bit	Limited
Program Editor	Standard	Standard	Standard
Text Editor	Available	Standard	Standard
Programming Languages			
MC68000/20 Assembly	Callable	Standard with Prog. Env.	Standard
Ada	Not Supported	Available	Not Supported
BASIC	Standard	Available as BASIC/UX	Not Supported
C	Not Supported	Standard with Prog. Env.	Not Supported
COBOL	Not Supported	Available	Not Supported
FORTRAN77	Not Supported	Available	Avail. from 3rd Party
LISP	Not Supported	Available	Not Supported
Pascal	Callable	Available	Standard
Prolog	Not Supported	Available	Not Supported
HP Graphics Software			
GKS	Standard	Standard (Starbase)	Standard
PHIGS	Not Supported	Available	Not Supported
PHIGS	Not Supported	Available from 3rd Party	Not Supported
File System Directory Structures			
Hierarchical File System	Standard	Standard	Standard
Logical Interchange Format	Standard	Standard Utilities	Standard
MS-DOS	Not Applicable	Standard Utilities	Not Applicable
Pascal Workstation 1.0	Not Applicable	Not Applicable	Standard
Networking			
Asynchronous	Not Supported	Available	Available
IBM 327x and RJE	Not Supported	Available	Available
LAN: ARPA/Berkeley	Not Supported	Available	Not Supported
TCP/IP and NFS			
X.25	Not Supported	Available	Not Supported
Shared Resource Mgr.	Standard	Available	Standard

Series 300 Operating Systems, continued

98515B Media† and documentation for 98515L, which is prerequisite. (Must order Opt. 022 for 1/4-inch cartridge tape media.)

98595L 16-user license to use Applications Execution Environment - includes HP-UX kernel, essential commands, and X11 X-Window system.

98595B Media† and documentation for 98595L, which is prerequisite. (Must order Opt. 022 for 1/4-inch cartridge tape media.)

98596L 32-user license to use Applications Execution Environment - includes HP-UX kernel, essential commands, and X11 X-Window system.

98596B Media† and documentation for 98596L, which is prerequisite. (Must order Opt. 022 for 1/4-inch cartridge tape media.)

Pascal/WS Products

98617A Pascal 3.2 Right-to-Execute with media and documentation.

98617E Pascal 3.2 Right-to-Execute only.

98617M Right-to-Copy Pascal 3.2 for end users with one set of manuals.

98617R Right-to-Copy Pascal 3.2 for resellers with one set of manuals.

† Only one media product is required for all the licensed systems at a site.

National Versions

Introduction

For convenient use in various nations throughout the world, HP 9000 Series 300 and 800 workstations and Superworkstations, network servers, keyboards, and certain peripheral devices used with them and HP 9000 Series 300 System Processor Units are offered in specific national versions.

National Versions of Series 300 Instrument Controllers, Workstations, Network Servers, and Series 800 Superworkstations with Keyboard

National versions of instrument controllers, workstations, superworkstations, and network servers provide appropriate keyboard, monitor, SPU, power cord and user's manuals. They are specified as "**must order**" options to the respective product number, as follows:

Option	National Version
ABA	U. S. English
ABC	French Canadian
ABD	German
ABE	European Spanish
ABF	European French
ABH	Dutch
ABJ	Katakana
ABK	Universal English ASCII
ABM*	Latin American Spanish
ABN	Norwegian
ABP	Swiss German
ABQ	Swiss French
ABS	Swedish
ABU	U. K. English
ABW	Belgian Dutch
ABX	Finnish
ABY	Danish
ABZ	Italian
AB0*	Taiwan (Chinese)
AB1*	Korean
ACA	Kanji

* Not available for 15NS or 25NS Network Server

National Versions of Series 300 Instrument Controllers with Keyboard Deleted

Instrument controllers offer options that delete the standard 46021x keyboard, for applications in which it is desired to instead use a 98203x keyboard or no keyboard is needed. National versions of instrument controllers without the standard keyboard are specified as "**must order**" alternate options to ABx, ACx keyboard options listed above, as follows:

Option	National Version
05A	English
05C	Canadian French
05D	German
05E	European Spanish
05F	European French
05K	Universal English
05M	Latin Spanish
05Z	Italian

National Versions of the 46021x HP-HIL Keyboard

National versions of the 46021x Keyboard are selected by substituting a suffix letter(s) for the x in 46021x product number, as follows:

Suffix	National Version
A	U. S. English
AC	French Canadian
AD	German
AE	European Spanish
AF	French
AH	Dutch
AJ	Katakana
AL	English Canadian
AM	Latin Am. Spanish
AN	Norwegian
AP	Swiss German
AQ	Swiss French
AS	Swedish
AT	Hebrew
AU	U. K. English
AV	Arabic
AW	Belgian Dutch
AX	Finnish
AY	Danish
AZ	Italian
W+ZAA	Taiwan Chinese
W+ZAB	Korean
W+ZAC	Chinese
W+ZAG	Arabic/French
W+ZAL	Kanji

National Versions of the 98203x HP-HIL Keyboard

National versions of the 98203x Keyboard are selected by substituting a suffix letter(s) for the x in 98203x product number, as follows:

Suffix	National Version
C	U. S. English
CD	German
CE	European Spanish
CF	French
CJ	Katakana
CS	Swedish-Finnish

National Versions of C100xA/G/W Terminals

National versions of C100xA/G/W Terminals provide appropriate keyboard, user's manuals, and power cable. They are specified as "**must order**" options to the respective product number, as follows:

Opt	Keyboard	User's Manual	Pwr Cable
ABA	U. S. English	English	U. S.
ABC	French Can.	French	U. S.
ABD	German	German	Eur.
ABE	Eur. Spanish	Spanish	Eur.
ABF	Eur. French	French	Eur.
ABH	Dutch	Dutch	Eur.
ABL	Can. English	English	U. S.
ABM	Latin Amer. Spanish	Spanish	U. S.
ABN	Norwegian	Norweg.	Eur.
ABP	Sw. German	German	Eur.
ABQ	Sw. French	French	Eur.
ABR	U. S. English	English	S. Afr.
ABS	Swedish	Swedish	Eur.
ABU	U. K. English	English	U. K.
ABW	Flemish	Dutch	Eur.
ABX	Finnish	Finnish	Eur.
ABY	Danish	Danish	Eur.
ABZ	Italian	Italian	Eur.
ACC	U. S. English	English	U. K.
ACD	U. S. English	English	Swiss
ACE	U. S. English	English	Danish
ACF	U. S. English	English	Japan
ACG	U. S. English	English	Aus.

National Versions of 239xA Terminals

National versions of 239xA terminals provide appropriate keyboard and user's manuals. They

National Versions, continued

are specified as “**must order**” options to the respective product number, as follows:

Option	Nat'l Version
Std	U.S. English
015	Int'l Monitor
101	Swedish
102	Norwegian
103	French
104	German
105	U.K. English
106	Spanish
107	French Canadian
108	Canadian English
109	Italian
110	Dutch
111	Finnish
112	Danish
113	Swiss German
114	Swiss French
115	Latin Am. Spanish
116	Flemish

National Versions of Printers

National versions of printers are indicated by a second suffix letter at the end of the respective product numbers, as listed in Table 2, at right.

National Versions of Graphics Plotters

National versions of graphics plotters are indicated by a second suffix letter at the end of the respective product numbers, as listed in Table 3, below, right.

National Versions of Electrostatic Plotters

National versions of C1600A/C1601A Electrostatic Plotters provide english user's manuals, and appropriate power cable. They are specified as “**must order**” options to the respective product number, as follows:

Option	Power Cable
ABA	U.S.
ABB	European
ABG	Australian
ABK	Intercon
ABL	Canadian
ABU	U.K.
AB4	Singapore
AB5	Hong Kong
ACD	Swiss
ACE	Danish
ACF	Japanese
ACQ	South African

Table 2. National Versions of Printers

2225D	ThinkJet
2227A	QuietJet Plus
2228A	QuietJet
2276A	DeskJet
3630A	PaintJet
2235x*	RuggedWriter
2684x†	LaserJet 2000
33440A	LaserJet Series II
33447A	LaserJet Series IID

National Version								
-	-	-	-	-	-	-	-	U.S.
A	A	A	A	A	A	A	A	South African
B	B	B	B	B	B	B	B	European
D			D		D	D		German
E			E		E	E	E	Spanish
F	F		F		F	F		French
G				G	G	G		Australian
		J					J	Japanese (Katakana)
	K	K		K				Intercon
P		P			P	P		Swiss French
Q	Q		Q	Q	Q	Q	Q	Swiss
U	U	U	U	U	U	U	U	United Kingdom
Y	Y	Y	Y	Y	Y	Y	Y	Danish
Z			Z		Z	Z		Italian

* 2235x denotes 2235A, 2235B, 2235C, or 2235D.

† 2684x denotes 2684A, 2684D, or 2684P.

Table 3. National Versions of Graphics Plotters

7440A*	ColorPro Plotter
7575A*	Graphics Plotter
7550A	Graphics Plotter
757xA	DraftPro Plotters
7595A	DraftMaster Plotter
7596A	DraftMaster II Plotter

National Version								
-	-	-	-	-	-	-	-	U.S.
A	A	A	A	A	A	A	A	South African
B	B	B	B	B	B	B	B	European
D	D	D	D	D	D	D	D	German
E	E	E	E	E	E	E	E	Spanish
F	F	F	F	F	F	F	F	French
Q	Q	Q	Q	Q	Q	Q	Q	Swiss
U	U	U	U	U	U	U	U	United Kingdom
Y	Y	Y	Y	Y	Y	Y	Y	Danish
Z	Z	Z	Z	Z	Z	Z	Z	Italian

* 7440AA through AZ and 7475AA through AZ specify the plotter with RS-232C interface; 7440BA through BZ and 7475BA through BZ specify the plotter with HP-IB interface.

Model 332 System Processor Unit

Description

The HP 9000 Model 332 is the lowest priced HP 9000 Series 300 System Processor Unit (SPU) that affords expandability. Figures 1 and 2 illustrate the Model 332 bus architecture and backplane layout and expandability.

CPU: MC68030, clocked at 16.7 MHz.

Bus Types: 32-bit memory bus and 16-bit Direct I/O (DIO) bus.

RAM: 1 MB parity, expandable to 8 MB in mainframe with substitution of 4 MB for 1 MB and a 4 MB add-on RAM card.

Built-in Interfaces: HP-HIL, RS-232, Std HP-IB, 512 by 400 on-board monochrome video, and audio output.

LAN Interface: HP 98643A (uses a DIO I/O slot).

Floating Point Coprocessor: MC68882 is opt 882.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

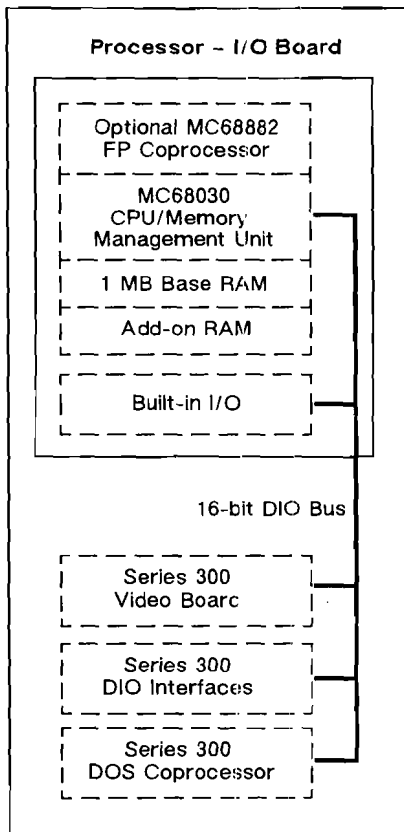


Figure 1. Model 332 Bus Architecture

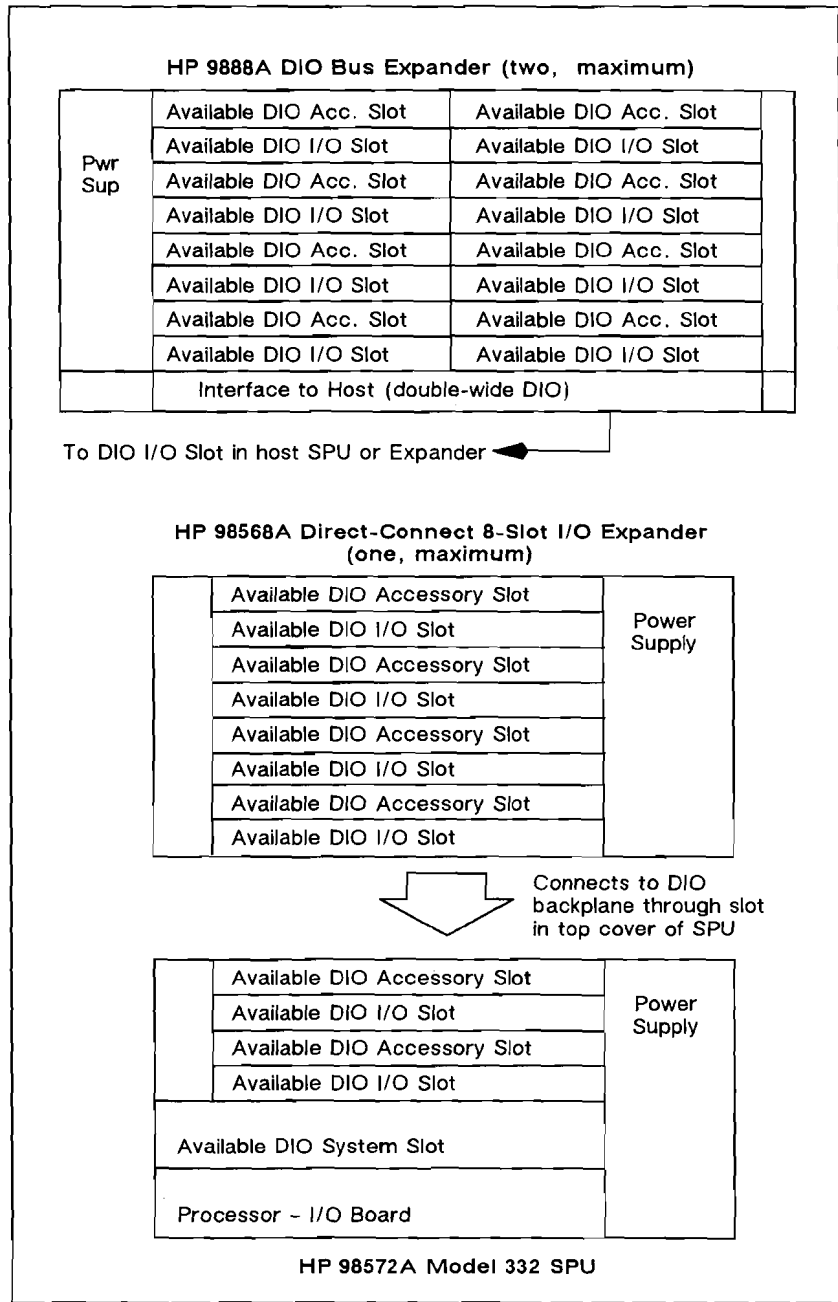


Figure 2. Model 332 Backplane Layout and Expandability

Product Summary

98572A Model 332 System Processor Unit, consisting of:

- A. Processor - I/O (system interface)board with:
1. 32-bit MC68030 CPU.
 2. 1 MB of parity-checking RAM.
 3. 4 GB virtual memory address space (under HP-UX).
 4. 32-bit memory bus and 16-bit DIO bus.
 5. IEEE-488 HP-IB interface and 1 meter HP-IB cable.
 6. RS-232C serial interface (1 port).
 7. HP-HIL interface and HP-HIL keyboard cable.
 8. 512 by 400 monochrome video output.
 9. Audio output interface.
- B. Enclosure with 1 available DIO system slot, 2 available DIO accessory slots, 2 available DIO I/O slots, and power supply.
- C. Manuals.
- D. 90-day on-site warranty.

Options

003: Deletes on-board monochrome video output interface from processor - I/O board.

004: Deletes 4-slot I/O card cage, leaving slots for CPU board and optional graphics interface.

102: Provides 2 MB RAM (adds second 1 MB RAM card).

104: Substitutes 4 MB RAM for 1 MB RAM.

544: Substitutes high-resolution (1024 by 768) monochrome graphics for medium resolution monochrome graphics (provides functionality of 98544B on Processor - I/O board).

882: Adds MC68882 floating point coprocessor (required to support HP-UX operating system).

Add-on Accessories

98269A: 1 MB Parity RAM daughterboard.

98269B: 4 MB Parity RAM daughterboard.

98284A: MC68882 floating point coprocessor.

98285A: Graphics upgrade kit (high resolution 1024 by 768 monochrome graphics instead of medium resolution graphics).

98568A: Direct Connect 8-slot I/O Expander (maximum of one per Model 332 SPU).

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

46021x: HP-HIL Keyboard (for National Versions, see page 13).

46060A: HP-HIL Two-button Mouse.

46081A: Buffer box with speaker.

46084A: HP-HIL ID Module.

98203x: HP-HIL Keyboard with rotary knob, for BASIC/WS or Series 200/300 Pascal systems (for National Versions, see page 13).

35731A: 12-inch Medium-resolution (512 by 400) Monochrome Monitor.

98543A: Medium-resolution (512 by 400 by 4) Color Video Output Board with RGB cable.

35741A: 12-inch Medium-resolution (512 by 400) Color Monitor.

35723A: HP-Touch Bezel for 35731A/35741A Monitor.

98544B: High-resolution (1024 by 768) Monochrome Video Output Board (option 544 provides this functionality on processor - I/O board at a lower price and without using another DIO system slot).

98786A: 17-inch High-resolution (1024 by 768) Monochrome Monitor.

98546A: Display Compatibility Interface with separate alpha and graphics planes for use with applications software that requires compatibility with Series 200 displays. (Requires adjacent DIO Accessory and DIO I/O slots).

98547A: High-resolution (1024 by 768 by 6) Color Video Output Board.

98549A: High-resolution (1024 by 768 by 6) Color Video Output Board.

98751A: 19-inch High-resolution (1024 by 768) Color Monitor.

98785A: 16-inch High-resolution (1024 by 768) Color Monitor.

98548A: High-resolution (1280 by 1024) Monochrome Video Output Board.

98788A: 19-inch High-resolution (1280 by 1024) Monochrome Monitor.

98550A: High-resolution (1280 by 1024 by 8) Color Video Output Board.

98752A: 19-inch High-resolution (1280 by 1024) Color Monitor.

98788A: 16-inch High-resolution (1280 by 1024) Color Monitor.

Operational Requirements

- 1. Operating System:** The BASIC/WS, HP-UX, or Pascal/WS System (see pages 10-12).
- 2. System Console:** A keyboard and monitor or a separate terminal (see pages 127-131).
- 3. System Disk:** A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).
- 4. Software Installation/ Backup Device:** A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 332CMA Instrument Controller

Description

The HP 9000 Model 332CMA is an instrument controller with keyboard and 12-inch color monitor that is based on the Model 332 System Processor Unit. Figures 3 and 4 illustrate the Model 332CMA functions and backplane usage and interconnections.

SPU: HP 98572A Model 332, as described on page 15.

Operating System: BASIC/WS.

Monitor: 12-inch 512 by 400 Color Monitor.

Expandability: See Figure 2, page 15.

Product Summary

98581C Model 332CMA Color Instrument Controller, consisting of:

A. 98572A Option 003 System Processor Unit (monochrome graphics deleted).

B. 98543A Medium Resolution Color Video Board with RGB cable.

C. 35741A 12-inch Medium Resolution (512 by 400) Color Monitor.

D. Keyboard, which must be specified by national version option (see page 13) unless keyboard is deleted with a keyboard delete option.

E. 98616A Option 044 BASIC Language System software on 3.5-inch flexible disks.

F. Manuals.

G. 90-day on-site warranty.

Keyboard Delete Options

For applications in which it is desired to substitute a 98203x keyboard for the 46021x keyboard or if keyboard is not needed.

05A: English controller with 46021x keyboard deleted.

05C: Canadian French controller with 46021x keyboard deleted.

05D: German controller with 46021x keyboard deleted.

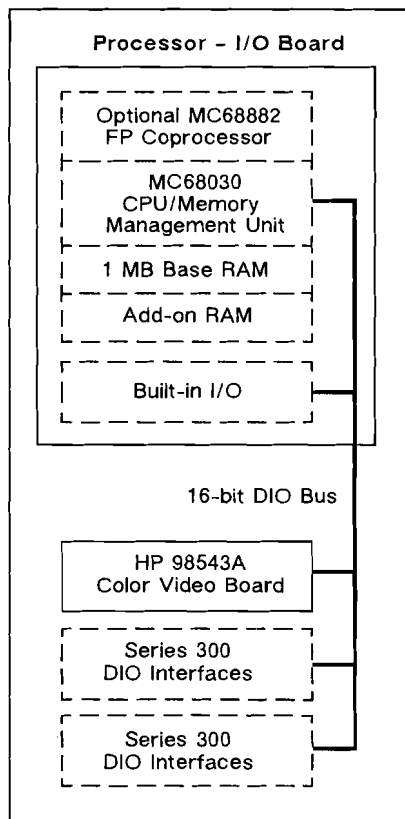


Figure 3. Model 332CMA Functions

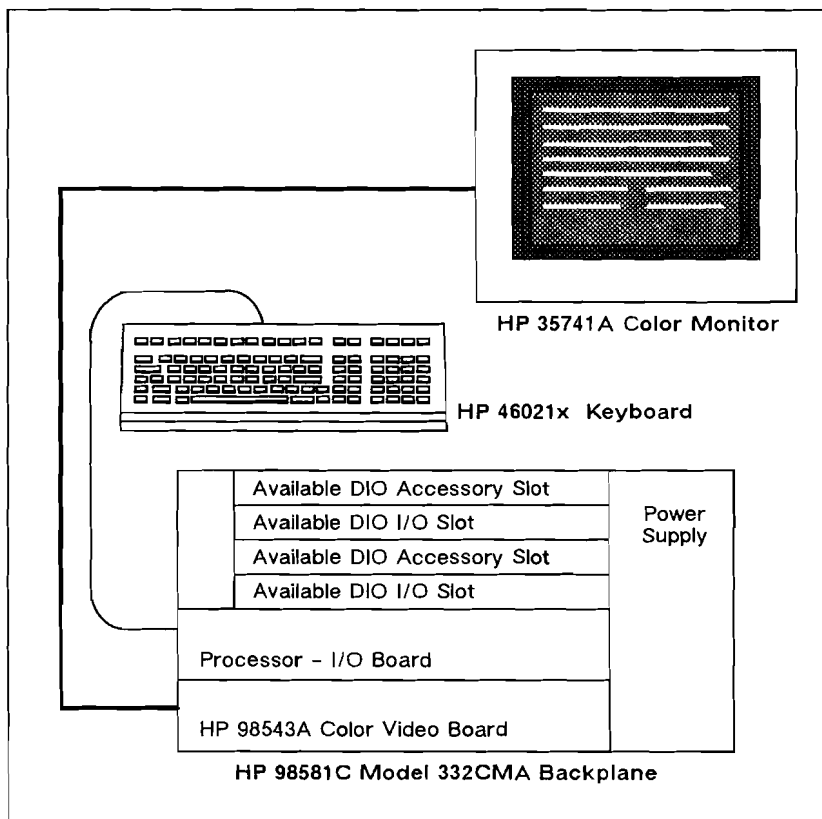


Figure 4. Model 332CMA Backplane Usage and Interconnections



05E: European Spanish controller with 46021x keyboard deleted.

05F: European French controller with 46021x keyboard deleted.

05K: Universal English controller with 46021x keyboard deleted.

05M: Latin Spanish controller with 46021x keyboard deleted.

05Z: Italian controller with 46021x keyboard deleted.

Other Options

008: Adds 98546A Display Compatibility Interface with separate alpha and graphics planes for use with applications software that requires compatibility with Series 200 displays. (Requires adjacent DIO Accessory and DIO I/O slots.)

042: Provides BASIC Software on 5.25-inch flexible disks instead of 3.5-inch flexible disks.

100: Deletes BASIC reference manuals.

102: Provides 2 MB RAM (adds second 1 MB RAM card).

104: Substitutes 4 MB RAM for 1 MB RAM.

613: Deletes BASIC Language System (media, license, and manuals).

618: Adds BASIC Compiler media and manuals).

882: Adds MC68882 floating point coprocessor.

Add-on Accessories

98269A: 1 MB Parity RAM daughterboard.

98269B: 4 MB Parity RAM daughterboard.

98284A: MC68882 floating point coprocessor.

98568A: Direct Connect 8-slot I/O Expander (maximum of one per Model 332CMA).

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

46081A: Buffer box with speaker.

46084A: HP-HIL ID Module.

98203x: HP-HIL Keyboard with rotary knob, for BASIC/WS or Series 200/300 Pascal systems (for National Versions, see page 13).

46060A: HP-HIL Two-button Mouse.

46081A: Buffer box with speaker.

46084A: HP-HIL ID Module.

98203C: HP-HIL Keyboard with rotary knob, for BASIC/WS or Series 200/300 Pascal systems.

46060A: HP-HIL Two-button Mouse.

35723A: HP-Touch Bezel for 35731A/35741A Monitor.

Operational Requirement

The Model 332CMA Instrument Controller requires a 3.5-inch or 5.25-inch flexible disk connected directly to the local system for software loading and backup.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 332MMA Instrument Controller

Description

The HP 9000 Model 332MMA is an instrument controller with keyboard and 12-inch monochrome monitor that is based on the Model 332 System Processor Unit. Figures 5 and 6 illustrate the Model 332MMA functions and backplane usage and interconnections.

SPU: HP 98572A Model 332, as described on page 15.

Operating System: BASIC/WS.

Monitor: 12-inch 512 by 400 Monochrome Monitor.

Expandability: See Figure 2, page 15.

Product Summary

98580C Model 332MMA Monochrome Instrument Controller, consisting of:

- A. 98572A System Processor Unit.
- B. 35731A 12-inch Medium Resolution (512 by 400) Monochrome Monitor.
- C. Keyboard, which must be specified by national version option (see page 13) unless keyboard is deleted with a keyboard delete option.
- D. 98616A Option 044 BASIC Language System software on 3.5-inch flexible disks.
- E. Manuals.
- F. 90-day on-site warranty.

Keyboard Delete Options

For applications in which it is desired to substitute a 98203x keyboard for the 46021x keyboard or if keyboard is not needed.

05A: English controller with 46021x keyboard deleted.

05C: Canadian French controller with 46021x keyboard deleted.

05D: German controller with 46021x keyboard deleted.

05E: European Spanish controller with 46021x keyboard deleted.

05F: European French controller with 46021x keyboard deleted.

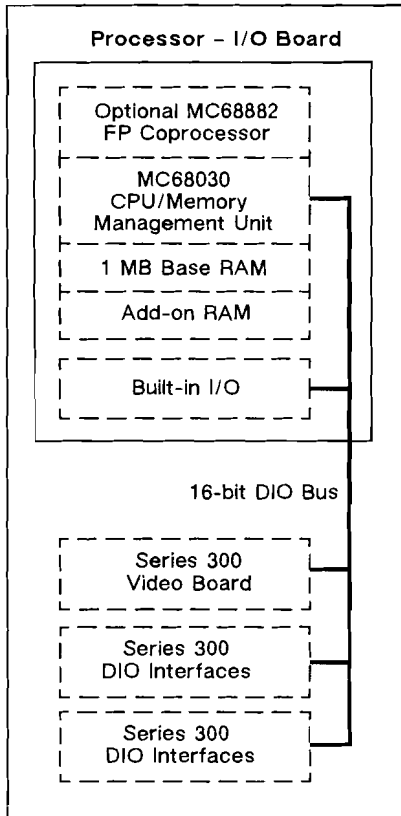


Figure 5. Model 332MMA Functions

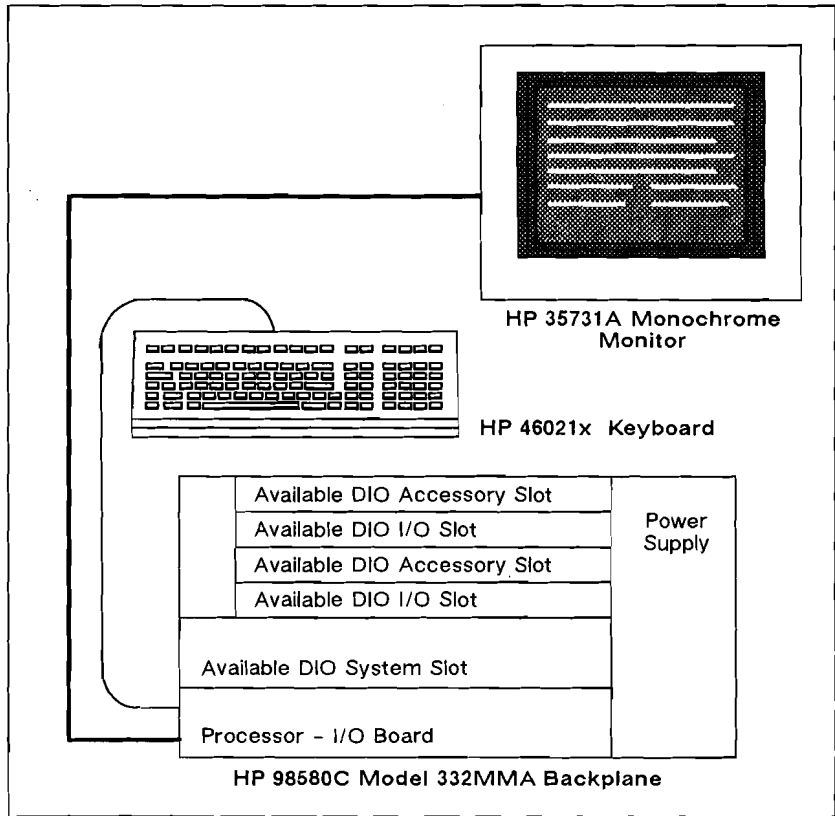


Figure 6. Model 332MMA Backplane Usage and Interconnections

05K: ICON English controller with 46021x keyboard deleted.

05M: Latin Spanish controller with 46021x keyboard deleted.

05Z: Italian controller with 46021x keyboard deleted.

Other Options

008: Adds 98546A Display Compatibility Interface with separate alpha and graphics planes for use with applications software that requires compatibility with Series 200 displays. (Requires adjacent DIO Accessory and DIO I/O slots.)

042: Provides BASIC Software on 5.25-inch flexible disks instead of 3.5-inch flexible disks.

100: Deletes BASIC reference manuals.

102: Provides 2 MB RAM (adds second 1 MB RAM card).

104: Substitutes 4 MB RAM for 1 MB RAM.

613: Deletes BASIC Language System (media, license, and manuals).

618: Adds BASIC Compiler media and manuals).

882: Adds MC68882 floating point coprocessor.

Add-on Accessories

98269A: 1 MB Parity RAM daughterboard.

98269B: 4 MB Parity RAM daughterboard.

98284A: MC68882 floating point coprocessor.

98568A: Direct Connect 8-slot I/O Expander (maximum of one per Model 332CMA).

9888A: 16-slot DIO Expander (uses one DIO I/O slot – maximum of two).

98203x: HP-HIL Keyboard with rotary knob, for BASIC/WS or Series 200/300 Pascal systems (for National Versions, see page 13).

35723A: HP-Touch Bezel for 35731A/35741A Monitor.

46060A: HP-HIL Two-button Mouse.

46081A: Buffer box with speaker.

46084A: HP-HIL ID Module.

Operational Requirement

The Model 332MMA Instrument Controller requires a 3.5-inch or 5.25-inch flexible disk connected directly to the local system for software loading and backup.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model R/332 Instrument Controller

Description

The HP 9000 Model R/332 is an instrument controller packaged with keyboard and 9-inch monochrome touchscreen display, Model 332 Processor - I/O board, 8 slot DIO backplane, built-in flexible disk (and built-in hard disk in some versions). Figures 7 and 8 illustrate the Model R/332 functions and backplane layout, interconnections, and expandability.

CPU: MC68030, clocked at 16.7 MHz.

Bus Types: 32-bit memory bus and 16-bit Direct I/O (DIO) bus.

RAM: 1 MB parity is standard, 2, 4, 5, or 8 MB is optional.

Built-in Interfaces: HP-HIL, RS-232C, Std HP-IB, 512 by 400 monochrome video to built-in display, and audio output to built-in beeper.

LAN Interface: HP 98643A (uses a DIO I/O slot).

Floating Point Coprocessor: MC68882 is option 882.

Expandability: See Figure 8, below.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

Operating System: BASIC/WS, Version 5.13, is included; R/332 also supports Pascal/WS Version 3.22 and HP-UX Version 6.5.

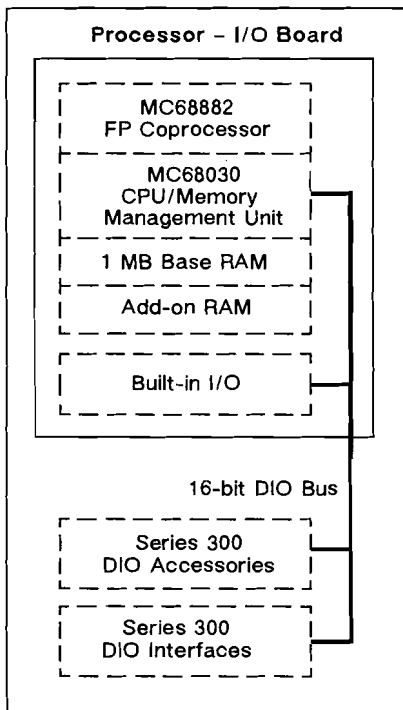


Figure 7. Model R/332 Functions

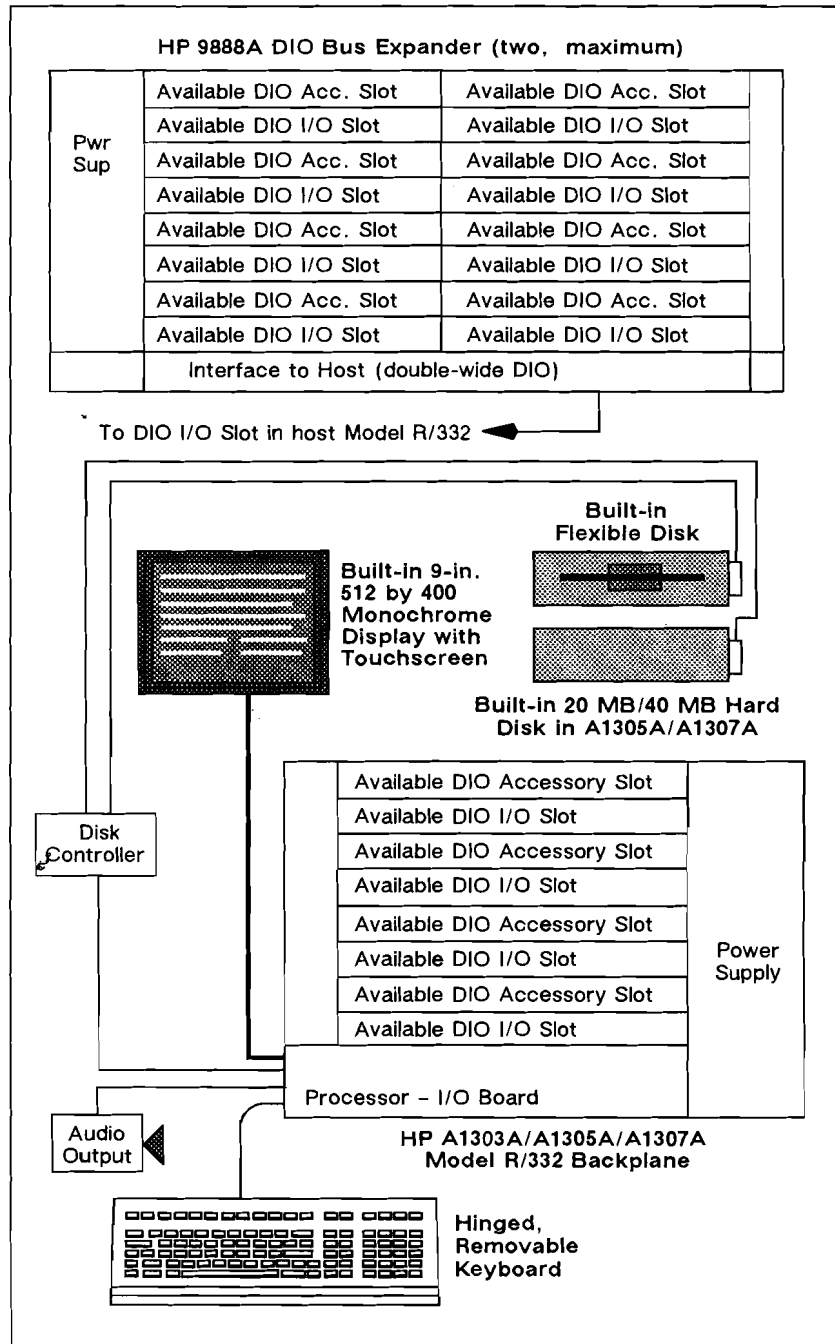


Figure 8. Model R/332 Backplane Layout, Interconnections, and Expandability

Display: 9-inch 512 by 400 monochrome display with Touchscreen.

Flexible Disk: 3.5-inch 1.4 MB flexible disk drive is standard on all versions.

Hard Disk: 20 MB hard disk is standard on A1305A; 40 MB hard disk is standard on A1307A.

Product Summary

A1303A Model R/332 Instrument Controller, consisting of:

- A. Processor - I/O board with:
 - 1. 32-bit MC68030 CPU.
 - 2. 1 MB of parity-checking RAM.
 - 3. 32-bit memory bus and 16-bit DIO bus.
 - 4. IEEE-488 HP-IB interface.
 - 5. RS-232C serial interface (1 port).
 - 6. HP-HIL interface and HP-HIL keyboard cable.
 - 7. 512 x 400 monochrome video interface.
 - 8. Audio output.
- B. Enclosure with built-in 9-inch 512 by 400 monochrome display with touchscreen, 4 available DIO accessory slots, 4 available DIO I/O slots, and power supply.
- C. Hinged, removable keyboard, which must be specified by national version option (see options, below).
- D. 98616A Option 045 BASIC Language System software on double-sided 3.5-inch flexible disks.
- E. Built-in 3.5-inch double-sided 1.4 MB flexible disk drive.
- F. Manuals.
- G. 90-day on-site warranty.

A1305A Model R/332 Instrument Controller, consisting of:

- A. A1303A Model R/332 Instrument Controller, as defined above.
- B. 20 MB built-in hard disk with BASIC/WS preinstalled .

A1307A Model R/332 Instrument Controller, consisting of:

- A. A1303A Model R/332 Instrument Controller, as defined above.
- B. 40 MB built-in hard disk with BASIC/WS preinstalled.

National Version Options

ABA: Provides U.S. keyboard and manuals in English.

ABD: Provides German keyboard and manuals in German.

ABF: Provides French keyboard and manuals in French.

ABJ: Provides Katakana keyboard and manuals in Japanese.

ABU: Provides United Kingdom keyboard and manuals in English.

RAM Options

102: Provides 2 MB memory (adds second 1 MB RAM card).

104: Provides 4 MB memory (substitutes 4 MB RAM card for 1 MB RAM card).

105: Provides 5 MB memory (adds 4 MB RAM card).

108: Provides 8 MB memory (substitutes two 4 MB RAM cards for 1 MB RAM card).

Other Options

001: Deletes touchscreen.

100: Deletes BASIC reference manuals.

613: Deletes BASIC Language System and BASIC reference manuals.

882: Adds MC68882 floating point coprocessor. (Required if HP-UX operating system is substituted for BASIC/WS system.)

Add-on Accessories

A1308A: Custom Engineering Kit.

A1309A: Rack Mount Flange Kit for rack mounting the Model R/332. Also requires 1494-0059 or 1494-0063 rack slides or 12679B slide rails.

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

46080A: HP-HIL extension cable (required for keyboard if used detached).

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 340C + Workstation

Description

The HP 9000 Model 340C + is a low-priced, non-extendable MC68030-based Series 300 color workstation. It includes keyboard and 16-inch 1024 by 768 color monitor. Figures 9 and 10 illustrate the Model 340C + functions and backplane usage and interconnections.

CPU: MC68030, clocked at 16.7 MHz.

Bus Types: 32-bit memory and Direct I/O-II (DIO-II) buses.

RAM: 4 MB parity, expandable to 16 MB with add-on RAM boards.

Built-in Interfaces: HP-HIL, LAN (AUI or ThinLAN with built-in ThinMAU), RS-232C, Std HP-IB, and color video output.

Floating Point Processor: MC68882, clocked at 16.7 MHz, is standard.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

Operating System: 98594L HP-UX License to Use Application Execution Environment, Programming Environment, NS-ARPA, NFS, and X-Windows Version 11 are included; one set of 98594A option 022 media and manuals must be purchased separately to provide installable software for all 98594L licensed workstations at a site.

Monitor: 16-inch 1024 by 768 Color Monitor.

Product Summary

98564C Model 340C + Color Workstation, consisting of:

- A. Processor - I/O board with:
 1. 32-bit MC68030 16.7 MHz CPU with MC68882 16.7 MHz Floating Point Processor.
 2. 4 MB of parity-checking RAM.
 3. 4 GB virtual memory address space.
 4. 32-bit memory and DIO-II buses.
 5. IEEE-488 HP-IB interface and 1 meter HP-IB cable.
 6. RS-232C serial interface (1 port).
 7. HP-HIL interface and HP-HIL keyboard cable.
 8. IEEE 802.3/Ethernet LAN interface.

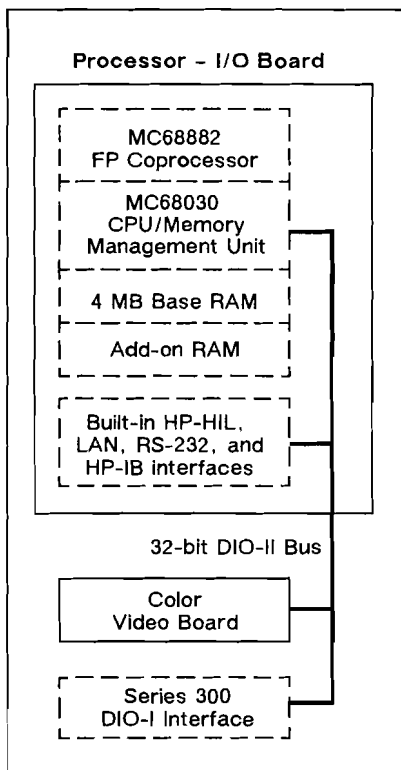


Figure 9. Model 340C +
Functions

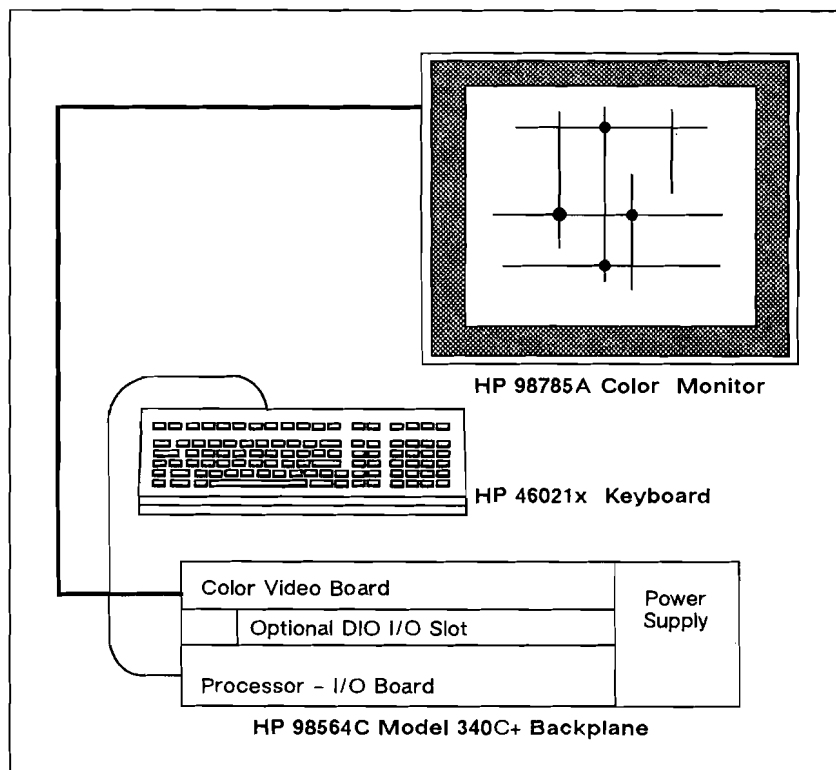


Figure 10. Model 340C + Backplane Usage and Interconnections

- B. 1024 by 768 by 6 plane color video interface with cable to monitor.
- C. Enclosure with 1 optionally available DIO-I I/O slot and power supply.
- D. 98785A 16-inch High Resolution (1024 by 768) Monochrome Monitor.
- E. Keyboard, which must be specified by national version option (see page 13).
- F. Installation manuals.
- G. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).
- H. 90-day on-site warranty.

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

060: Adds 46060A 2-button HP-HIL mouse.

084: Adds 46084A HP-HIL ID module.

108: Increases total RAM to 8 MB (adds one 98268A 4 MB add-on RAM board - excludes options 112 and 116).

112: Increases total RAM to 12 MB (adds two 98268A 4 MB add-on RAM boards - excludes options 108 and 116).

116: Increases total RAM to 16 MB (adds three 98268A 4 MB add-on RAM boards - excludes options 108 and 112).

719: Substitutes 98751A 19-inch color monitor for 98785A 16-inch color monitor.

Options

006: Adds 1 DIO-I I/O Slot (98013A). (Excludes options 010 and 011).

010: Adds 98625B high speed HP-IB (disk) interface (Includes option 006, excludes option 011).

011: Adds 98658A SCSI (disk) interface (Includes option 006, excludes option 010).

Add-on Accessories

98013A: DIO I/O Slot Upgrade.

98235A: AUI Upgrade for built-in LAN interface.

98237A: ThinLAN Upgrade for built-in LAN interface.

98268A: 4 MB add-on Parity RAM board.

98556A: 2D Integer-Based Graphics Accelerator.

Operational Requirements

1. Operating System:

HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system.

The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 340M Workstation

Description

The HP 9000 Model 340M is a low-priced, non-extendable MC68030-based Series 300 2D monochrome workstation. It includes keyboard and 17-inch 1024 by 768 monochrome monitor. Figures 11 and 12 illustrate the Model 340M functions and backplane usage and interconnections.

CPU: MC68030, clocked at 16.7 MHz.

Bus Types: 32-bit memory and Direct I/O-II (DIO-II) buses.

RAM: 4 MB parity, expandable to 16 MB with add-on RAM boards.

Built-in Interfaces: HP-HIL, LAN (AUI or ThinLAN with built-in ThinMAU), RS-232C, Std HP-IB, and monochrome graphics.

Floating Point Processor: MC68882, clocked at 16.7 MHz, is standard.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

Operating System: 98594L HP-UX License to Use Application Execution Environment, Programming Environment, NS-ARPA, NFS, and X-Windows Version 11 are included; one set of 98594A option 022 media and manuals must be purchased separately to provide installable software for all 98594L licensed workstations at a site.

Monitor: 17-inch 1024 by 768 Monochrome Monitor.

Product Summary

98563E Model 340M Monochrome Workstation, consisting of:

- A. Processor - I/O board with:
 1. 32-bit MC68030 16.7 MHz CPU with MC68882 16.7 MHz Floating Point Processor.
 2. 4 MB of parity-checking RAM.
 3. 4 GB virtual memory address space.
 4. 32-bit memory and DIO-II buses.
 5. IEEE-488 HP-IB interface and 1 meter HP-IB cable.
 6. RS-232C serial interface (1 port).
 7. HP-HIL interface and HP-HIL keyboard cable.
 8. IEEE 802.3/Ethernet LAN interface.

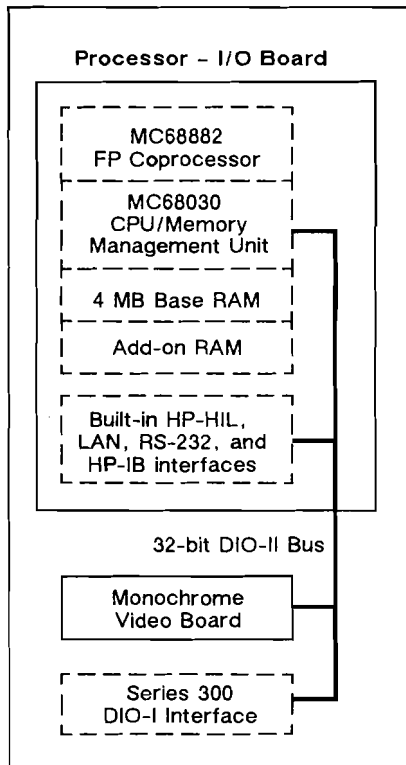


Figure 11. Model 340M Functions

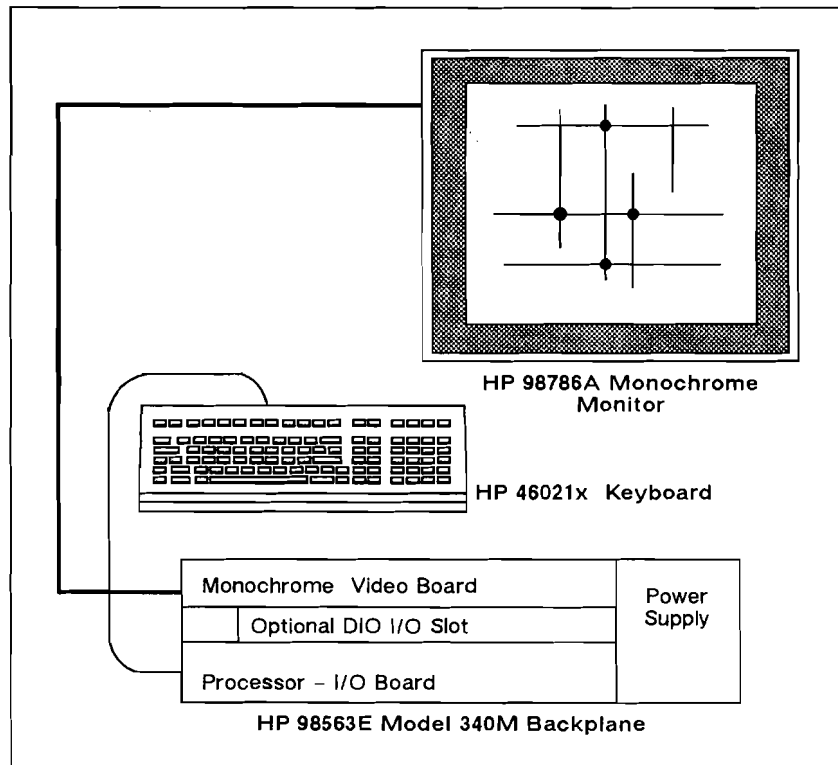


Figure 12. Model 340M Backplane Usage and Interconnections

B. 1024 by 768 monochrome video interface with cable to monitor.

C. Enclosure with 1 optionally available DIO-I I/O slot and power supply.

D. 98786A 17-inch High Resolution (1024 by 768) Monochrome Monitor.

E. Keyboard, which must be specified by national version option (see page 13).

F. Installation manuals.

G. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).

H. 90-day on-site warranty.

Options

006: Adds 1 DIO-I I/O Slot (98013A). (Excludes options 010 and 011).

010: Adds 98625B high speed HP-IB (disk) interface (Includes option 006, excludes option 011).

011: Adds 98658A SCSI (disk) interface (Includes option 006, excludes option 010).

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

060: Adds 46060A 2-button HP-HIL mouse.

084: Adds 46084A HP-HIL ID module.

108: Increases total RAM to 8 MB (adds one 98268A 4 MB add-on RAM board - excludes options 112 and 116).

112: Increases total RAM to 12 MB (adds two 98268A 4 MB add-on RAM boards - excludes options 108 and 116).

116: Increases total RAM to 16 MB (adds three 98268A 4 MB add-on RAM boards - excludes options 108 and 112).

Add-on Accessories

98013A: DIO I/O Slot Upgrade.

98235A: AUI Upgrade for built-in LAN interface.

98237A: ThinLAN Upgrade for built-in LAN interface.

98268A: 4 MB Parity add-on RAM board.

Operational Requirements

1. Operating System:

HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 340CH Workstation

Description

The HP 9000 Model 340CH is a low-priced, non-extendable MC68030-based high-resolution Series 300 2D color workstation. It includes keyboard and 16-inch 1280 by 1024 color monitor. Figures 13 and 14 illustrate the Model 340CH functions and backplane usage and interconnections.

CPU: MC68030, clocked at 16.7 MHz.

Bus Types: 32-bit memory and 16-bit Direct I/O (DIO) buses.

RAM: 4 MB parity built-in, expandable to 16 MB with add-on RAM boards.

Built-in Interfaces: HP-HIL, LAN (AUI or ThinLAN with built-in ThinMAU), RS-232C, Std HP-IB, and color video output.

Floating Point Processor: MC68882, clocked at 16.7 MHz, is standard.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

Operating System: 98594L HP-UX License to Use Application Execution Environment, Programming Environment, NS-ARPA, NFS, and X-Windows Version 11 are included; one set of 98594A option 022 media and manuals must be purchased separately to provide installable software for all 98594L licensed workstations at a site.

Monitor: 16-inch 1280 by 1024 Color Monitor.

Product Summary

98564G Model 340CH Color Workstation, consisting of:

- A. Processor - I/O board with:
 1. 32-bit MC68030 16.7 MHz CPU with MC68882 16.7 MHz Floating Point Processor.
 2. 4 MB of on-board parity-checking RAM.
 3. 4 GB virtual memory address space.
 4. 32-bit memory and DIO-II buses.
 5. IEEE-488 HP-IB interface and 1 meter HP-IB cable.
 6. RS-232C serial interface (1 port).
 7. HP-HIL interface and HP-HIL keyboard cable.
 8. IEEE 802.3/Ethernet LAN interface.

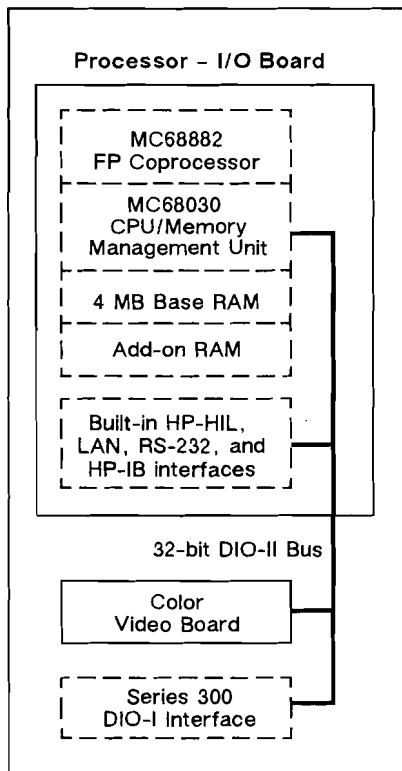


Figure 13. Model 340CH Functions

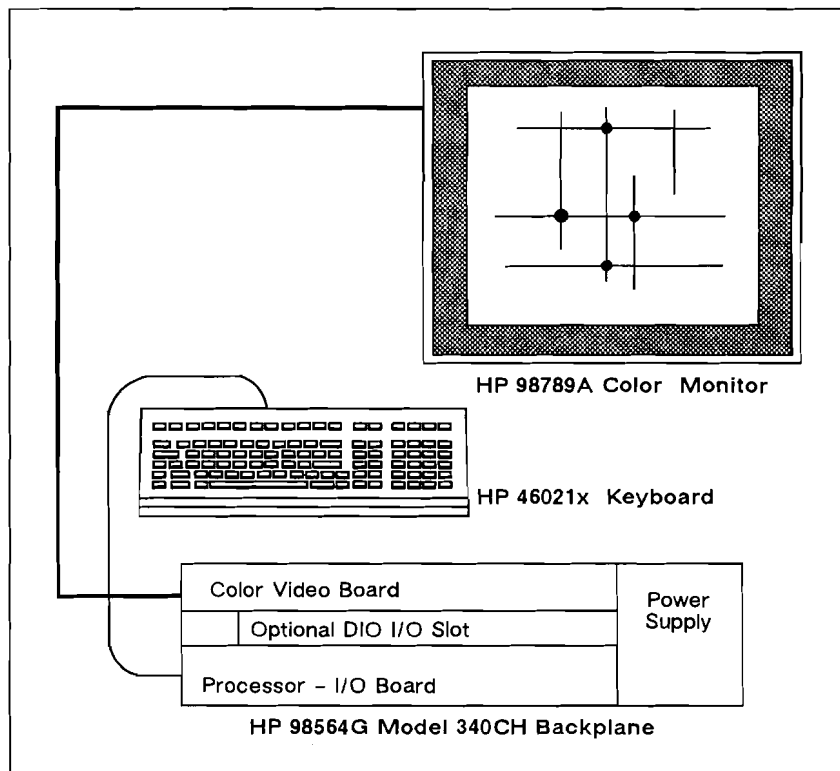


Figure 14. Model 340CH Backplane Usage and Interconnections

- B. 1280 by 1024 by 8 plane color video interface with cable to monitor.
- C. Enclosure with 1 optionally available DIO-I I/O slot and power supply.
- D. 98789A 16-inch High Resolution (1280 by 1024) Color Monitor.
- E. Keyboard, which must be specified by national version option (see page 13).
- F. Installation manuals.
- G. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).
- H. 90-day on-site warranty.

Options

- 006:** Adds 1 DIO-I I/O Slot (98013A). (Excludes options 010 and 011).
- 010:** Adds 98625B high speed HP-IB (disk) interface (Includes option 006, excludes option 011).
- 011:** Adds 98658A SCSI (disk) interface (Includes option 006, excludes option 010).
- 015:** Specifies AUI-type LAN connection (excludes option 017).
- 017:** Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

060: Adds 46060A 2-button HP-HIL mouse.

084: Adds 46084A HP-HIL ID module.

108: Increases total RAM to 8 MB (adds one 98268A 4 MB add-on RAM board - excludes options 112 and 116).

112: Increases total RAM to 12 MB (adds two 98268A 4 MB add-on RAM boards - excludes options 108 and 116).

116: Increases total RAM to 16 MB (adds three 98268A 4 MB add-on RAM boards - excludes options 108 and 112).

556: Adds integer-based 2D Graphics Accelerator to graphics interface.

719: Substitutes 98751A 19-inch color monitor for 98789A 16-inch color monitor.

Add-on Accessories

- 98013A:** DIO I/O Slot Upgrade.
- 98235A:** AUI Upgrade for built-in LAN interface.
- 98237A:** ThinLAN Upgrade for built-in LAN interface.
- 98268A:** 4 MB Parity add-on RAM board.
- 98556A:** 2D Integer-Based Graphics Accelerator.

Operational Requirements

- 1. Operating System:** HP 98594A Option 022 Media and documentation for 98594L must be available for installation.
- 2. System Disk:** A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).
- 3. Software Installation/ Backup Device:** A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

- Interfacing:** See pages 84-99.
- Terminals:** See pages 127-135.
- Disks:** See pages 136-140.
- Cartridge Tape Subsystems and Magnetic Tape Units:** See pages 141-142.
- Printers:** See pages 143-146.
- Plotters:** See pages 147-152.
- Communications:** See pages 153-158.
- Data Base Management:** See pages 159-160.
- Application Development:** See pages 161-163.
- MS-DOS Support:** See pages 164-166.
- Rack Mounting:** See pages 167-169.

Model 340MH Workstation

Description

The HP 9000 Model 340MH is a low-priced, non-extendable MC68030-based high-resolution Series 300 2D monochrome workstation. It includes keyboard and 19-inch 1280 by 1024 color monitor. Figures 15 and 16 illustrate the Model 340MH functions and backplane usage and interconnections.

CPU: MC68030, clocked at 16.7 MHz.

Bus Types: 32-bit memory and 16-bit Direct I/O (DIO) buses.

RAM: 4 MB parity built-in, expandable to 16 MB with add-on RAM boards.

Built-in Interfaces: HP-HIL, LAN (AUI or ThinLAN with built-in ThinMAU), RS-232C, Std HP-IB, and monochrome video output.

Floating Point Processor: MC68882, clocked at 16.7 MHz, is standard.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

Operating System: 98594L HP-UX License to Use Application Execution Environment, Programming Environment, NS-ARPA, NFS, and X-Windows Version 11 are included; one set of 98594A option 022 media and manuals must be purchased separately to provide installable software for all 98594L licensed workstations at a site.

Monitor: 19-inch 1280 by 1024 Monochrome Monitor.

Product Summary

98563G Model 340MH Color Workstation, consisting of:

- A. Processor - I/O board with:
 1. 32-bit MC68030 16.7 MHz CPU with MC68882 16.7 MHz Floating Point Processor.
 2. 4 MB of on-board parity-checking RAM.
 3. 4 GB virtual memory address space.
 4. 32-bit memory and DIO-II buses.
 5. IEEE-488 HP-IB interface and 1 meter HP-IB cable.
 6. RS-232C serial interface (1 port).
 7. HP-HIL interface and HP-HIL keyboard cable.
 8. IEEE 802.3/Ethernet LAN interface.

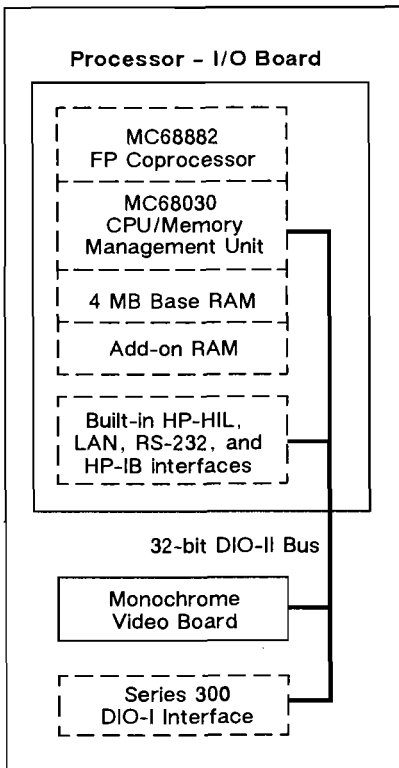


Figure 15. Model 340MH Functions

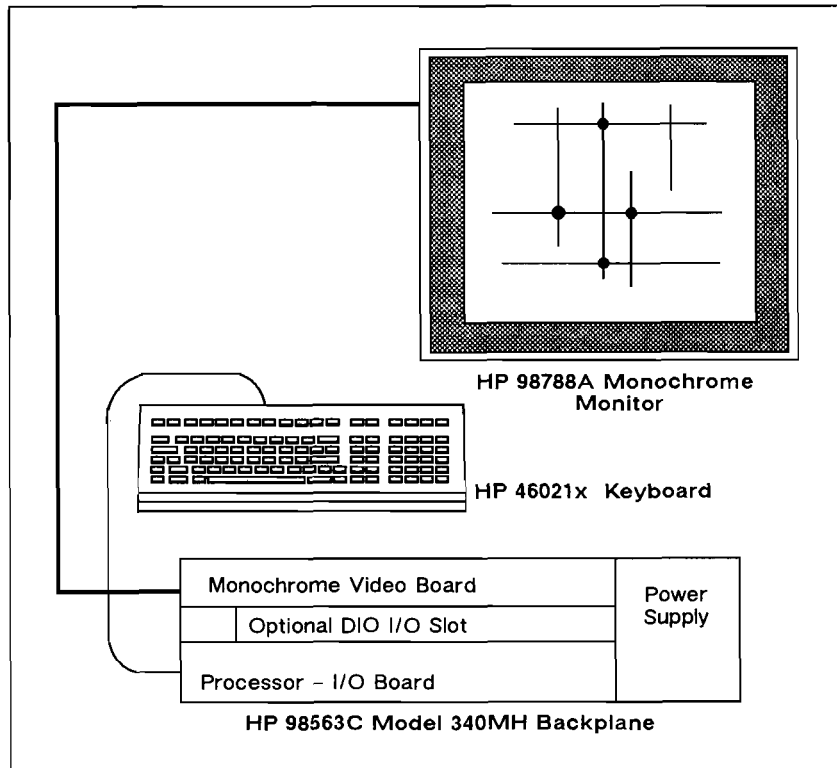


Figure 16. Model 340MH Backplane Usage and Interconnections

- B. 1280 by 1024 monochrome video interface with cable to monitor.
- C. Enclosure with 1 optionally available DIO-I I/O slot and power supply.
- D. 98788A 19-inch High Resolution (1280 by 1024) Monochrome Monitor.
- E. Keyboard, which must be specified by national version option (see page 13).
- F. Installation manuals.
- G. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).
- H. 90-day on-site warranty.

Options

- 006:** Adds 1 DIO-I I/O Slot (98013A). (Excludes options 010 and 011).
- 010:** Adds 98625B high speed HP-IB (disk) interface (Includes option 006, excludes option 011).
- 011:** Adds 98658A SCSI (disk) interface (Includes option 006, excludes option 010).

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

060: Adds 46060A 2-button HP-HIL mouse.

084: Adds 46084A HP-HIL ID module.

108: Increases total RAM to 8 MB (adds one 98268A 4 MB add-on RAM board - excludes options 112 and 116).

112: Increases total RAM to 12 MB (adds two 98268A 4 MB add-on RAM boards - excludes options 108 and 116).

116: Increases total RAM to 16 MB (adds three 98268A 4 MB add-on RAM boards - excludes options 108 and 112).

Add-on Accessories

- 98013A:** DIO I/O Slot Upgrade.
- 98235A:** AUI Upgrade for built-in LAN interface.
- 98237A:** ThinLAN Upgrade for built-in LAN interface.
- 98268A:** 4 MB Parity add-on RAM board.

Operational Requirements

1. Operating System:

HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system.

The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 340SRX Workstation

Description

The HP 9000 Model 340SRX is a low-priced, non-extendable MC68030-based high-resolution Series 300 solid rendering 3D color workstation. It includes keyboard and 16-inch 1280 by 1024 color monitor. Figures 17 and 18 illustrate the Model 340SRX functions and backplane usage and interconnections.

CPU: MC68030, clocked at 16.7 MHz.

Bus Types: 32-bit memory and 16-bit Direct I/O (DIO) buses.

RAM: 4 MB parity built-in, expandable to 16 MB with add-on RAM boards.

Built-in Interfaces: HP-HIL, LAN (AUI or ThinLAN with built-in ThinMAU), RS-232C, Std HP-IB, and local graphics bus (display controller) interface.

Floating Point Processor: MC68882, clocked at 16.7 MHz, is standard.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

Operating System: 98594L HP-UX License to Use Application Execution Environment, Programming Environment, NS-ARPA, NFS, and X-Windows Version 11 are included; one set of 98594A option 022 media and manuals must be purchased separately to provide installable software for all 98594L licensed workstations at a site.

Monitor: 16-inch 1280 by 1024 Color Monitor.

Product Summary

98573C Model 340SRX Solid Rendering Color Workstation, consisting of:

- A. Processor - I/O board with:
 1. 32-bit MC68030 16.7 MHz CPU with MC68882 16.7 MHz Floating Point Processor.
 2. 4 MB of on-board parity-checking RAM.
 3. 4 GB virtual memory address space.
 4. 32-bit memory and DIO-II buses.
 5. IEEE-488 HP-IB interface and 1 meter HP-IB cable.
 6. RS-232C serial interface (1 port).
 7. HP-HIL interface and HP-HIL keyboard cable.
 8. IEEE 802.3/Ethernet LAN interface.
- B. Local Graphics Bus Interface to 98720A Display Controller.

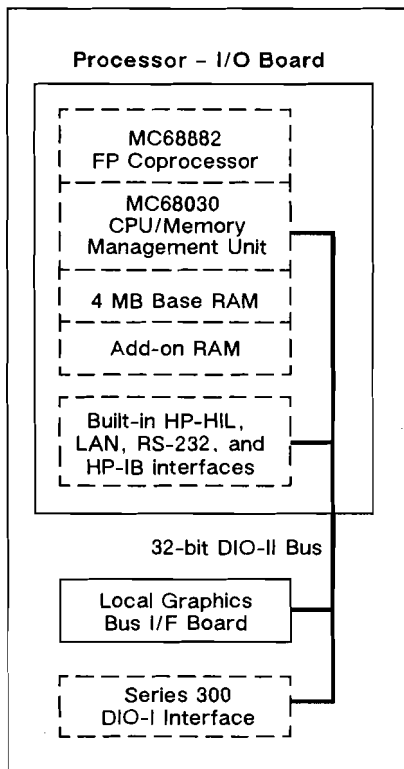


Figure 17. Model 340SRX Functions

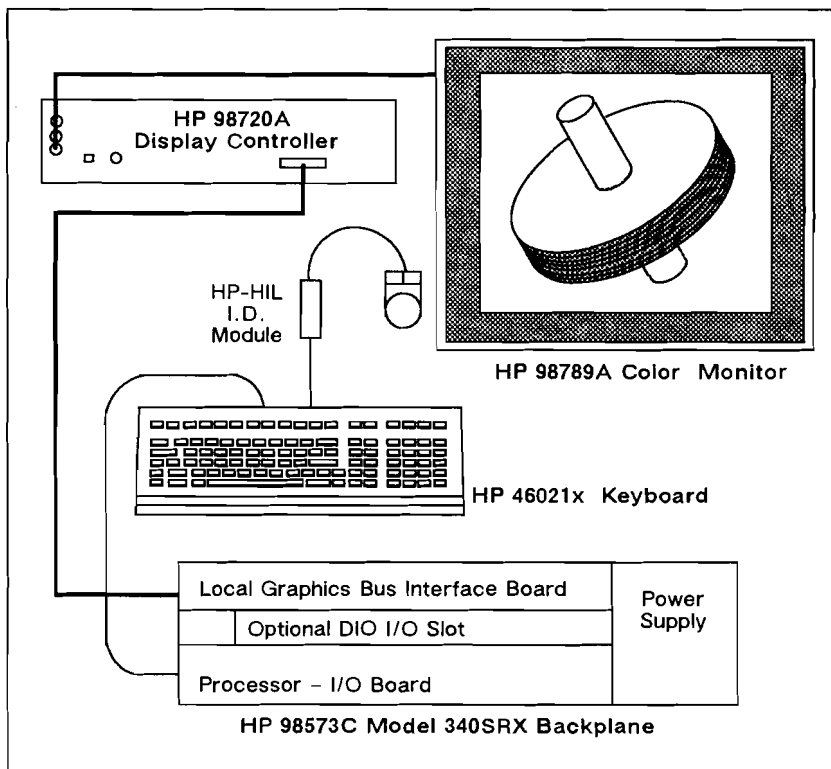


Figure 18. Model 340SRX Backplane Usage and Interconnections

- C. Enclosure with 1 optionally available DIO-I I/O slot and power supply.
- D. 98720A Display Controller with 3D solid rendering graphics acclerator and 8 planes of frame buffer memory.
- E. 98789A 16-inch High Resolution (1280 by 1024) Color Monitor.
- F. Keyboard, which must be specified by national version option (see page 13).
- G. 46060A 2-button HP-HIL Mouse.
- H. 46084A HP-HIL ID module.
- I. Installation manuals.
- J. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).
- K. 90-day on-site warranty.

Options

- 010:** Adds 98625B high speed HP-IB (disk) interface (Excludes option 011).
- 011:** Adds 98658A SCSI (disk) interface (Excludes option 010).
- 015:** Specifies AUI-type LAN connection (excludes opt. 017).
- 016:** Increases SRX frame buffers to 16 (adds one 98722A 8-plane frame buffer board and additional power supply – excludes options 024 and 032).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC “T” connector)(excludes option 015).

024: Increases SRX frame buffers to 24 (adds two 98722A 8-plane frame buffer boards and additional power supply – excludes options 016 and 032).

032: Increases SRX frame buffers to 32 (adds three 98722A 8-plane frame buffer board and additional power supply – excludes options 016 and 024).

108: Increases total RAM to 8 MB (adds one 98268A 4 MB add-on RAM board – excludes options 112 and 116).

112: Increases total RAM to 12 MB (adds two 98268A 4 MB add-on RAM boards – excludes options 108 and 116).

116: Increases total RAM to 16 MB (adds three 98268A 4 MB add-on RAM boards – excludes options 108 and 112).

719: Substitutes 98751A 19-inch color monitor for 98789A 16-inch color monitor.

Add-on Accessories

- 98235A:** AUI Upgrade for built-in LAN interface.
- 98237A:** ThinLAN Upgrade for built-in LAN interface.
- 98268A:** 4 MB Parity add-onRAM board.
- 98722A:** 8-plane frame buffer board (max. of four 8-plane frame buffers per 98720A).
- 98723A:** Additional power supply for 98720A Display Controller with more than 8 planes of frame buffer memory.

Operational Requirements

- 1. Operating System:** The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.
- 2. System Disk:** A hard disk with at least 81 MB (see pages 136-140). The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).
- 3. Software Installation/ Backup Device:** A cartridge tape subsystem (see pages 141-142).

Other Items

- Interfacing:** See pages 84-99.
- Terminals:** See pages 127-135.
- Disks:** See pages 136-140.
- Cartridge Tape Subsystems and Magnetic Tape Units:** See pages 141-142.
- Printers:** See pages 143-146.
- Plotters:** See pages 147-152.
- Communications:** See pages 153-158.
- Data Base Management:** See pages 159-160.
- Application Development:** See pages 161-163.
- MS-DOS Support:** See pages 164-166.
- Rack Mounting:** See pages 167-169.

Model 360 System Processor Unit

Description

The HP 9000 Model 360 is a mid-priced HP 9000 Series 300 System Processor Unit (SPU) that affords expandability. Figures 19 and 20 illustrate the Model 360 bus architecture and backplane layout and expandability.

CPU: MC68030, clocked at 25 MHz.

Bus Types: 32-bit memory and Direct I/O-II (DIO-II) buses.

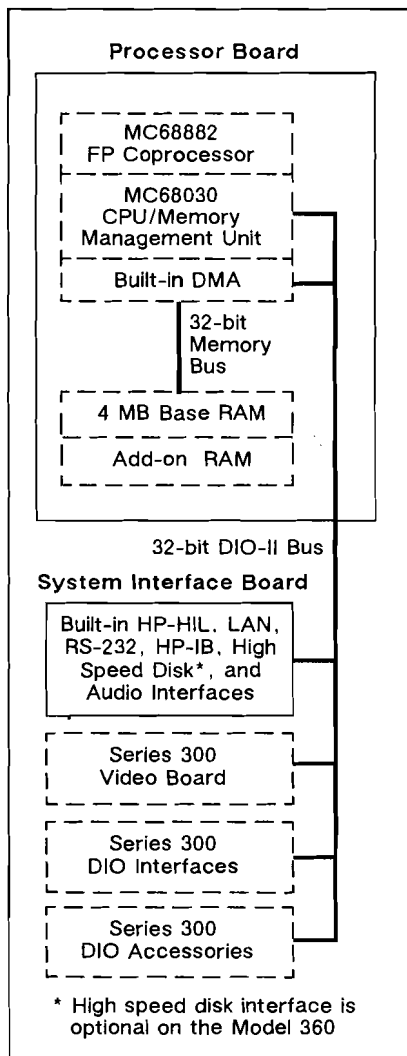


Figure 19. Model 360 Bus Architecture

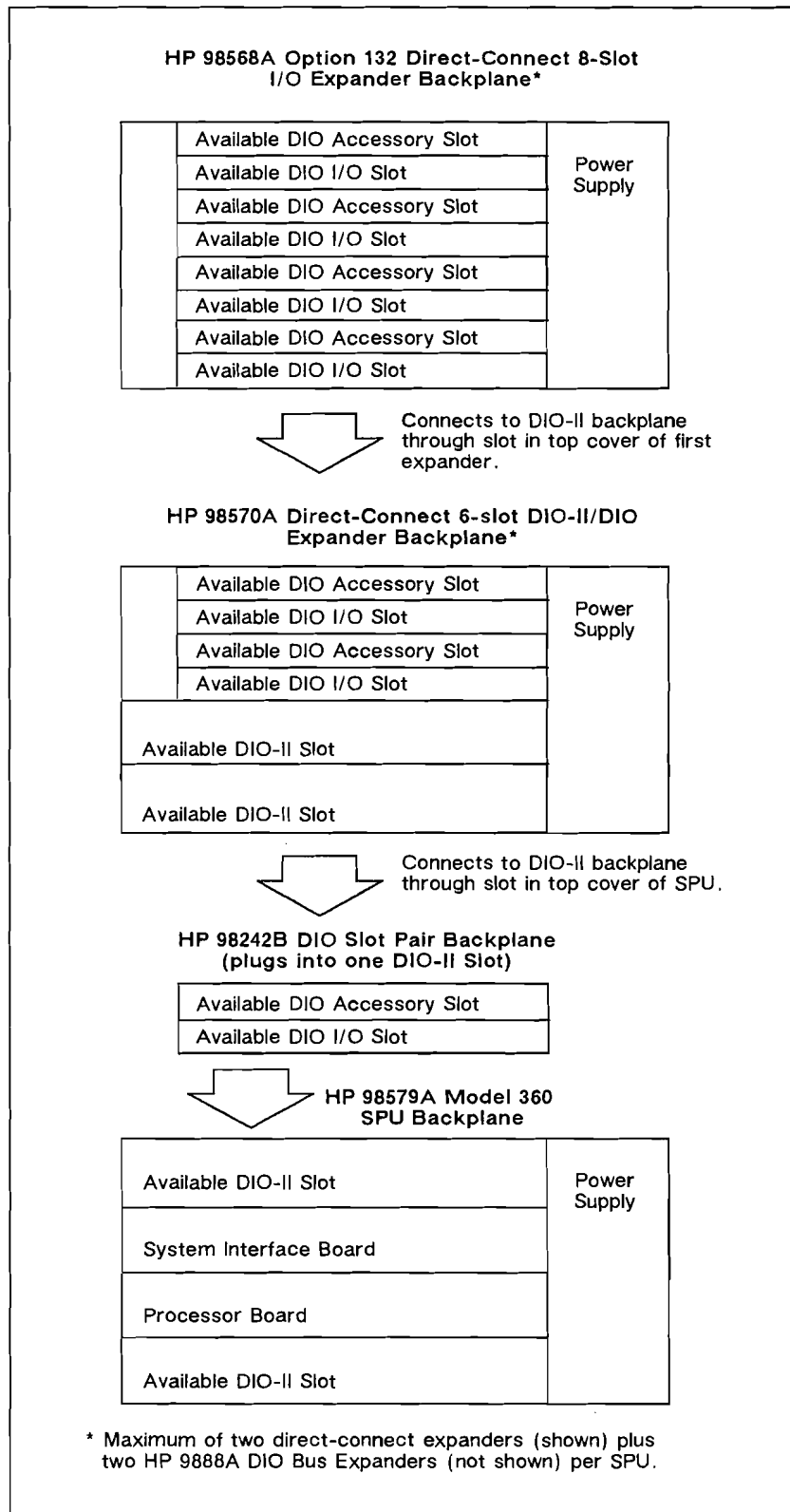


Figure 20. Model 360 Backplane Layout and Expandability

RAM: 4 MB parity, expandable to 16 MB with add-on RAM board.

Built-in Interfaces: HP-HIL, LAN (AUI or ThinLAN with built-in ThinMAU), RS-232, Std HP-IB, and audio output.

Floating Point Coprocessor: MC68882, clocked at 25 MHz, is standard.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

Model 360 Bundles

For a wide variety of products that bundle the Model 360 SPU with keyboards, monitors, and software, see pages 37 through 56.

Product Summary

98579A Model 360 System Processor Unit, consisting of:

- A. Processor board with:
 - 1. 32-bit MC68030 25 MHz CPU with MC68882 25 MHz Floating Point Coprocessor,.
 - 2. 4 MB of parity-checking RAM, expandable to 8, 12, or 16 MB with addition of an add-on RAM board.
 - 3. 4 GB virtual memory address space.
 - 4. 32-bit memory and DIO-II buses.
- B. System interface board with:
 - 1. IEEE-488 HP-IB interface and 1 meter HP-IB cable.
 - 2. RS-232C serial interface (1 port) and adapter cable.
 - 3. HP-HIL interface and HP-HIL keyboard cable.
 - 4. IEEE 802.3/Ethernet LAN interface.
 - 5. Audio output interface.

C. Enclosure with 2 available DIO-II slots, and power supply.

D. Installation manuals.

E. 90-day on-site warranty.

Options

006: Adds 98242B Two-slot DIO backplane.

010: Adds high-speed HP-IB Disk Interface (excludes option 011).

011: Adds SCSI single-ended Disk Interface with 1m cable and terminator (excludes option 010).

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinMAU and BNC "T" connector for LAN connection (excludes option 015).

108: Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).

112: Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).

116: Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).

Add-on Accessories

98242B: 2-slot DIO backplane.

98248B: Floating Point Accelerator.

98267A: 4 MB Parity-Checking add-on RAM board.

98267B: 8 MB Parity-Checking add-on RAM board.

98267C: 12 MB Parity-Checking add-on RAM board.

98568A: Direct Connect 8-slot I/O Expander.*

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

46021x: HP-HIL Keyboard (for National Versions, see page 13).

98203x: HP-HIL Keyboard with rotary knob, for BASIC/WS or Series 200/300 Pascal systems (for National Versions, see page 13).

35731A: 12-inch Medium-resolution (512 by 400) Monochrome Monitor

98542A: Medium-resolution Monochrome Video Output Board with cable.

35741A: Medium-resolution (512 by 400) Color Monitor.

35723A: HP-Touch Bezel for 35731A/35741A Monitor.

98543A: Medium-resolution Color Video Output Board with RGB cable.

98544B: High-resolution (1024 by 768) Monochrome Video Output Board.

98786A: 17-inch High-resolution (1024 by 768) Monochrome Monitor.

98547A: High-resolution (1024 by 768 by 6) Color Video Output Board.

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Model 360 System Processor Unit, continued

98549A: High-resolution (1024 by 768 by 6) Color Video Output Board.

98751A: 19-inch High-resolution (1024 by 768) Color Monitor.

98785A: 16-inch High-resolution (1024 by 768) Color Monitor.

98548A: High-resolution (1280 by 1024) Monochrome Video Output Board.

98788A: 19-inch High-resolution (1280 by 1024) Monochrome Monitor.

98550A: High-resolution (1280 by 1024 by 8) Color Video Output Board.

98752A: 19-inch High-resolution (1280 by 1024) Color Monitor.

98788A: 16-inch High-resolution (1280 by 1024) Color Monitor.

46060A: HP-HIL Two-button Mouse.

46081A: Buffer box with speaker.

46084A: HP-HIL ID Module.

Operational Requirements

- 1. Operating System:** The BASIC/WS, HP-UX, or Pascal/WS System (see pages 10-12).
- 2. System Console:** A keyboard and monitor or a separate terminal (see pages 127-131).
- 3. System Disk:** A flexible disk for BASIC/WS or Pascal/WS or hard disk for HP-UX (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).
- 4. Software Installation/Backup Device:** A cartridge tape subsystem for HP-UX (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 360CMA Instrument Controller

Description

The HP 9000 Model 360CMA is a mid-priced instrument controller with keyboard and 12-inch color monitor that is based on the Model 360 System Processor Unit. Figures 21 and 22 illustrate the Model 360CMA functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: BASIC/WS.

Monitor: 12-inch 512 by 400 Color Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98581W Model 360CMA Color Instrument Controller, consisting of:

- A. 98579A System Processor Unit.
- B. 98242B 2-Slot DIO Backplane.
- C. 98262A High-Speed HP-IB Disk Interface.
- D. 98543A Medium Resolution Color Video Board with RGB cable.
- E. 35741A 12-inch Medium Resolution (512 by 400) Color Monitor.
- F. Keyboard, which must be specified by national version option (see page 13) unless keyboard is deleted with a keyboard delete option.
- G. 98616A Option 044 BASIC Language System software on 3.5-inch flexible disks.
- H. Manuals.
- I. 90-day on-site warranty.

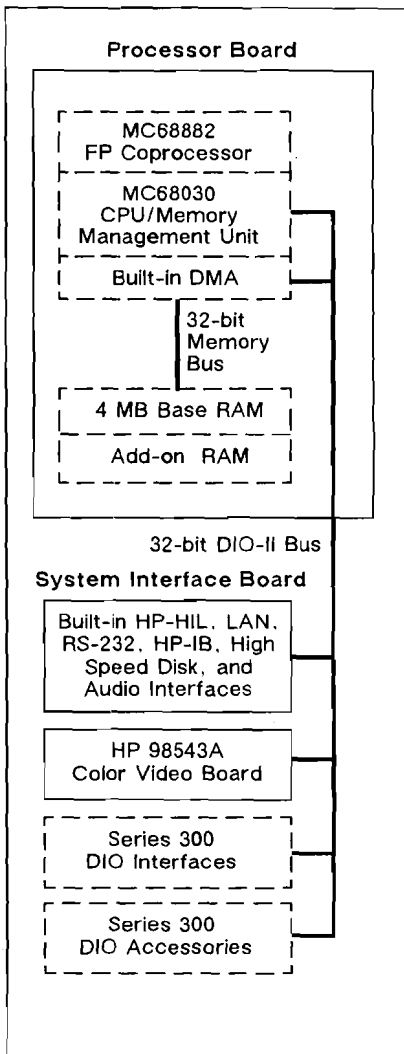


Figure 21. Model 360CMA Functions

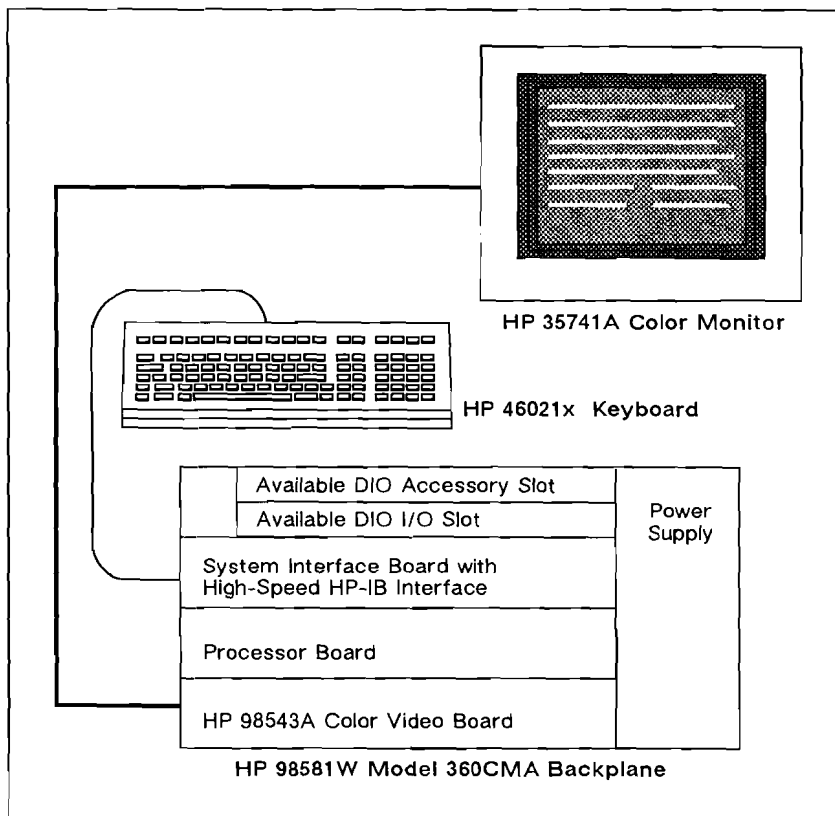


Figure 22. Model 360CMA Backplane Usage and Interconnections

Model 360CMA Instrument Controller, continued

Keyboard Delete Options

For applications in which it is desired to substitute a 98203x keyboard for the 46021x keyboard or if keyboard is not needed.

05A: English controller with 46021x keyboard deleted.

05C: Canadian French controller with 46021x keyboard deleted.

05D: German controller with 46021x keyboard deleted.

05E: European Spanish controller with 46021x keyboard deleted.

05F: European French controller with 46021x keyboard deleted.

05K: ICON English controller with 46021x keyboard deleted.

05M: Latin Spanish controller with 46021x keyboard deleted.

05Z: Italian controller with 46021x keyboard deleted.

Options

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

042: Provides BASIC Software on 5.25-inch flexible disks instead of 3.5-inch flexible disks.

108: Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).

112: Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).

116: Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).

613: Deletes BASIC Language System (media, license, and manuals).

Add-on Accessories

98248B: Floating Point Accelerator.

98267A: 4 MB Parity-Checking add-on RAM board.

98267B: 8 MB Parity-Checking add-on RAM board.

98267C: 12 MB Parity-Checking add-on RAM board.

98568A: Direct Connect 8-slot I/O Expander*.

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

35723A: HP-Touch Bezel for 35731A/35741A Monitor.

46060A: HP-HIL Two-button Mouse.

46081A: Buffer box with speaker.

46084A: HP-HIL ID Module.

98203x: HP-HIL Keyboard with rotary knob, for BASIC/WS or Series 200/300 Pascal systems (for National Versions, see page 13).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Operational Requirement

The Model 360CMA Instrument Controller requires a 3.5-inch or 5.25-inch flexible disk connected directly to the local system for software loading and backup.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 360MMA Instrument Controller

Description

The HP 9000 Model 360MMA is a mid-priced instrument controller with keyboard and 12-inch monochrome monitor that is based on the Model 360 System Processor Unit. Figures 23 and 24 illustrate the Model 360MMA functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: BASIC/WS.

Monitor: 12-inch 512 by 400 Monochrome Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98580W Model 360MMA Color Instrument Controller, consisting of:

- A. 98579A System Processor Unit.
- B. 98242B 2-Slot DIO Backplane.
- C. 98262A High-Speed HP-IB Disk Interface.
- D. 98542A Medium Resolution Monochrome Video Board with cable.
- E. 35731A 12-inch Medium Resolution (512 by 400) Color Monitor.
- F. Keyboard, which must be specified by national version option (see page 13) unless keyboard is deleted with a keyboard delete option.
- G. 98616A Option 044 BASIC Language System software on 3.5-inch flexible disks.
- H. Manuals.
- I. 90-day on-site warranty.

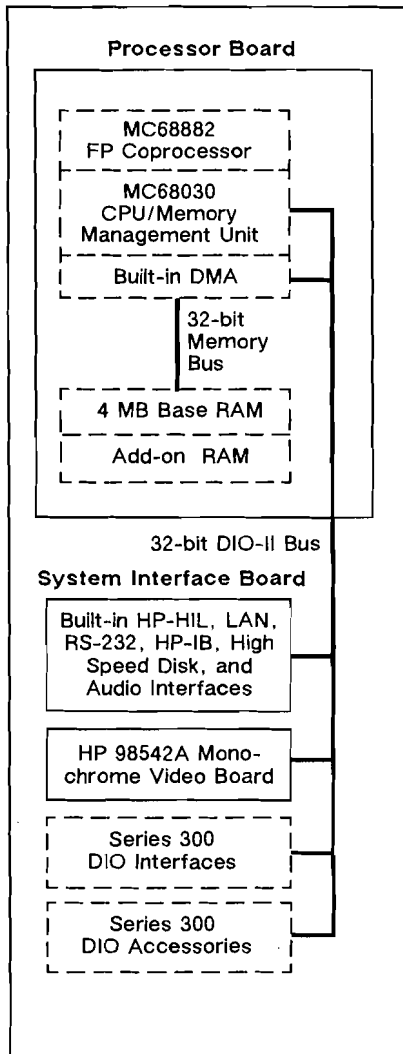


Figure 23. Model 360MMA Functions

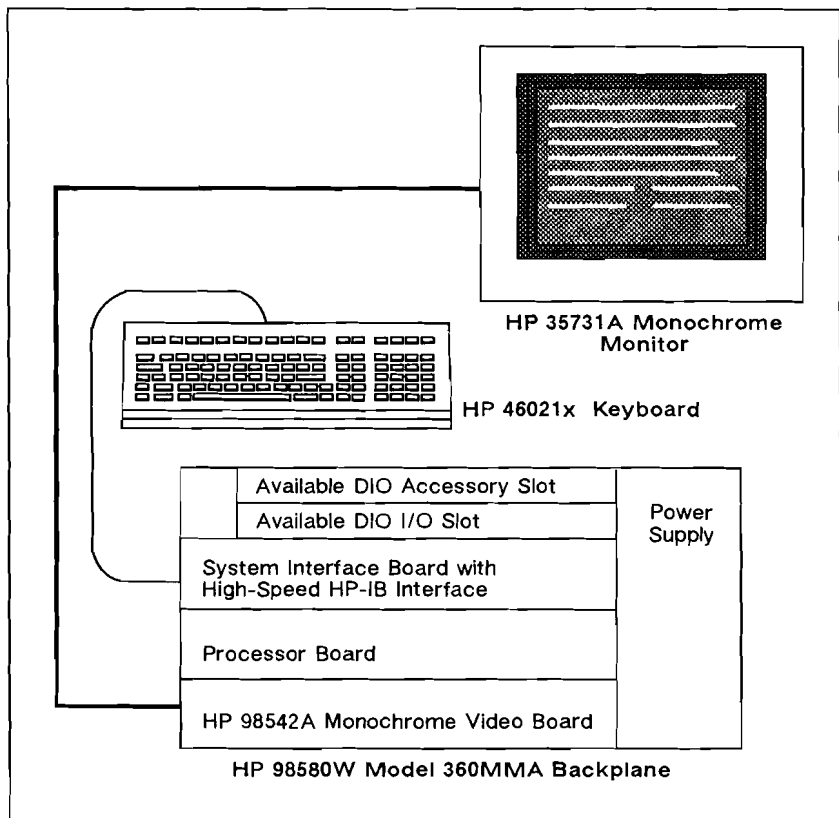


Figure 24. Model 360MMA Backplane Usage and Interconnections

Model 360MMA Instrument Controller, continued

Keyboard Delete Options

For applications in which it is desired to substitute a 98203x keyboard for the 46021x keyboard or if keyboard is not needed.

05A: English controller with 46021x keyboard deleted.

05C: Canadian French controller with 46021x keyboard deleted.

05D: German controller with 46021x keyboard deleted.

05E: European Spanish controller with 46021x keyboard deleted.

05F: European French controller with 46021x keyboard deleted.

05K: ICON English controller with 46021x keyboard deleted.

05M: Latin Spanish controller with 46021x keyboard deleted.

05Z: Italian controller with 46021x keyboard deleted.

Options

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

042: Provides BASIC Software on 5.25-inch flexible disks instead of 3.5-inch flexible disks.

108: Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).

112: Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).

116: Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).

613: Deletes BASIC Language System (media, license, and manuals).

Add-on Accessories

98248B: Floating Point Accelerator.

98267A: 4 MB Parity-Checking add-on RAM board.

98267B: 8 MB Parity-Checking add-on RAM board.

98267C: 12 MB Parity-Checking add-on RAM board.

98568A: Direct Connect 8-slot I/O Expander*.

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

35723A: HP-Touch Bezel for 35731A/35741A Monitor.

46060A: HP-HIL Two-button Mouse.

46081A: Buffer box with speaker.

46084A: HP-HIL ID Module.

98203x: HP-HIL Keyboard with rotary knob, for BASIC/WS or Series 200/300 Pascal systems (for National Versions, see page 13).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Operational Requirement

The Model 360MMA Instrument Controller requires a 3.5-inch or 5.25-inch flexible disk connected directly to the local system for software loading and backup.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 360CMA Instrument Controller

Description

The HP 9000 Model 360CMA is an HP BASIC/UX instrument controller with keyboard and 16-inch color monitor that is based on the Model 360 System Processor Unit. Figures 25 and 26 show the Model 360CMA functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: HP-UX and BASIC/UX License-to-use, media, and manuals are included.

Monitor: 16-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98581WX Model 360CMA Color Instrument Controller, consisting of:

- A. 98579A System Processor Unit.
- B. 98242B 2-Slot DIO Backplane.
- C. 98262A High-Speed HP-IB Disk Interface.
- D. 98550A High Resolution Color Video Board with RGB cable.
- E. 98789A 16-inch 1280 by 1024 Color Monitor.
- F. Keyboard, which must be specified by national version option (see page 13).
- G. 46060A HP-HIL Two-button Mouse.
- H. 46081A Buffer box with speaker.
- I. 46084A HP-HIL ID Module.
- J. Installation manuals.
- K. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11).

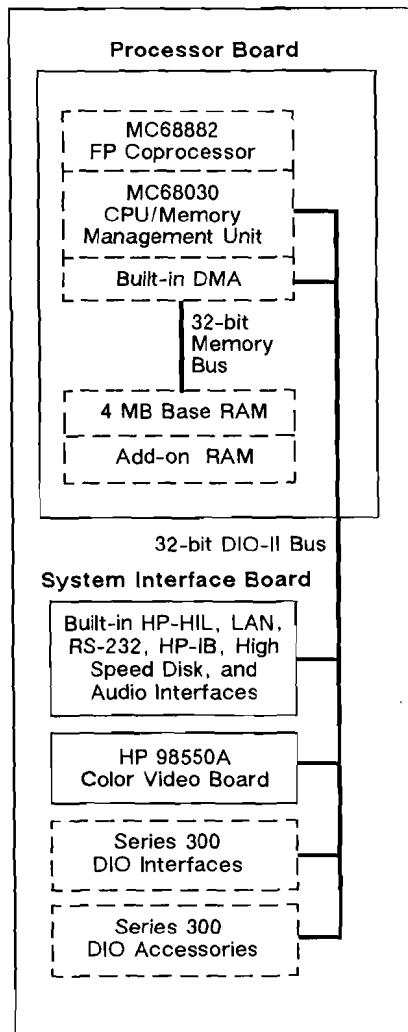


Figure 29. Model 360CMA Functions

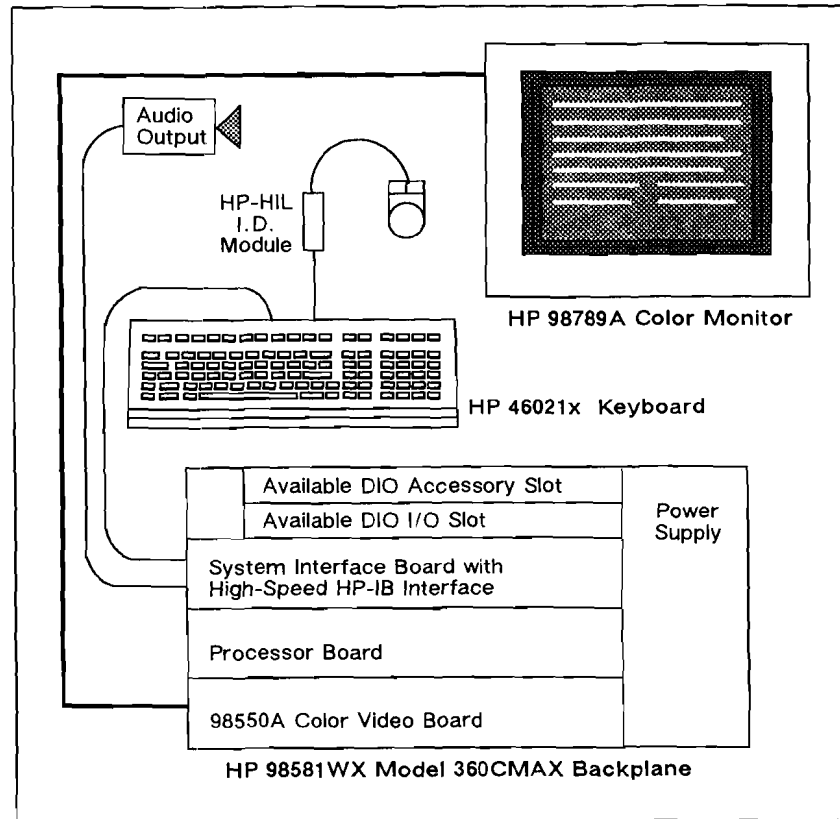


Figure 30. Model 360CMA Backplane Usage and Interconnections

Model 360CMAX Instrument Controller, continued

- L. 98794A Media and documentation for 98549L software, delivered on 1/4-inch cartridge tape media.
- M. 98796L HP BASIC/UX License to use.
- N. 98796A HP BASIC/UX on 1/4-inch cartridge tape media and documentation.
- O. 90-day on-site warranty.

Options

- 015:** Specifies AUI-type LAN connection (excludes option 017).
- 017:** Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).
- 108:** Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).
- 112:** Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).
- 116:** Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).
- 402:** Adds 7958B 152 MB Disk Drive with all software installed (recommended for development systems).

Add-on Accessories

- 98248B:** Floating Point Accelerator.
- 98267A:** 4 MB Parity-Checking add-on RAM board.
- 98267B:** 8 MB Parity-Checking add-on RAM board.
- 98267C:** 12 MB Parity-Checking add-on RAM board.
- 98568A:** Direct Connect 8-slot I/O Expander*.
- 98570A:** Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*
- 9888A:** 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Operational Requirements

- 1. System Disk:** A hard disk with at least 81 MB (see pages 136-140).
- 2. Software Installation/ Backup Device:** A cartridge tape subsystem (see pages 141-142).

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 360MMAX Instrument Controller

Description

The HP 9000 Model 360MMAX is an HP BASIC/UX instrument controller with keyboard and 17-inch monochrome monitor that is based on the Model 360 System Processor Unit. Figures 27 and 28 illustrate the Model 360MMAX functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: HP-UX and BASIC/UX License-to-use, media, and manuals are included.

Monitor: 17-inch 1024 by 768 Monochrome Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98580WX Model 360MMAX Monochrome Instrument Controller, consisting of:

- A. 98579A System Processor Unit.
- B. 98242B 2-Slot DIO Backplane.
- C. 98262A High-Speed HP-IB Disk Interface.
- D. 98544B High Resolution Monochrome Video Board with cable to monitor.
- E. 98786A 17-inch 1024 by 768 Monochrome Monitor.
- F. Keyboard, which must be specified by national version option (see page 13).
- G. 46060A HP-HIL Two-button Mouse.
- H. 46081A Buffer box with speaker.
- I. 46084A HP-HIL ID Module.
- J. Installation manuals.
- K. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11).

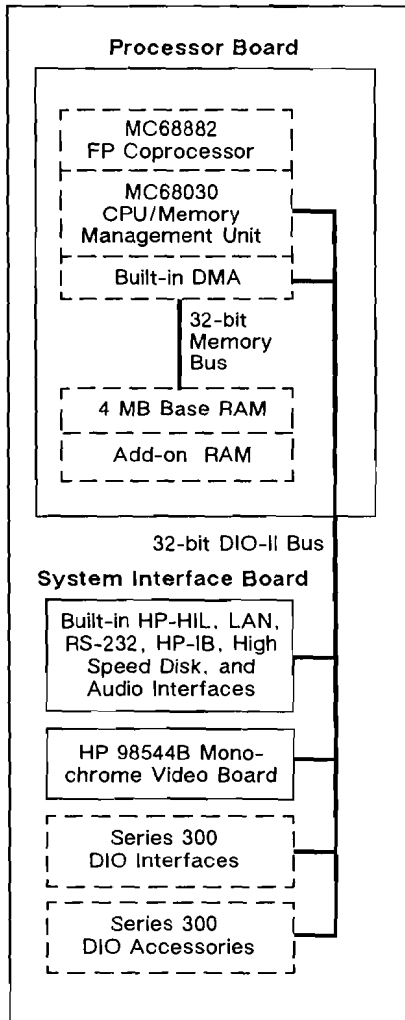


Figure 27. Model 360MMAX Functions

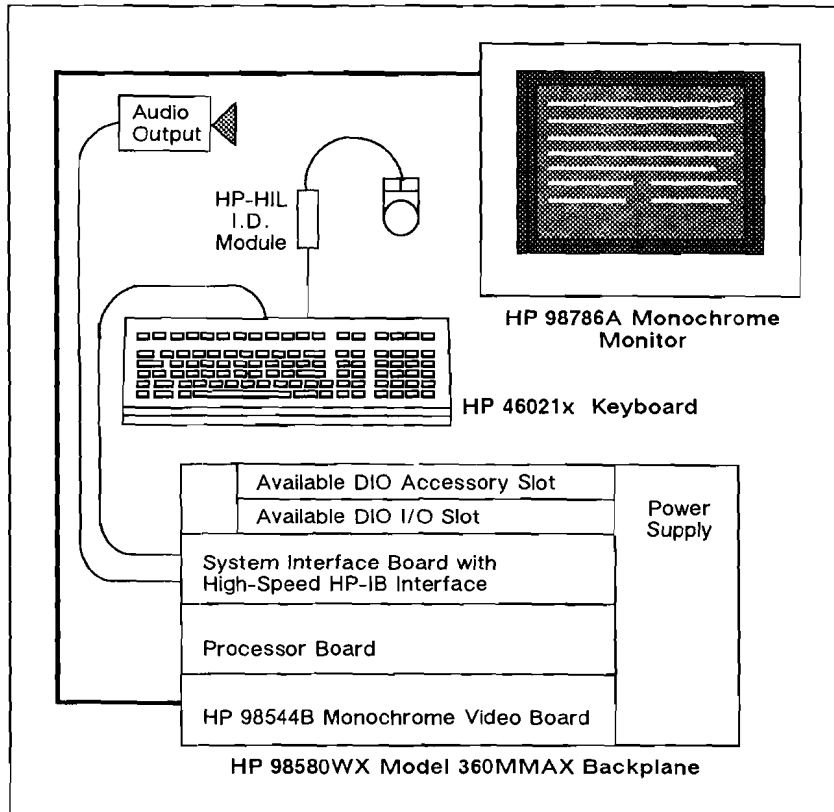


Figure 28. Model 360MMAX Backplane Usage and Interconnections

Model 360MMAX Instrument Controller, continued

- L. 98794A Media and documentation for 98549L software, delivered on 1/4-inch cartridge tape media.
- M. 98796L HP BASIC/UX License to use.
- N. 98796A HP BASIC/UX on 1/4-inch cartridge tape media and documentation.
- O. 90-day on-site warranty.

Options

- 015:** Specifies AUI-type LAN connection (excludes option 017).
- 017:** Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).
- 108:** Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).
- 112:** Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).
- 116:** Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).
- 402:** Adds 7958B 152 MB Disk Drive with all software installed (recommended for development systems).

Add-on Accessories

- 98248B:** Floating Point Accelerator.
- 98267A:** 4 MB Parity-Checking add-on RAM board.
- 98267B:** 8 MB Parity-Checking add-on RAM board.
- 98267C:** 12 MB Parity-Checking add-on RAM board.
- 98568A:** Direct Connect 8-slot I/O Expander*.
- 98570A:** Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*
- 9888A:** 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Operational Requirements

- 1. System Disk:** A hard disk with at least 81 MB (see pages 136-140).
- 2. Software Installation/Backup Device:** A cartridge tape subsystem (see pages 141-142).

Other Items

- Interfacing:** See pages 84-99.
- Terminals:** See pages 127-135.
- Disks:** See pages 136-140.
- Cartridge Tape Subsystems and Magnetic Tape Units:** See pages 141-142.
- Printers:** See pages 143-146.
- Plotters:** See pages 147-152.
- Communications:** See pages 153-158.
- Data Base Management:** See pages 159-160.
- Application Development:** See pages 161-163.
- MS-DOS Support:** See pages 164-166.
- Rack Mounting:** See pages 167-169.

Model 360C + Workstation

Description

The HP 9000 Model 360C + is a mid-priced 2D color workstation with keyboard and 16-inch 1024 by 768 color monitor that is based on the Model 360 System Processor Unit. Figures 29 and 30 illustrate the Model 360C + functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: 98594L HP-UX License to Use Application Execution Environment, Programming Environment, NS-ARPA, NFS, and X-Windows Version 11 are included; one set of 98594A option 022 media and manuals must be purchased separately to provide installable software for all 98594L licensed workstations at a site.

Monitor: 16-inch 1024 by 768 Color Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98583W Model 360C + 2D Color Workstation, consisting of:

- A. 98579A System Processor Unit.
- B. 98549A High Resolution Color Video Board with RGB cable.
- C. 98785A 16-inch 1024 by 768 Color Monitor.
- D. Keyboard, which must be specified by national version option (see page 13).
- E. 46060A HP-HIL Two-button Mouse.

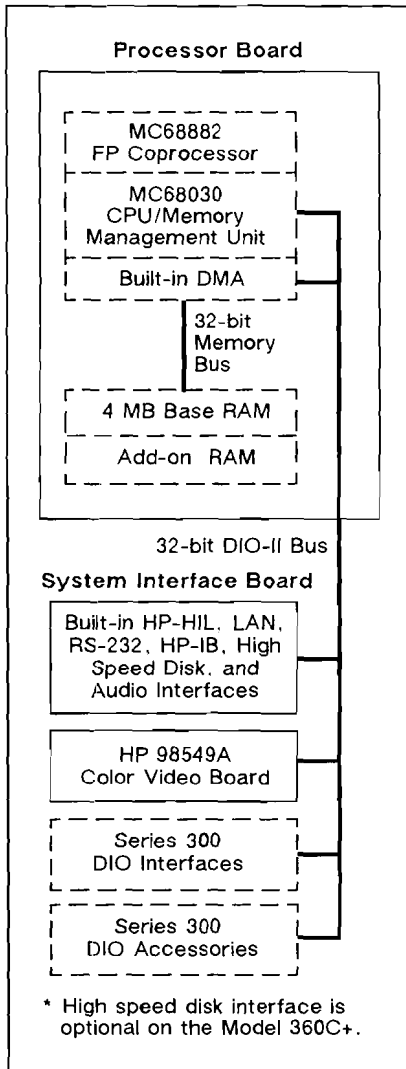


Figure 29. Model 360C +
Functions

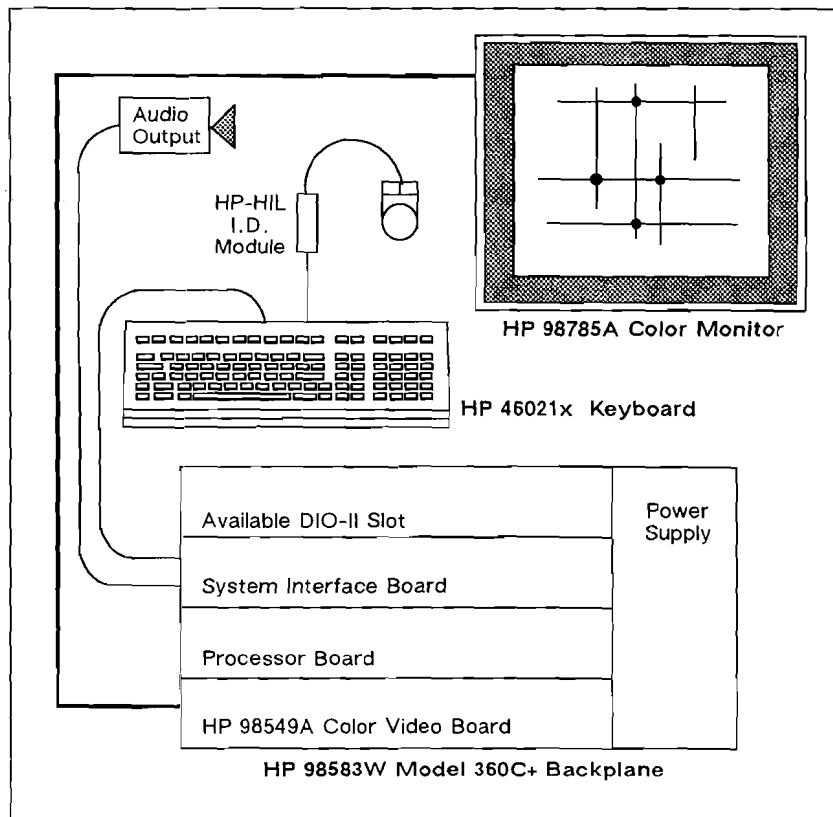


Figure 30. Model 360C + Backplane Usage and Interconnections

Model 360C + Workstation, continued

- F. 46081A Buffer box with speaker.
- G. 46084A HP-HIL ID Module.
- H. Installation manuals.
- I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).
- J. 90-day on-site warranty.

Options

- 006:** Adds 98242A Two-slot DIO backplane.
- 010:** Adds high-speed HP-IB Disk Interface (excludes option 011).
- 011:** Adds SCSI single-ended Disk Interface (excludes option 010).
- 015:** Specifies AUI-type LAN connection (excludes option 017).
- 017:** Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

108: Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).

112: Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).

116: Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).

719: Substitutes 98751A 19-inch monitor for 98785A 16-inch monitor.

Add-on Accessories

98242A: Two-slot DIO backplane.

98248B: Floating Point Accelerator.

98267A: 4 MB Parity-Checking add-on RAM board.

98267B: 8 MB Parity-Checking add-on RAM board.

98267C: 12 MB Parity-Checking add-on RAM board.

98556A: 2D Integer-Based Graphics Accelerator.

98568A: Direct Connect 8-slot I/O Expander*.

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Operational Requirements

1. Operating System: The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 360CH Workstation

Description

The HP 9000 Model 360CH is a mid-priced 2D color workstation with keyboard and 16-inch 1280 by 1024 color monitor that is based on the Model 360 System Processor Unit. Figures 31 and 32 illustrate the Model 360CH functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: 98594L HP-UX License to Use Application Execution Environment, Programming Environment, NS-ARPA, NFS, and X-Windows Version 11 are included; one set of 98594A option 022 media and manuals must be purchased separately to provide installable software for all 98594L licensed workstations at a site.

Monitor: 16-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98588W Model 360CH 2D Color Workstation, consisting of:

- A. 98579A System Processor Unit.
- B. 98550A High Resolution Color Video Board with RGB cable.
- C. 98789A 16-inch 1280 by 1024 Color Monitor.
- D. Keyboard, which must be specified by national version option (see page 13).
- E. 46060A HP-HIL Two-button Mouse.

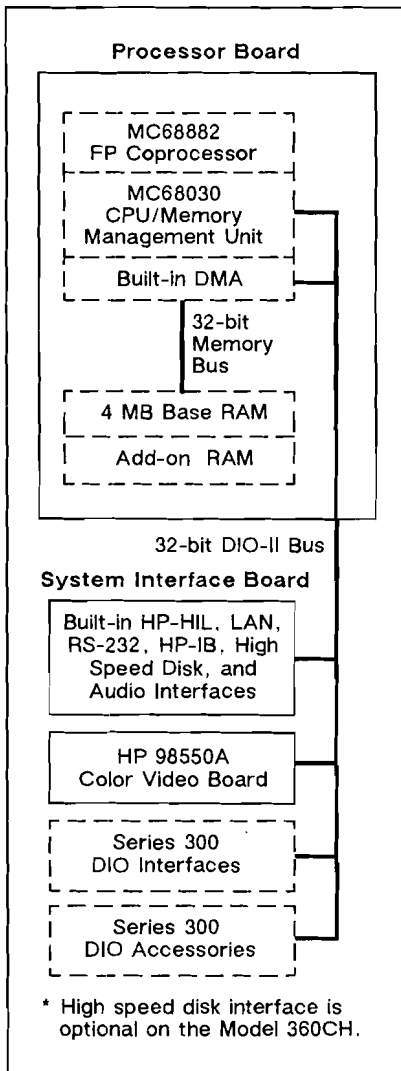


Figure 31. Model 360CH Functions

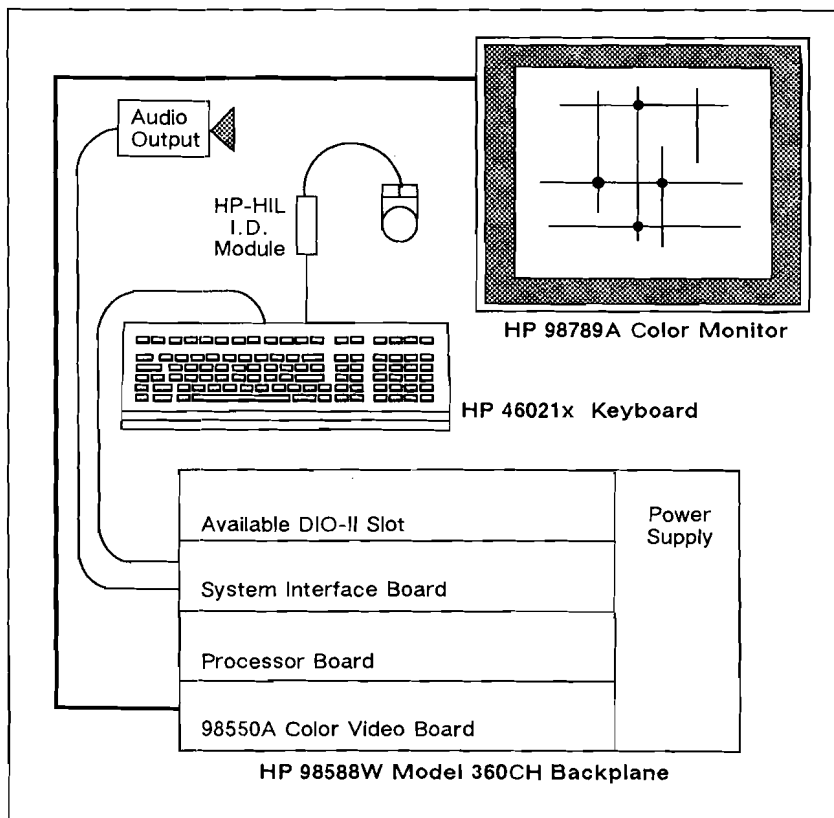


Figure 32. Model 360CH Backplane Usage and Interconnections

Model 360CH Workstation, continued

- F. 46081A Buffer box with speaker.
- G. 46084A HP-HIL ID Module.
- H. Installation manuals.
- I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).
- J. 90-day on-site warranty.

108: Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).

112: Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).

116: Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).

556: Adds 98556A 2D integer-based graphics accelerator.

719: Substitutes 98752A 19-inch monitor for 98789A 16-inch monitor.

Add-on Accessories

98242A: Two-slot DIO backplane.

98248B: Floating Point Accelerator.

98267A: 4 MB Parity-Checking add-on RAM board.

98267B: 8 MB Parity-Checking add-on RAM board.

98267C: 12 MB Parity-Checking add-on RAM board.

98556A: 2D Integer-Based Graphics Accelerator.

98568A: Direct Connect 8-slot I/O Expander*.

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Operational Requirements

1. Operating System: The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Options

006: Adds 98242A Two-slot DIO backplane.

010: Adds high-speed HP-IB Disk Interface (excludes option 011).

011: Adds SCSI single-ended Disk Interface (excludes option 010).

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

Model 360CHX Workstation

Description

The HP 9000 Model 360CHX is a mid-priced 2D color workstation with 2D integer-based graphics accelerator, keyboard, and 16-inch 1280 by 1024 color monitor that is based on the Model 360 System Processor Unit. Figures 33 and 34 illustrate the Model 360CHX functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: 98594L HP-UX License to Use Application Execution Environment, Programming Environment, NS-ARPA, NFS, and X-Windows Version 11 are included; one set of 98594A option 022 media and manuals must be purchased separately to provide installable software for all 98594L licensed workstations at a site.

Monitor: 16-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98588W + 556 Model 360CHX 2D Color Workstation, consisting of:

- A. 98579A System Processor Unit.
- B. 98550A High Resolution Color Video Board with RGB cable.
- C. 98556A 2D Integer-based Graphics Accelerator.
- D. 98789A 16-inch 1280 by 1024 Color Monitor.
- E. Keyboard, which must be specified by national version option (see page 13).

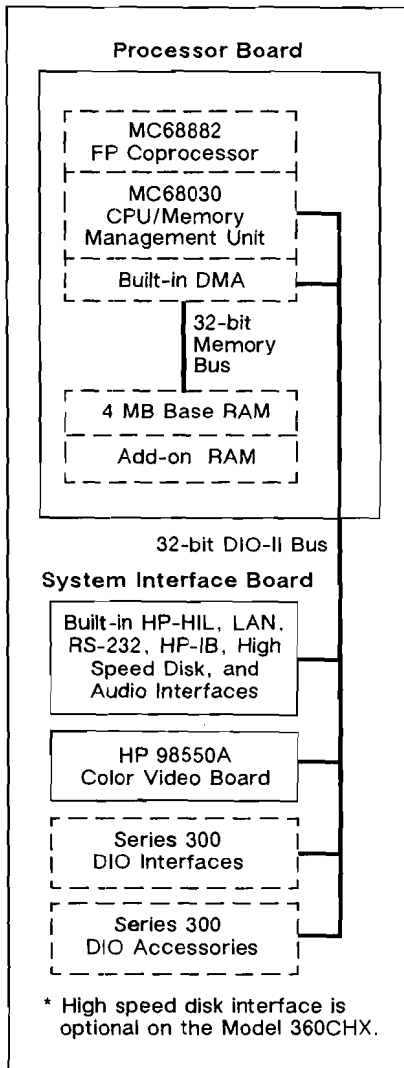


Figure 33. Model 360CHX Functions

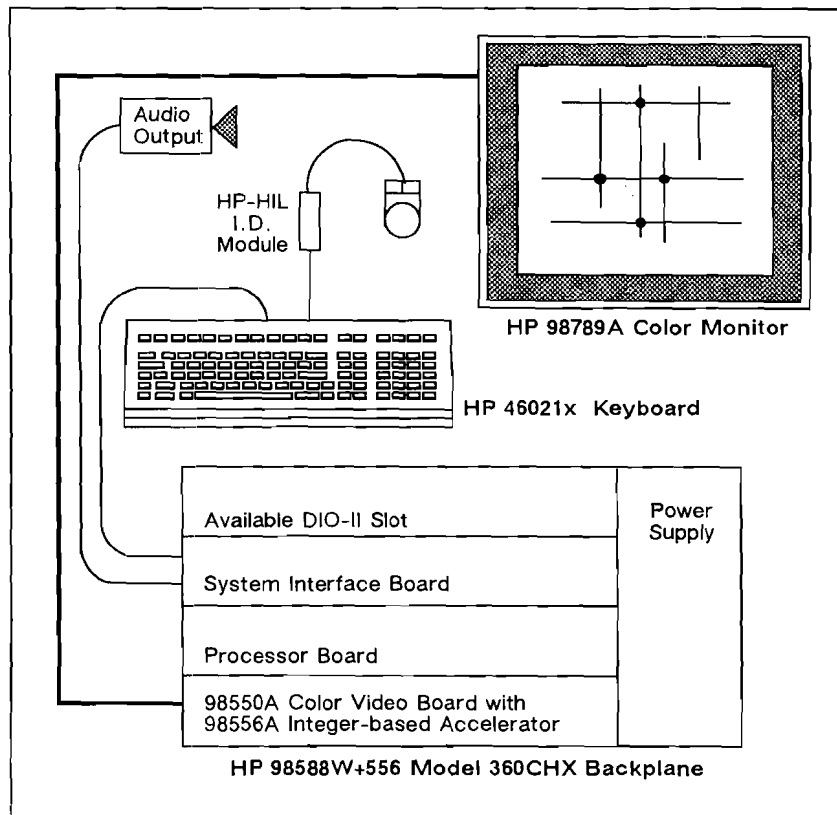


Figure 34. Model 360CHX Backplane Usage and Interconnections

Model 360CHX Workstation, continued

F. 46060A HP-HIL Two-button Mouse.

G. 46081A Buffer box with speaker.

H. 46084A HP-HIL ID Module.

I. Installation manuals.

J. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).

K. 90-day on-site warranty.

Options

006: Adds 98242A Two-slot DIO backplane.

010: Adds high-speed HP-IB Disk Interface (excludes option 011).

011: Adds SCSI single-ended Disk Interface (excludes option 010).

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

108: Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).

112: Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).

116: Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).

719: Substitutes 98752A 19-inch monitor for 98789A 16-inch monitor.

Add-on Accessories

98242A: Two-slot DIO backplane.

98248B: Floating Point Accelerator.

98267A: 4 MB Parity-Checking add-on RAM board.

98267B: 8 MB Parity-Checking add-on RAM board.

98267C: 12 MB Parity-Checking add-on RAM board.

98568A: Direct Connect 8-slot I/O Expander*.

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Operational Requirements

1. Operating System: The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 360MH Workstation

Description

The HP 9000 Model 360MH is a mid-priced 2D monochrome workstation with keyboard and 19-inch 1280 by 1024 monochrome monitor that is based on the Model 360 System Processor Unit. Figures 35 and 36 illustrate the Model 360MH functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: 98594L HP-UX License to Use Application Execution Environment, Programming Environment, NS-ARPA, NFS, and X-Windows Version 11 are included; one set of 98594A option 022 media and manuals must be purchased separately to provide installable software for all 98594L licensed workstations at a site.

Monitor: 19-inch 1280 by 1024 Monochrome Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98589W Model 360MH 2D Monochrome Workstation, consisting of:

- A. 98579A System Processor Unit.
- B. 98548A High Resolution Monochrome Video Board with cable to monitor.
- C. 98788A 19-inch 1280 by 1024 Monochrome Monitor.
- D. Keyboard, which must be specified by national version option (see page 13).

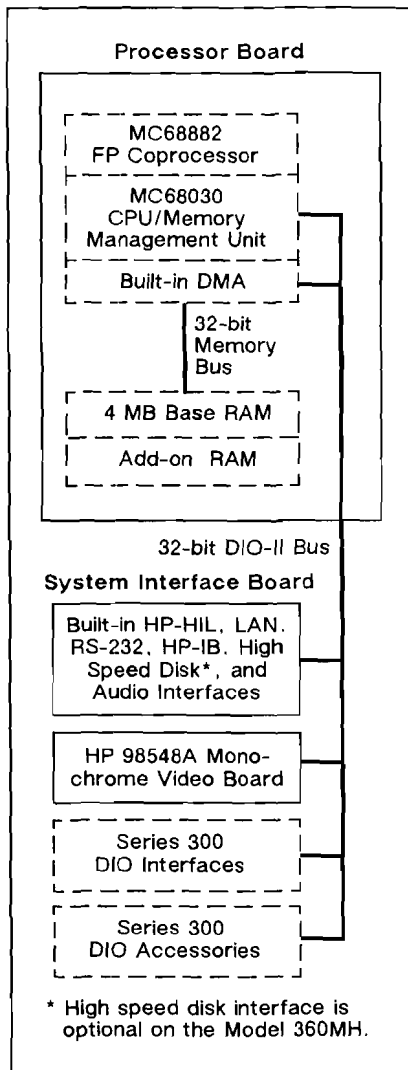


Figure 35. Model 360MH Functions

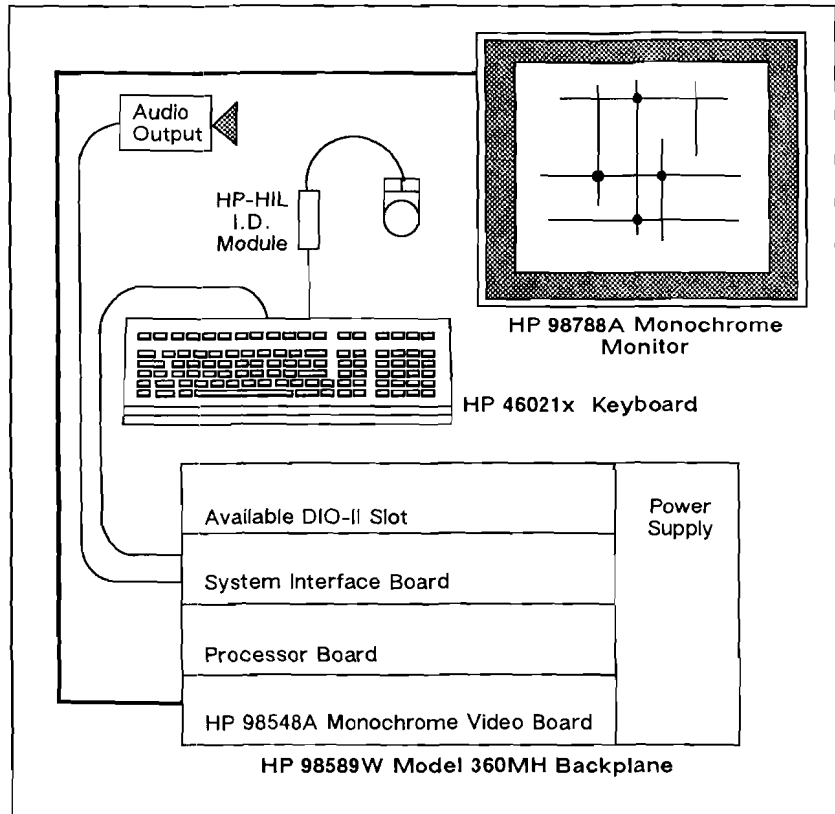


Figure 36. Model 360MH Backplane Usage and Interconnections

Model 360MH Workstation, continued

E. 46060A HP-HIL Two-button Mouse.

F. 46081A Buffer box with speaker.

G. 46084A HP-HIL ID Module.

H. Installation manuals.

I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).

J. 90-day on-site warranty.

108: Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).

112: Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).

116: Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).

Add-on Accessories

98242A: Two-slot DIO backplane.

98248B: Floating Point Accelerator.

98267A: 4 MB Parity-Checking add-on RAM board.

98267B: 8 MB Parity-Checking add-on RAM board.

98267C: 12 MB Parity-Checking add-on RAM board.

98568A: Direct Connect 8-slot I/O Expander*.

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Operational Requirements

1. Operating System: The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Options

006: Adds 98242A Two-slot DIO backplane.

010: Adds high-speed HP-IB Disk Interface (excludes option 011).

011: Adds SCSI single-ended Disk Interface (excludes option 010).

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

Model 360SRX Workstation

Description

The HP 9000 Model 360SRX is a mid-priced solid rendering color workstation with keyboard and 16-inch color monitor that is based on the Model 360 System Processor Unit. Figures 37 and 38 illustrate the Model 360SRX functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: License-to-use HP-UX is included; HP-UX media and manuals must be purchased separately to provide installable software for licensed systems

Monitor: 16-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98587W Model 360SRX Solid Rendering Color Workstation, consisting of:

- A. 98579A System Processor Unit.
- B. 98720A Display Controller with 3D solid rendering graphics accelerator and 8 planes of frame buffer
- C. 98725A Display Controller (local graphics bus) Interface.
- D. 98789A 16-inch 1280 by 1024 Color Monitor.
- E. 98290A RGB Cable.
- F. Keyboard, which must be specified by national version option (see page 13).
- G. 46060A HP-HIL Two-button Mouse.
- H. 46081A Buffer box with speaker.
- I. 46084A HP-HIL ID Module.
- J. Installation manuals.

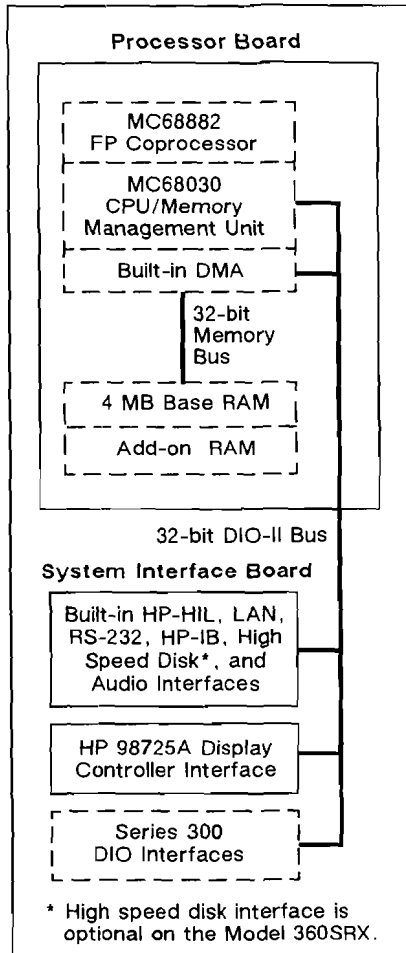


Figure 37. Model 360SRX Functions

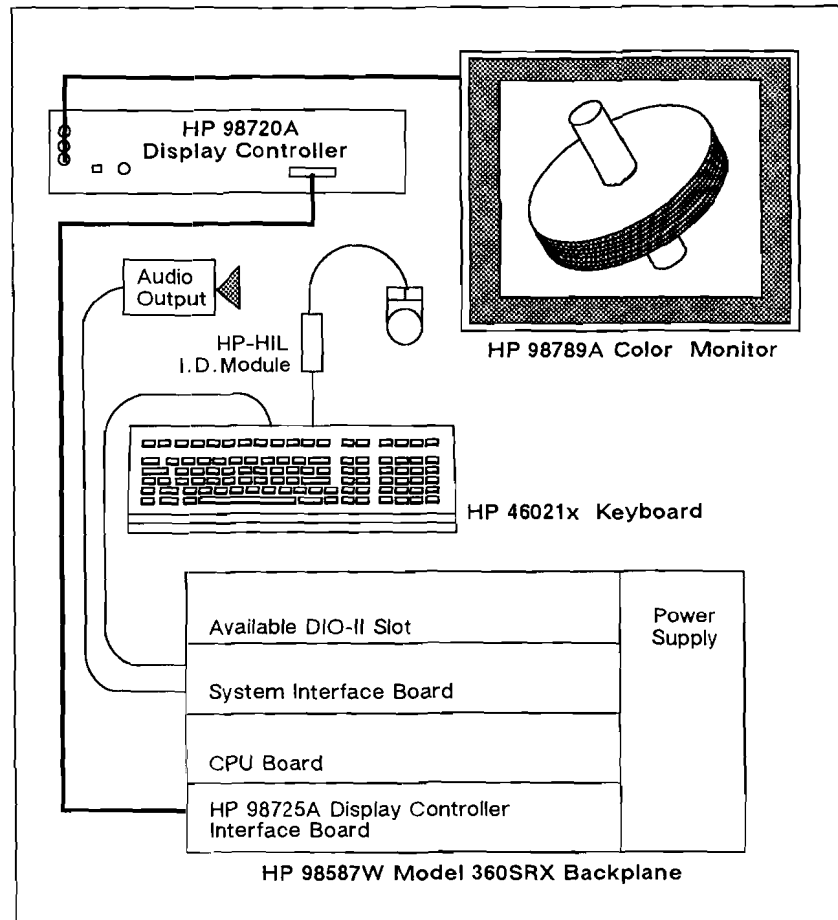


Figure 38. Model 360SRX Backplane Usage and Interconnections

Model 360SRX Workstation, continued

K. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).

L. 90-day on-site warranty.

Options

006: Adds 98242A Two-slot DIO backplane.

010: Adds high-speed HP-IB Disk Interface (excludes option 011).

011: Adds SCSI single-ended Disk Interface (excludes option 010).

015: Specifies AUI-type LAN connection (excludes option 017).

016: Adds one 8-plane frame buffer board for a total of 16 planes and increases power supply (excludes options 024 and 032).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

024: Adds two 8-plane frame buffer boards for a total of 24 planes and increases power supply (excludes options 016 and 032).

032: Adds three 8-plane frame buffer boards for a total of 32 planes and increases power supply (excludes options 016 and 024).

108: Adds 4 MB RAM for a total of 8 MB (excludes options 112 and 116).

112: Adds 8 MB RAM for a total of 12 MB (excludes options 108 and 116).

116: Adds 12 MB RAM for a total of 16 MB (excludes options 108 and 112).

Add-on Accessories

98242A: Two-slot DIO backplane.

98248B: Floating Point Accelerator.

98267A: 4 MB Parity-Checking add-on RAM board.

98267B: 8 MB Parity-Checking add-on RAM board.

98267C: 12 MB Parity-Checking add-on RAM board.

98568A: Direct Connect 8-slot I/O Expander*.

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

98722A: 8-plane frame buffer board (max. of four 8-plane frame buffers per 98720A).

98723A: Additional power supply for 98720A Display Controller with more than 8 planes of frame buffer memory.

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

Operational Requirements

1. Operating System: The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 360 TurboSRX Workstation

Description

The HP 9000 Model 360 TurboSRX is a mid-priced, ultra-fast solid rendering 3D color workstation with keyboard and 19-inch color monitor based on the Model 360 System Processor Unit. Figures 39 and 40 illustrate the Model 360 TurboSRX functions and backplane usage and interconnections.

SPU: HP 98579A Model 360, as described on page 34.

Operating System: License-to-use HP-UX is included; HP-UX media and manuals must be purchased separately to provide installable software for licensed systems

Monitor: 19-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 20, page 34.

Product Summary

98587T Model 360 TurboSRX Solid Rendering Color Workstation, consisting of:

- A. 98579A System Processor Unit.
- B. 98267A 4 MB additional RAM (brings total to 8 MB).
- C. 98730A Display Controller with 8 planes of frame buffer memory.
- D. 98726A 32-bit Display Controller (local graphics bus) Interface.
- E. 98752A 19-inch 1280 by 1024 Color Monitor.
- F. 98290A RGB Cable.
- G. 98262A High-Speed HP-IB Disk Interface.
- H. Keyboard, which must be specified by national version option (see page 13).
- I. 46060A HP-HIL Two-button Mouse.
- J. 46081A Buffer box with speaker.

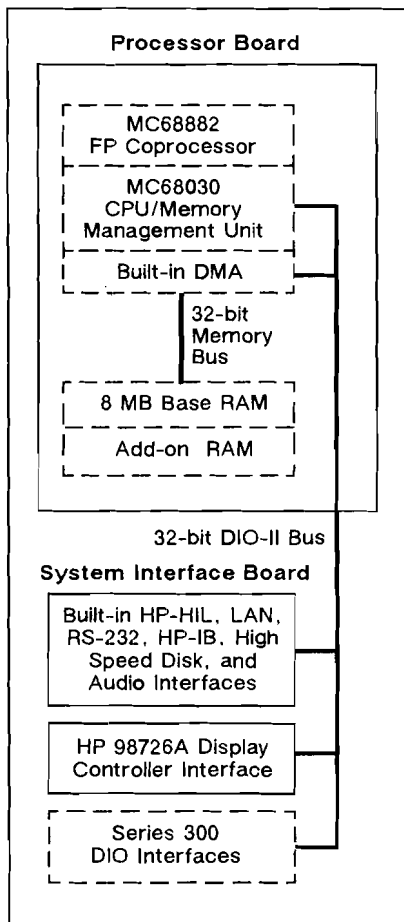


Figure 39. Model 360 TurboSRX Functions

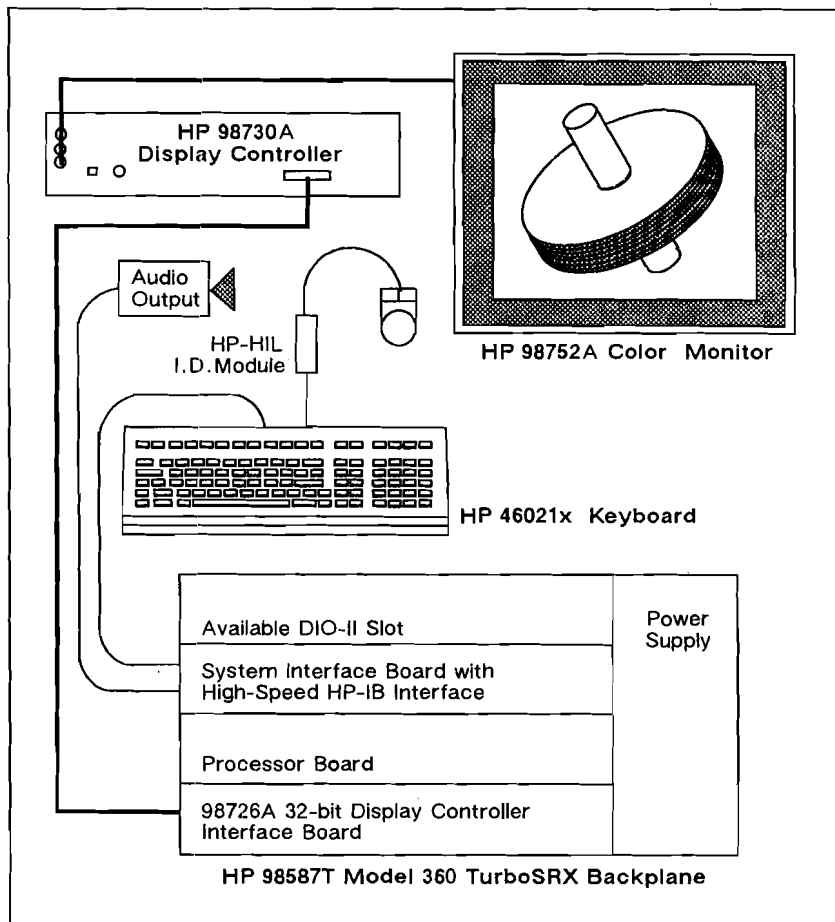


Figure 40. Model 360 TurboSRX Backplane Usage and Interconnections

Model 360 TurboSRX Workstation, continued

K. 46084A HP-HIL ID Module.

L. Installation manuals.

M. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, top right).

N. 90-day on-site warranty.

Options

006: Adds 98242A Two-slot DIO backplane.

011: Substitutes SCSI single-ended Disk Interface for high-speed HP-IB Disk Interface.

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

112: Adds 4 MB RAM for a total of 12 MB (excludes option 116).

116: Adds 8 MB RAM for a total of 16 MB (excludes option 112).

416: Adds one 8-plane frame buffer board for a total of 16 planes and increases power supply (excludes options 424, 616, and 624).

424: Adds two 8-plane frame buffer boards for a total of 24 planes and increases power supply (excludes options 416, 616, and 624).

608: Adds three accelerators for 3D solids and a full 16-bit Z-buffer.

616: Adds one 8-plane frame buffer board for a total of 16 planes, three accelerators for 3D solids, a full 16-bit Z-buffer, and increases power supply (excludes options 416, 424, and 624).

624: Adds two 8-plane frame buffer boards for a total of 24 planes, three accelerators for 3D solids, a full 16-bit Z-buffer, and increases power supply (excludes options 416, 424, and 616).

716: Substitutes 98789A 16-inch monitor for 98752A 19-inch monitor.

Add-on Accessories

98242B: Two-slot DIO backplane.

98248B: Floating Point Accelerator.

98267A: 4 MB Parity-Checking add-on RAM board.

98267B: 8 MB Parity-Checking add-on RAM board.

98267C: 12 MB Parity-Checking add-on RAM board.

98568A: Direct Connect 8-slot I/O Expander*.

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 360 SPU.

98722A: 8-plane frame buffer board (max. of three 8-plane frame buffers per 98730A).

98723A: Additional power supply for 98730A Display Controller with more than 8 planes of frame buffer memory.

Operational Requirements

1. Operating System: The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 370 System Processor Unit

Description

The HP 9000 Model 370 is the most powerful HP 9000 Series 300 System Processor Unit (SPU). Figures 41 and 42 illustrate the Model 370 bus architecture and backplane layout and expandability.

CPU: MC68030, clocked at 33 MHz.

Cache: 64 KB, 60 ns cycle time, no wait states.

Bus Types: 32-bit system, Floating Point Accelerator, and Direct I/O-II (DIO-II) buses.

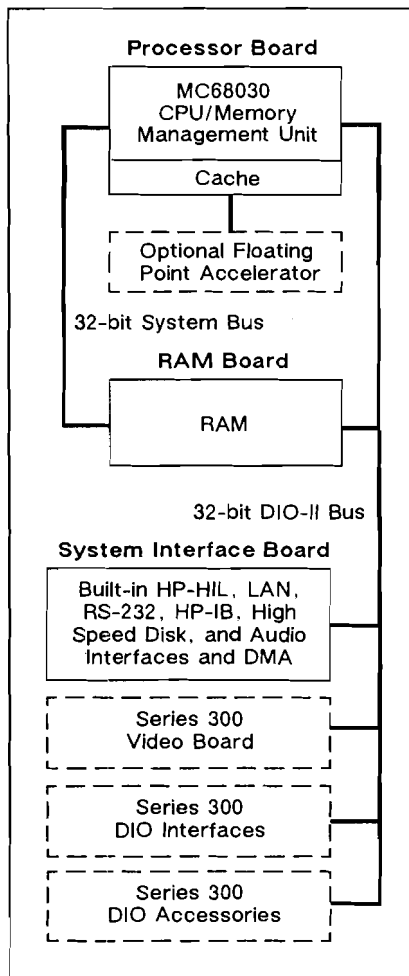


Figure 41. Model 370 Bus Architecture

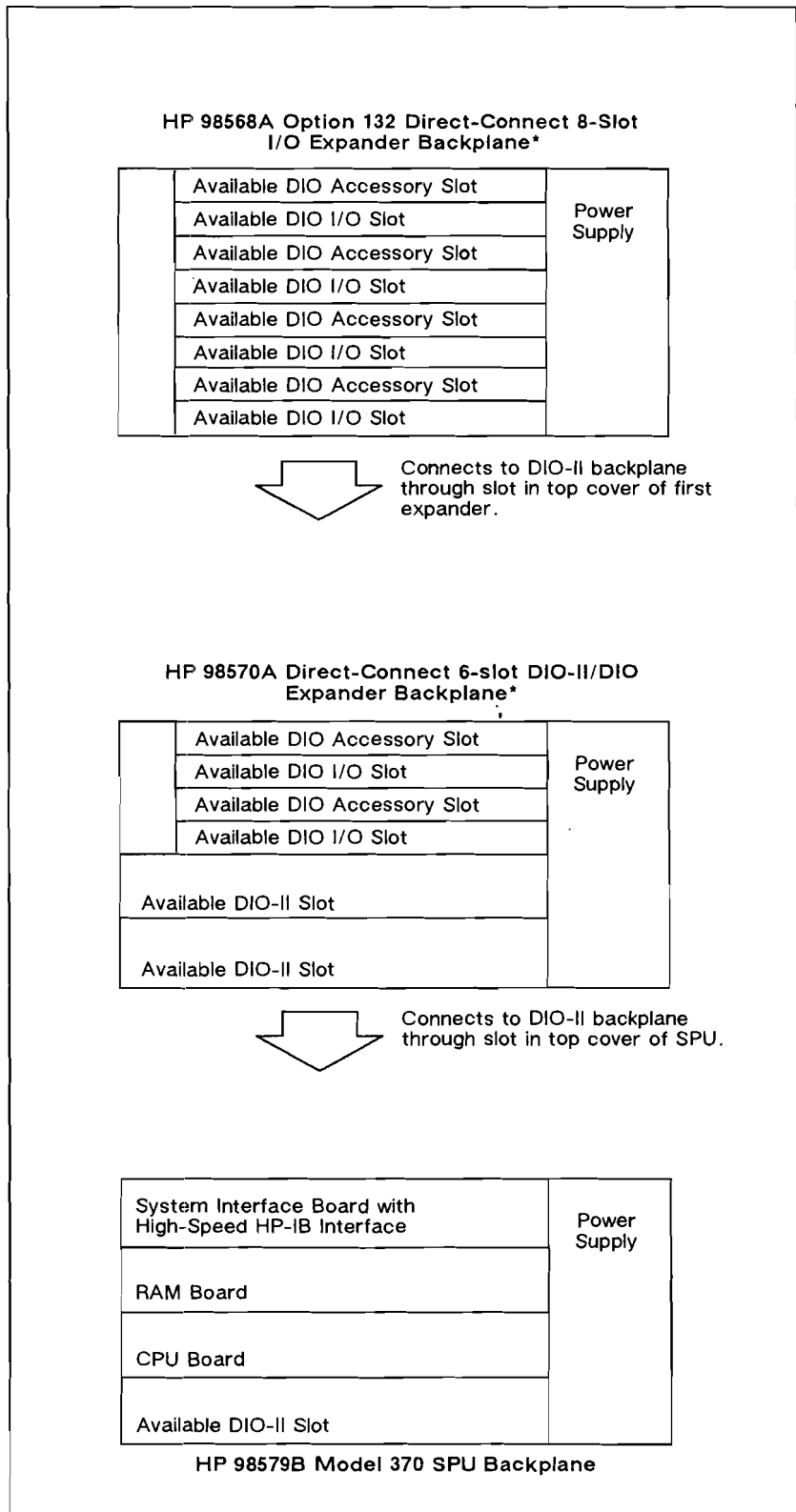


Figure 42. Model 370 Backplane Layout and Expandability

Model 370 System Processor Unit, continued

RAM: 8 MB parity, expandable to 32 MB parity or 48 MB ECC. See pages 59 and 60 for more information on memory expansion in the Model 370 SPU and bundles based on it.

Built-in Interfaces: HP-HIL, LAN (AUI or ThinLAN with built-in ThinMAU), RS-232, Std HP-IB, high-speed HP-IB, and audio output.

Floating Point Coprocessor: MC68882, clocked at 33 MHz, is standard.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

Model 370 Bundles

For a wide variety of products that bundle the Model 370 SPU with keyboards, monitors, and software, see pages 61 through 76.

Product Summary

98579B Model 370 System Processor Unit, consisting of:

- A. Processor board with:
 - a. 32-bit MC68030 33 MHz CPU with MC68882 33 MHz Floating Point Coprocessor,.
 - b. 64 KB of 60 ns cache memory.
 - c. 4 GB virtual memory address space.
 - d. 32-bit system and DIO-II buses.
- B. RAM board with:
 - a. 8 MB of parity-checking RAM.
 - b. Dual-port access to 32-bit CPU system bus and 32-bit DIO-II bus.
- C. System interface board with:
 - a. IEEE-488 HP-IB interface and 1 meter HP-IB cable.
 - b. High-speed HP-IB Disk interface and 1 meter HP-IB cable.
 - c. RS-232C serial interface (1 port) and adapter cable.
 - d. HP-HIL interface and HP-HIL keyboard cable.
 - e. IEEE 802.3/Ethernet LAN interface.
 - f. Audio output interface.
 - g. Two-channel direct memory access.
- D. Enclosure with one available DIO-II slot and power supply.
- E. Installation manuals.
- F. 90-day on-site warranty.

Options

- 011:** Substitutes SCSI single-ended Disk Interface with 1m cable and terminator for high-speed HP-IB interface.
- 015:** Specifies AUI-type LAN connection (excludes option 017).
- 017:** Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).
- 116:** Converts 8 MB parity checking RAM to 16 MB parity checking RAM (excludes options 208 and 216).
- 208:** Substitutes 8 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 216).
- 216:** Substitutes 16 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 208).

Add-on Accessories

- 98248B:** Floating Point Accelerator.
- 98258A:** 4 MB Parity-Checking RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98258B:** Adds 4 MB Parity-checking RAM to 98258A.
- 98258C:** Adds 12 MB Parity-checking RAM to 98258A.
- 98264A:** 8 MB ECC RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98264B:** 16 MB ECC RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98568A: Direct Connect 8-slot I/O Expander.*

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 370 SPU.

46021x: HP-HIL Keyboard (for National Versions, see page 13).

98203x: HP-HIL Keyboard with rotary knob, for BASIC/WS or Series 200/300 Pascal systems (for National Versions, see page 13).

35731A: 12-inch Medium-resolution (512 by 400) Monochrome Monitor

98542A: Medium-resolution Monochrome Video Output Board with cable.

35741A: Medium-resolution (512 by 400) Color Monitor.

35723A: HP-Touch Bezel for 35731A/35741A Monitor.

98543A: Medium-resolution Color Video Output Board with RGB cable.

98544B: High-resolution (1024 by 768) Monochrome Video Output Board.

98786A: 17-inch High-resolution (1024 by 768) Monochrome Monitor.

98547A: High-resolution (1024 by 768 by 6) Color Video Output Board.

98549A: High-resolution (1024 by 768 by 6) Color Video Output Board.

98751A: 19-inch High-resolution (1024 by 768) Color Monitor.

98785A: 16-inch High-resolution (1024 by 768) Color Monitor.

98548A: High-resolution (1280 by 1024) Monochrome Video Output Board.

98788A: 19-inch High-resolution (1280 by 1024) Monochrome Monitor.

98550A: High-resolution (1280 by 1024 by 8) Color Video Output Board.

98752A: 19-inch High-resolution (1280 by 1024) Color Monitor.

98788A: 16-inch High-resolution (1280 by 1024) Color Monitor.

46060A: HP-HIL Two-button Mouse.

46081A: Buffer box with speaker.

46084A: HP-HIL ID Module.

Operational Requirements

- 1. Operating System:** The BASIC/WS, HP-UX, or Pascal/WS System (see pages 10-12).
- 2. System Console:** A keyboard and monitor or a separate terminal (see pages 127-131).
- 3. System Disk:** A flexible disk for BASIC/WS or Pascal/WS or hard disk for HP-UX (see pages 136-140) or comparable support from a LAN-connected network server system.
- 4. Software Installation/Backup Device:** A cartridge tape subsystem for HP-UX (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

RAM Configuration and Expansion

Parity RAM

Option 116 provides for doubling the basic 8 MB of parity RAM in Model 370 SPUs to 16 MB on the standard RAM controller board that comes with the SPU. An additional 98258A 4 MB parity RAM board with 98258C 12 MB add-on can be installed in the SPU to provide a total of up to 32 MB of parity RAM, the maximum that has been tested and is supported.

Model 370 System Processor Unit, continued

ECC Memory

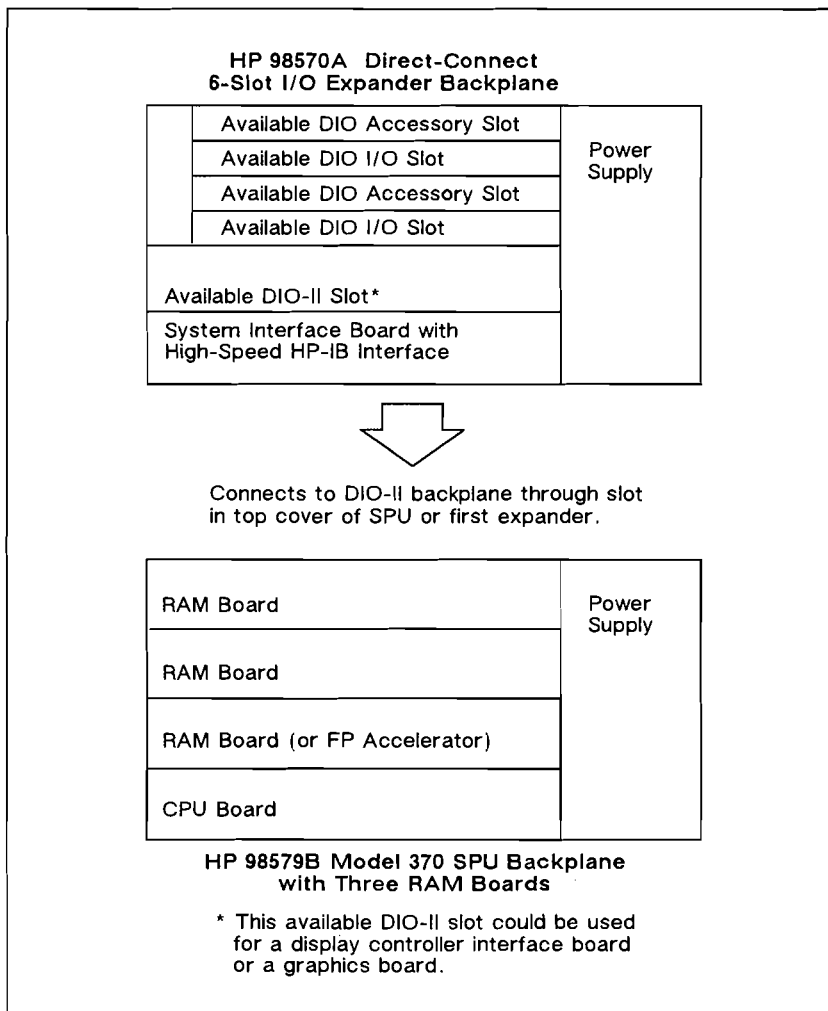
Options 208 and 216 provide for substitution of 8 or 16 MB of ECC RAM, respectively, for the 8 MB of parity RAM that is provided in the SPU. Two additional 98264B 16 MB ECC RAM boards can be installed in the option 216 SPU to provide a total of up to 48 MB of ECC memory.

Mixed Use of Parity and ECC Memory

The HP 98258A Parity Memory Controller and the HP 98264A/B ECC Memory Controller can be used together in the same system. The ECC protection is provided only for the RAM locations on the ECC Memory Controller board(s). It does not extend to the RAM on the Parity Memory Controller.

Memory Location Considerations

To the extent that RAM boards use DIO-II slots in the SPU that might otherwise be occupied by the system interface board or a display controller interface or a video board, those other boards must be installed in an appropriate expander. Figure 43 shows a configuration in which the system interface board has been moved to an expander to make space for a total of three RAM boards (48 MB of ECC memory). It is important to note that the 98248A Floating Point Accelerator must also occupy a slot in the SPU (the slot directly above the CPU card), if it is to achieve full rated performance. This reduces maximum SPU-resident memory to 32 MB.



**Figure 43. Model 370 Configuration with Three
RAM Boards in SPU Backplane**

Memory Performance in Expander

Although RAM boards can be installed in a 98570A Expander, only RAM in the SPU mainframe, which is frontplane-connected via the system bus, is accessed without wait states. RAM boards in an expander, and therefore not on the system bus, incur wait states during fill or flush upon cache fault, reducing performance.

Model 370AIC AI Development System

Description

The HP 9000 Model 370AIC is a color AI development system with HP-UX and AI development environment software, keyboard, and 19-inch 1280 by 1024 color monitor that is based on the powerful Model 370 System Processor Unit. Figures 44 and 45 illustrate the Model 370AIC functions and backplane usage and interconnections.

SPU: HP 98579B Model 370, described on page 57.

Operating System: License to use HP-UX, media, and manuals are included.

Programming Software: License-to-use Common LISP II Development Environment, media, and manuals are included.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 42, page 57, and Figure 43, page 60.

Product Summary

98588G + 688 Model 370AIC Color AI Development system, consisting of:

- A. 98579B System Processor Unit.
- B. 98550A High-Resolution Color Video Board with RGB Cable.
- C. 98752A 19-inch 1280 by 1024 Color Monitor.
- D. Keyboard, which must be specified by national version option (see page 13).
- E. 46060A HP-HIL Two-button Mouse.
- F. 46081A Buffer Box with Speaker.
- G. 46084A HP-HIL ID Module.
- H. Installation manuals.
- I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11).

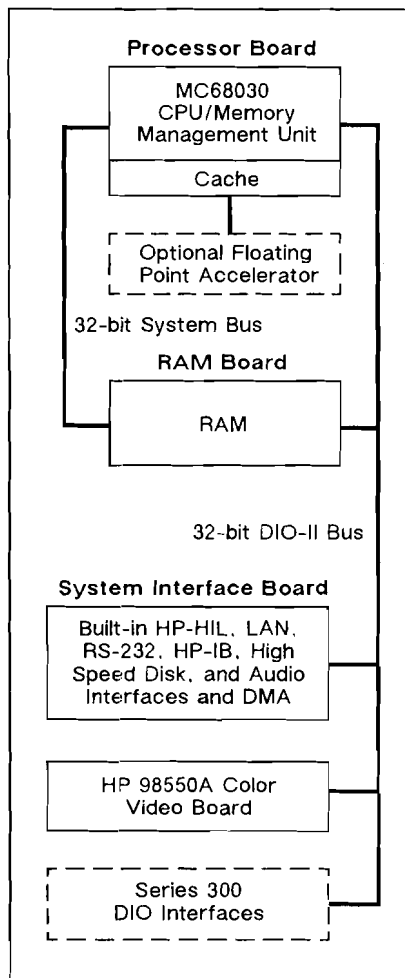


Figure 44. Model 370AIC Functions

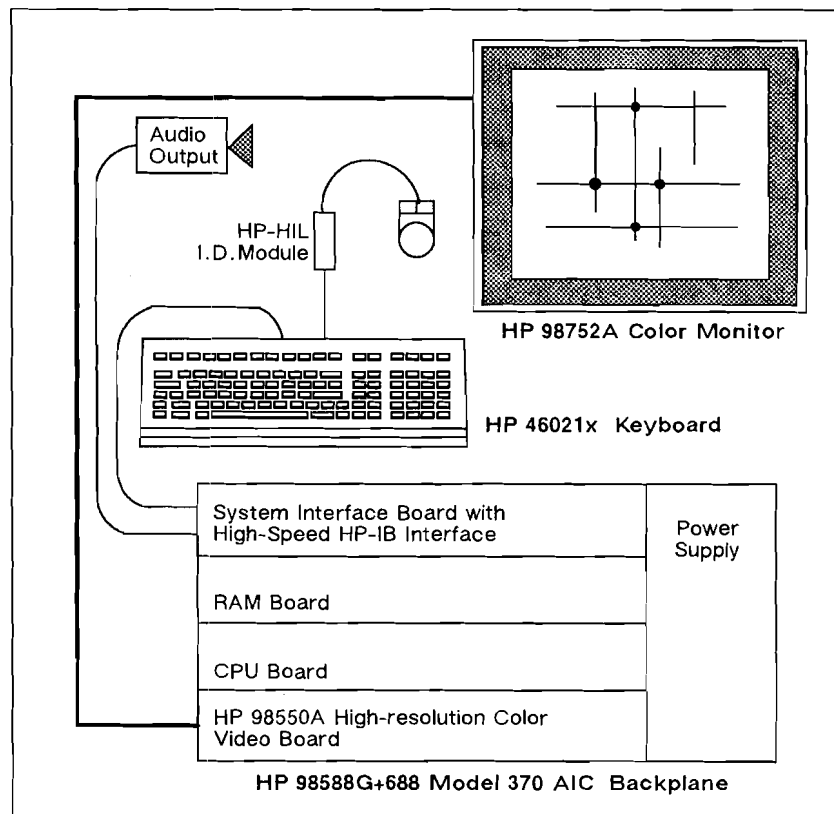


Figure 45. Model 370AIC Backplane Usage and Interconnections

Model 370AIC AI Development System, continued

J. 98594A media and documentation for 98594L software. Software is delivered on 1/4-inch tape cartridge.

K. 98794A HP-UX Programmer's Documentation Set.

L. 98688L License to use Development Environment for Common LISP II.

M. 98688A Opt. 022 Development Environment for Common LISP II. Software is delivered on 1/4-inch tape cartridge.

N. 90-day on-site warranty.

Options

011: Substitutes SCSI single-ended Disk Interface for high-speed HP-IB disk interface.

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

116: Converts 8 MB parity-checking RAM to 16 MB parity checking RAM (excludes options 208 and 216).

208: Substitutes 8 MB ECC RAM for 8 MB parity checking RAM† (excludes options 116 and 216).

216: Substitutes 16 MB ECC RAM for 8 MB parity checking RAM† (excludes options 116 and 208).

716: Substitutes 98789A 16-inch monitor for 98752A 19-inch monitor.

Add-on Accessories

98248B: Floating Point Accelerator.

98258A: 4 MB Parity-Checking RAM controller with 3-slot system bus frontplane connector.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98258B: Adds 4 MB Parity-checking RAM to 98258A.

98258C: Adds 12 MB Parity-checking RAM to 98258A.

98264A: 8 MB ECC RAM controller with 3-slot system bus frontplane connector†.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98264B: 16 MB ECC RAM controller with 3-slot system bus frontplane connector†.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98556A: 2D Integer-Based Graphics Accelerator†.

98568A: Direct Connect 8-slot I/O Expander.*

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 370 SPU.

Operational Requirements

1. System Disk: A hard disk with at least 152 MB (see pages 136-140).

2. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142).

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

† A 98550A Graphics Board with 98556A 2D Graphics Accelerator is not supported in the Model 370AIC card cage with ECC RAM. If ECC RAM is used, the graphics board with accelerator daughter board must be installed in a 98570A DIO-II Expander.

Model 370AIM AI Development System

Description

The HP 9000 Model 370AIM is a monochrome AI development system with HP-UX and AI development environment software, keyboard, and 19-inch 1280 by 1024 monochrome monitor that is based on the powerful Model 370 System Processor Unit. Figures 46 and 47 illustrate the Model 370AIM functions and backplane usage and interconnections.

SPU: HP 98579B Model 370, described on page 57.

Operating System: License to use HP-UX, media, and manuals are included.

Programming Software: License-to-use Common LISP II Development Environment, media, and manuals are included.

Monitor: 19-inch 1280 by 1024 Monochrome Monitor.

Expandability: See Figure 42, page 57, and Figure 43, page 60.

Product Summary

98589G + 688 Model 370AIM Monochrome AI Development system, consisting of:

- A. 98579B System Processor Unit.
- B. 98548A High-Resolution Monochrome Video Board with cable to monitor.
- C. 98788A 19-inch 1280 by 1024 Monochrome Monitor.
- D. Keyboard, which must be specified by national version option (see page 13).
- E. 46060A HP-HIL Two-button Mouse.
- F. 46081A Buffer Box with Speaker
- G. 46084A HP-HIL ID Module.
- H. Installation manuals.
- I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11).

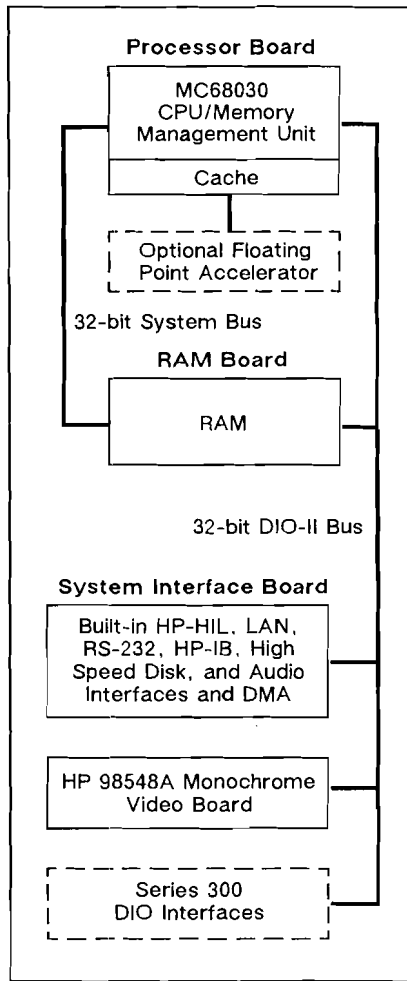


Figure 56. Model 370AIM Functions

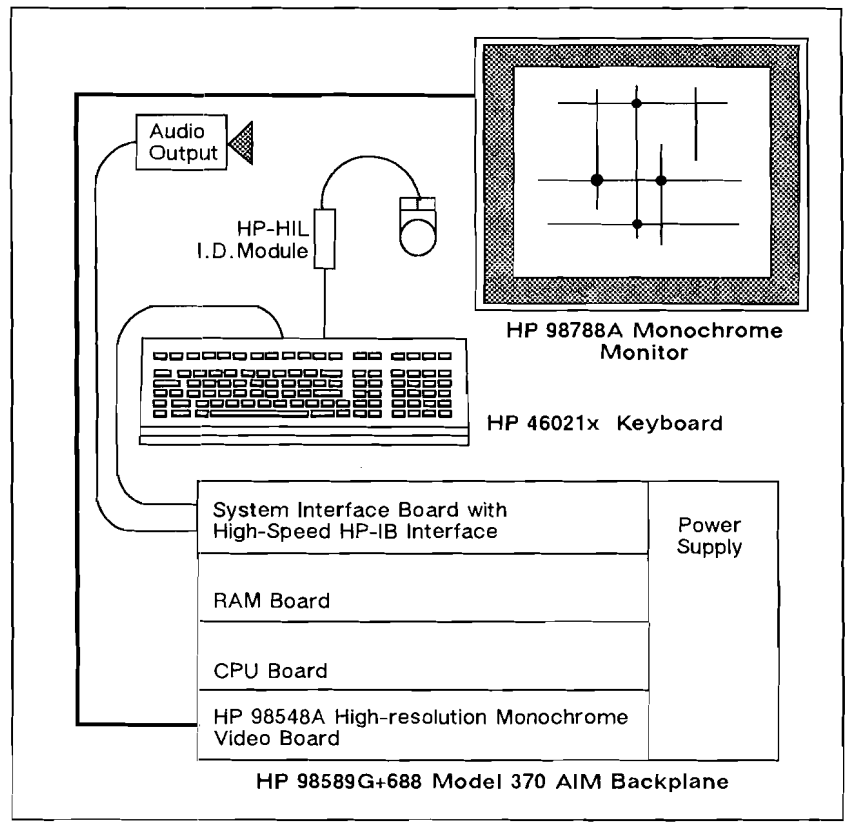


Figure 57. Model 370AIM Backplane Usage and Interconnections

Model 370AIM AI Development System, continued

- J. 98594A media and documentation for 98594L software. Software is delivered on 1/4-inch tape cartridge.
- K. 98794A HP-UX Programmer's Documentation Set.
- L. 98688L License to use Development Environment for Common LISP II.
- M. 98688A Opt. 022 Development Environment for Common LISP II. Software is delivered on 1/4-inch tape cartridge.
- N. 90-day on-site warranty.

Options

- 011:** Substitutes SCSI single-ended Disk Interface for high-speed HP-IB disk interface.
- 015:** Specifies AUI-type LAN connection (excludes option 017).
- 017:** Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).
- 116:** Converts 8 MB parity-checking RAM to 16 MB parity checking RAM (excludes options 208 and 216).
- 208:** Substitutes 8 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 216).
- 216:** Substitutes 16 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 208).

Add-on Accessories

- 98248B:** Floating Point Accelerator.
- 98258A:** 4 MB Parity-Checking RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98258B:** Adds 4 MB Parity-checking RAM to 98258A.
- 98258C:** Adds 12 MB Parity-checking RAM to 98258A.
- 98264A:** 8 MB ECC RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98264B:** 16 MB ECC RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98568A:** Direct Connect 8-slot I/O Expander.*
- 98570A:** Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*
- 9888A:** 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 370 SPU.

Operational Requirements

- 1. System Disk:** A hard disk with at least 152 MB (see pages 136-140).
- 2. Software Installation/ Backup Device:** A cartridge tape subsystem (see pages 141-142).

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 370C + Workstation

Description

The HP 9000 Model 370C + is a 2D color workstation with keyboard and 19-inch 1024 by 768 color monitor that is based on the powerful Model 370 System Processor Unit. Figures 48 and 49 illustrate the Model 370C + functions and backplane usage and interconnections.

SPU: HP 98579B Model 370, described on page 57.

Operating System: License to use HP-UX is included; HP-UX media and manuals must be purchased separately to provide installable software for licensed systems.

Monitor: 19-inch 1024 by 768 Color Monitor.

Expandability: See Figure 42, page 57, and Figure 43, page 60.

Product Summary

98583G Model 370C + 2D Color Workstation, consisting of:

- A. 98579B System Processor Unit.
- B. 98549A Color Video Board with RGB Cable.
- C. 98751A 19-inch 1024 by 768 Color Monitor.
- D. Keyboard, which must be specified by national version option (see page 13).
- E. 46060A HP-HIL Two-button Mouse.
- F. 46081A Buffer Box with Speaker.
- G. 46084A HP-HIL ID Module.
- H. Installation manuals.
- I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, next page).
- J. 90-day on-site warranty.

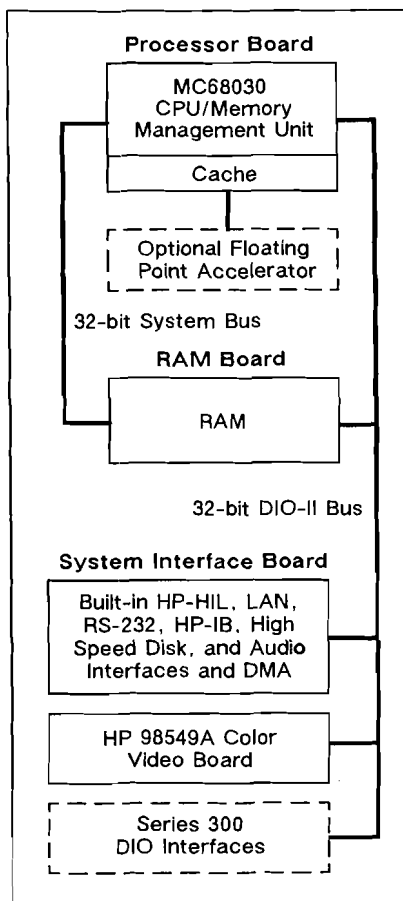


Figure 48. Model 370C + Functions

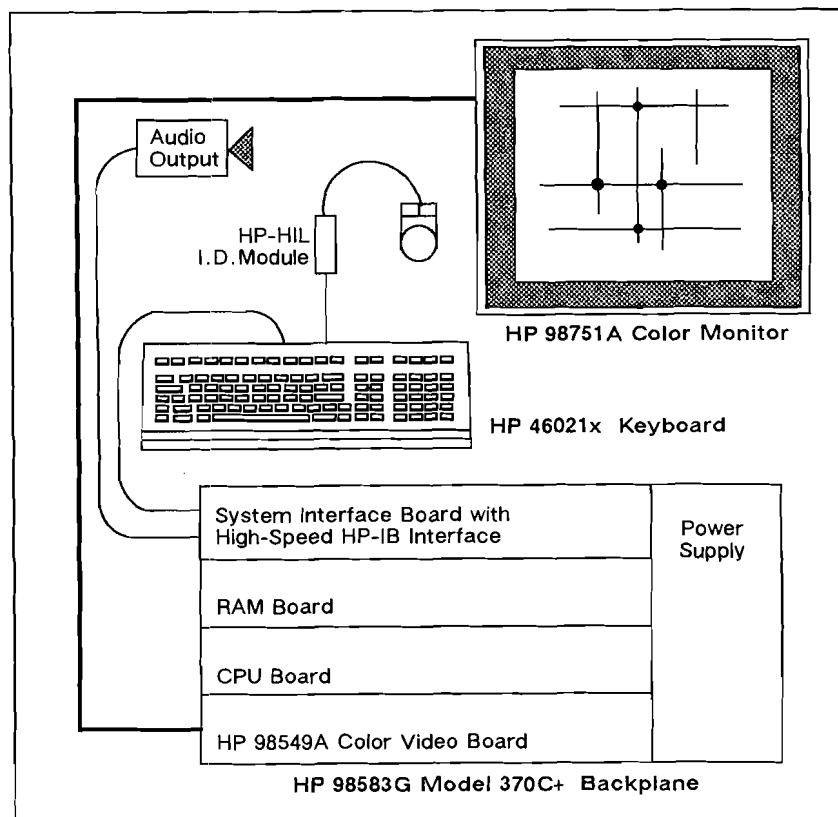


Figure 49. Model 370C + Backplane Usage and Interconnections

Options

011: Substitutes SCSI single-ended Disk Interface for high-speed HP-IB disk interface.

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

116: Converts 8 MB parity-checking RAM to 16 MB parity-checking RAM (excludes options 208 and 216).

208: Substitutes 8 MB ECC RAM for 8 MB parity-checking RAM† (excludes options 116 and 216).

216: Substitutes 16 MB ECC RAM for 8 MB parity-checking RAM† (excludes options 116 and 208).

716: Substitutes 98785A 16-inch monitor for 98751A 19-inch monitor.

Add-on Accessories

98248B: Floating Point Accelerator.

98258A: 4 MB Parity-Checking RAM controller with 3-slot system bus frontplane connector.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98258B: Adds 4 MB Parity-checking RAM to 98258A.

98258C: Adds 12 MB Parity-checking RAM to 98258A.

98264A: 8 MB ECC RAM controller with 3-slot system bus frontplane connector†.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98264B: 16 MB ECC RAM controller with 3-slot system bus frontplane connector†.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98556A: 2D Integer-Based Graphics Accelerator†.

98568A: Direct Connect 8-slot I/O Expander.*

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

† A 98550A Graphics Board with 98556A 2D Graphics Accelerator is not supported in the Model 370CH card cage with ECC RAM. If ECC RAM is used, the graphics board with accelerator daughter board must be installed in a 98570A DIO-II Expander.

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 370 SPU.

Operational Requirements

1. Operating System: The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system. The system disk will require either a high-speed HP-IB interface (option 010) or an SCSI interface (option 011).

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 370CH Workstation

Description

The HP 9000 Model 370CH is a 2D color workstation with keyboard, and 19-inch 1280 by 1024 color monitor that is based on the powerful Model 370 System Processor Unit. Figures 50 and 51 illustrate the Model 370CH functions and backplane usage and interconnections.

SPU: HP 98579B Model 370, described on page 57.

Operating System: License to use HP-UX is included; HP-UX media and manuals must be purchased separately to provide installable software for licensed systems.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 42, page 57, and Figure 43, page 60.

Product Summary

98588G Model 370CH 2D Color Workstation, consisting of:

- A. 98579B System Processor Unit.
- B. 98550A High-Resolution Color Video Board with RGB Cable.
- C. 98752A 19-inch 1280 by 1024 Color Monitor.
- D. Keyboard, which must be specified by national version option (see page 13).
- E. 46060A HP-HIL Two-button Mouse.
- F. 46081A Buffer Box with Speaker
- G. 46084A HP-HIL ID Module.
- H. Installation manuals.
- I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, next page).
- J. 90-day on-site warranty.

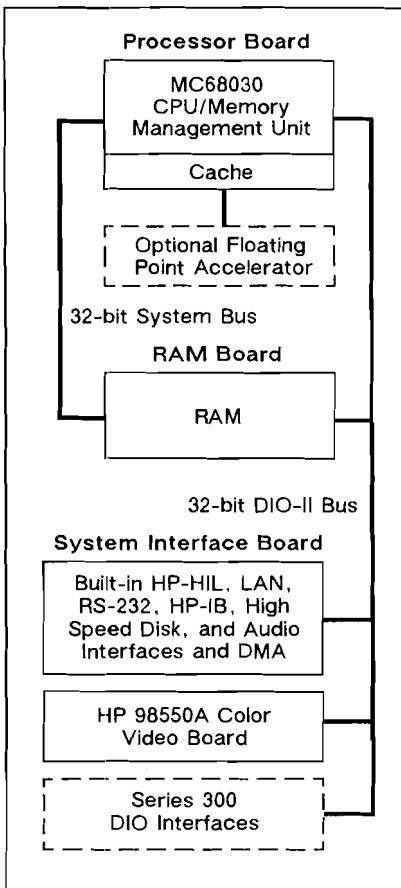


Figure 50. Model 370CH Functions

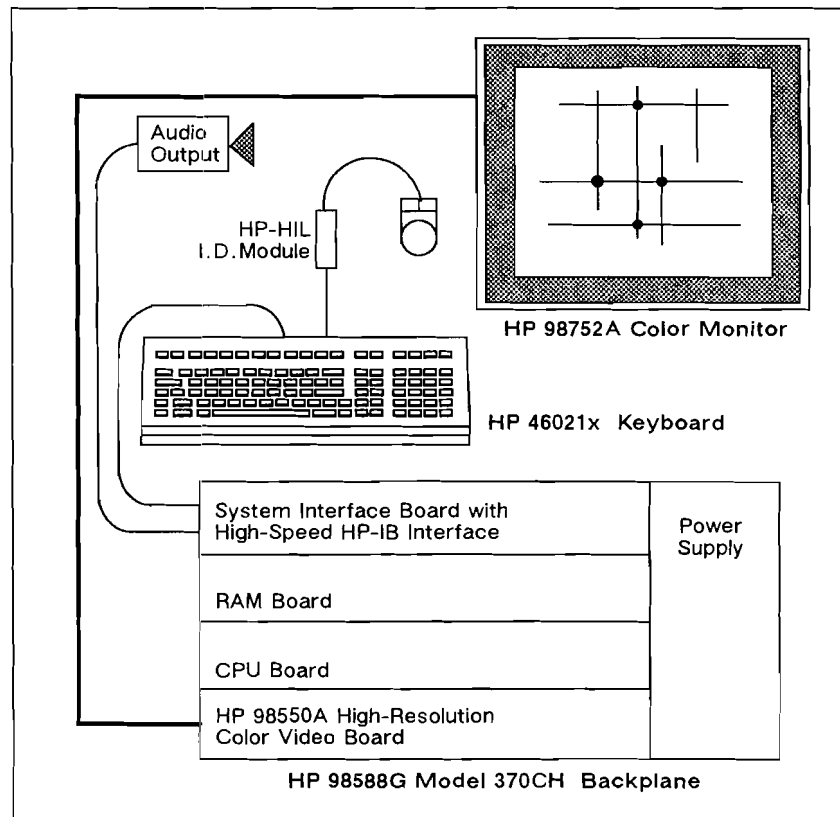


Figure 51. Model 370CH Backplane Usage and Interconnections



Model 370CH Workstation, continued

Options

011: Substitutes SCSI single-ended Disk Interface for high-speed HP-IB disk interface.

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

116: Converts 8 MB parity-checking RAM to 16 MB parity checking RAM (excludes options 208 and 216).

208: Substitutes 8 MB ECC RAM for 8 MB parity checking RAM† (excludes options 116 and 216).

216: Substitutes 16 MB ECC RAM for 8 MB parity checking RAM† (excludes options 116 and 208).

716: Substitutes 98789A 16-inch monitor for 98752A 19-inch monitor.

Add-on Accessories

98248B: Floating Point Accelerator.

98258A: 4 MB Parity-Checking RAM controller with 3-slot system bus frontplane connector.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98258B: Adds 4 MB Parity-checking RAM to 98258A.

98258C: Adds 12 MB Parity-checking RAM to 98258A.

98264A: 8 MB ECC RAM controller with 3-slot system bus frontplane connector†.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98264B: 16 MB ECC RAM controller with 3-slot system bus frontplane connector†.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98556A: 2D Integer-Based Graphics Accelerator†.

98568A: Direct Connect 8-slot I/O Expander.*

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot – maximum of two).

† A 98550A Graphics Board with 98556A 2D Graphics Accelerator is not supported in the Model 370CH card cage with ECC RAM. If ECC RAM is used, the graphics board with accelerator daughter board must be installed in a 98570A DIO-II Expander.

* Maximum of two 98568A/98570A Direct Connect I/O Expanders per Model 370 SPU.

Operational Requirements

1. Operating System: The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system.

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 370CHX Workstation

Description

The HP 9000 Model 370CHX is a 2D color workstation with 2D integer-based graphics accelerator, keyboard, and 19-inch 1280 by 1024 color monitor that is based on the powerful Model 370 System Processor Unit. Figures 52 and 53 illustrate the Model 370CHX functions and backplane usage and interconnections.

SPU: HP 98579B Model 370, described on page 57.

Operating System: License to use HP-UX is included; HP-UX media and manuals must be purchased separately to provide installable software for licensed systems.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 42, page 57, and Figure 43, page 60.

Product Summary

98588G + 556 Model 370CHX 2D Color Workstation, consisting of:

- A. 98579B System Processor Unit.
- B. 98550A High-Resolution Color Video Board with RGB Cable.
- C. 98556A 2D Integer-based Graphics Accelerator.
- D. 98752A 19-inch 1280 by 1024 Color Monitor.
- E. Keyboard, which must be specified by national version option (see page 13).
- F. 46060A HP-HIL Two-button Mouse.
- G. 46081A Buffer Box with Speaker.
- H. 46084A HP-HIL ID Module.
- I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, next page).

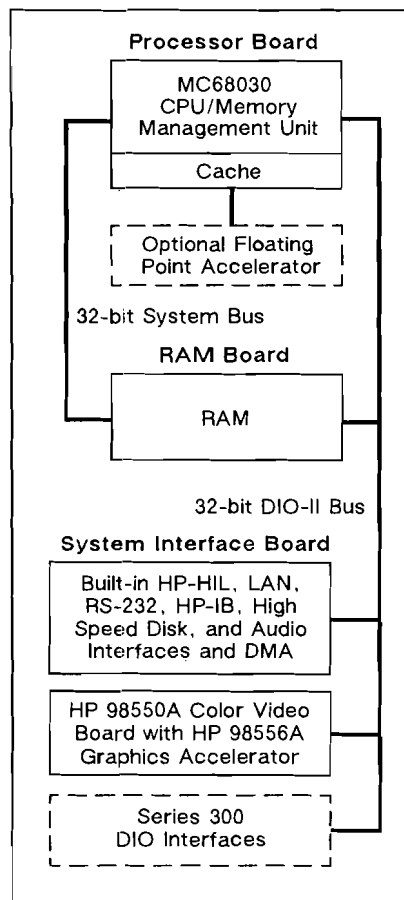


Figure 52. Model 370CHX Functions

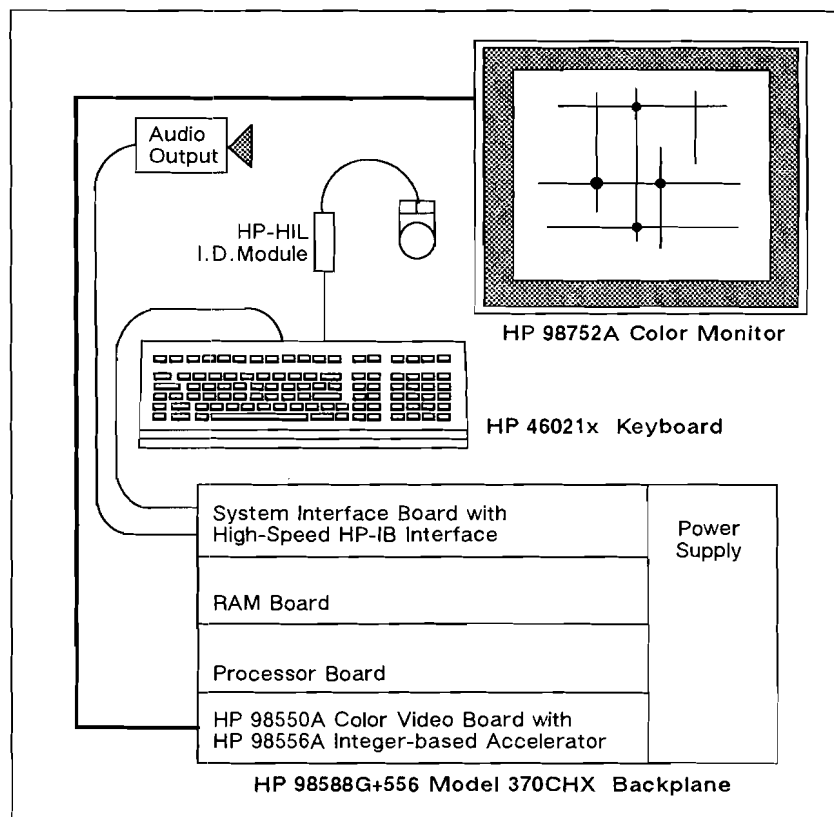


Figure 53. Model 370CHX Backplane Usage and Interconnections

Model 370CHX Workstation, continued

J. Installation manuals.

K. 90-day on-site warranty.

Options

011: Substitutes SCSI single-ended Disk Interface for high-speed HP-IB disk interface.

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

116: Converts 8 MB parity-checking RAM to 16 MB parity checking RAM (excludes options 208 and 216).

208: Substitutes 8 MB ECC RAM for 8 MB parity checking RAM† (excludes options 116 and 216).

216: Substitutes 16 MB ECC RAM for 8 MB parity checking RAM† (excludes options 116 and 208).

716: Substitutes 98789A 16-inch monitor for 98752A 19-inch monitor.

Add-on Accessories

98248B: Floating Point Accelerator.

98258A: 4 MB Parity-Checking RAM controller with 3-slot system bus frontplane connector.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98258B: Adds 4 MB Parity-checking RAM to 98258A.

98258C: Adds 12 MB Parity-checking RAM to 98258A.

98264A: 8 MB ECC RAM controller with 3-slot system bus frontplane connector†.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98264B: 16 MB ECC RAM controller with 3-slot system bus frontplane connector†.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98568A: Direct Connect 8-slot I/O Expander.*

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

† The 98550A Graphics Board with 98556A 2D Graphics Accelerator is not supported in the Model 370CHX card cage with ECC RAM. If ECC RAM is used, the graphics board with accelerator daughter board must be installed in a 98570A DIO-II Expander.

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 370 SPU.

Operational Requirements

1. Operating System: The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.

2. System Disk: A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system.

3. Software Installation/ Backup Device: A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 370MH Workstation

Description

The HP 9000 Model 370MH is a 2D monochrome workstation with keyboard and 19-inch 1280 by 1024 monochrome monitor that is based on the powerful Model 370 System Processor Unit. Figures 54 and 55 illustrate the Model 370MH functions and backplane usage and interconnections.

SPU: HP 98579B Model 370, described on page 57.

Operating System: License to use HP-UX is included; HP-UX media and manuals must be purchased separately to provide installable software for licensed systems.

Monitor: 19-inch 1280 by 1024 Monochrome Monitor.

Expandability: See Figure 42, page 57, and Figure 43, page 60.

Product Summary

98589G Model 370MH 2D Monochrome Workstation, consisting of:

- A. 98579B System Processor Unit.
- B. 98548A High-Resolution Monochrome Video Board with Cable to monitor.
- C. 98788A 19-inch 1280 by 1024 Monochrome Monitor.
- D. Keyboard, which must be specified by national version option (see page 13).

E. 46060A HP-HIL Two-button Mouse.

F. 46081A Buffer Box with Speaker

G. 46084A HP-HIL ID Module.

H. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, next page).

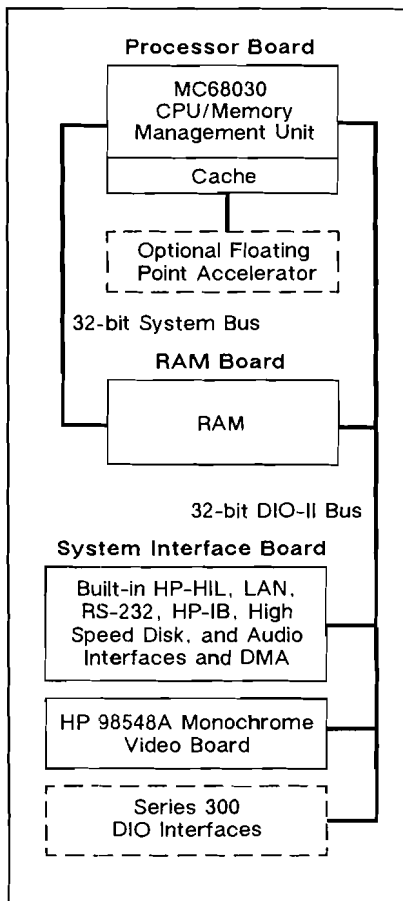


Figure 54. Model 370MH Functions

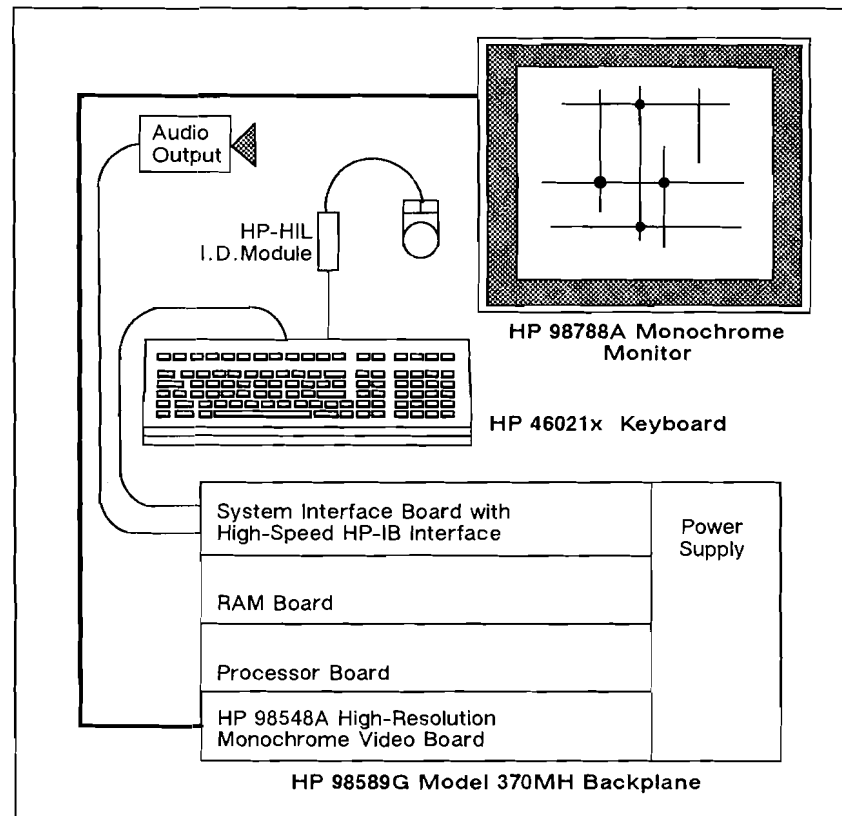


Figure 55. Model 370MH Backplane Usage and Interconnections

Model 370MH Workstation, continued

- I. Installation manuals.
- J. 90-day on-site warranty.

Options

- 011:** Substitutes SCSI single-ended Disk Interface for high-speed HP-IB disk interface.
- 015:** Specifies AUI-type LAN connection (excludes option 017).
- 017:** Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).
- 116:** Converts 8 MB parity-checking RAM to 16 MB parity checking RAM (excludes options 208 and 216).
- 208:** Substitutes 8 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 216).
- 216:** Substitutes 16 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 208).

Add-on Accessories

- 98248B:** Floating Point Accelerator.
- 98258A:** 4 MB Parity-Checking RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98258B: Adds 4 MB Parity-checking RAM to 98258A.

98258C: Adds 12 MB Parity-checking RAM to 98258A.

98264A: 8 MB ECC RAM controller with 3-slot system bus frontplane connector.

- 004: Deletes 3-slot system bus frontplane connector.
- 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98264B: 16 MB ECC RAM controller with 3-slot system bus frontplane connector.

- 004: Deletes 3-slot system bus frontplane connector.
- 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98568A: Direct Connect 8-slot I/O Expander.*

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 370 SPU.

Operational Requirements

- 1. Operating System:** The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.
- 2. System Disk:** A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system.
- 3. Software Installation/ Backup Device:** A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 370SRX Workstation

Description

The HP 9000 Model 370SRX is a solid rendering 3D color workstation with keyboard and 19-inch 1280 by 1024 color monitor that is based on the powerful Model 370 System Processor Unit. Figures 56 and 57 illustrate the Model 370SRX functions and backplane usage and interconnections.

SPU: HP 98579B Model 370, described on page 57.

Operating System: License to use HP-UX is included; HP-UX media and manuals must be purchased separately to provide installable software for licensed systems.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 42, page 57, and Figure 43, page 60.

Product Summary

98587G Model 370SRX Solid Rendering Color Workstation, consisting of:

- A. 98579B System Processor Unit.
- B. 98720A Display Controller with 3D solid rendering graphics accelerator and 8 planes of frame buffer memory.
- C. 98725A Display Controller (local graphics bus) Interface.
- E. 98290A RGB Cable.
- D. 98752A 19-inch 1280 by 1024 Color Monitor.
- F. Keyboard, which must be specified by national version option (see page 13).
- G. 46060A HP-HIL Two-button Mouse.
- H. 46081A Buffer Box with Speaker
- I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, next page).

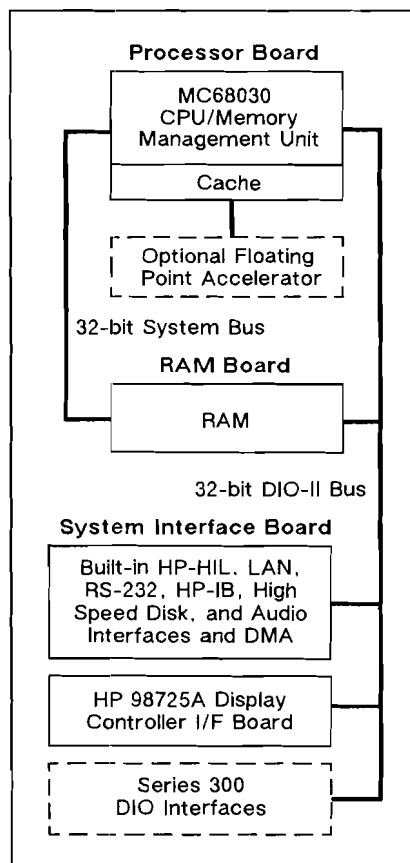


Figure 56. Model 370SRX Functions

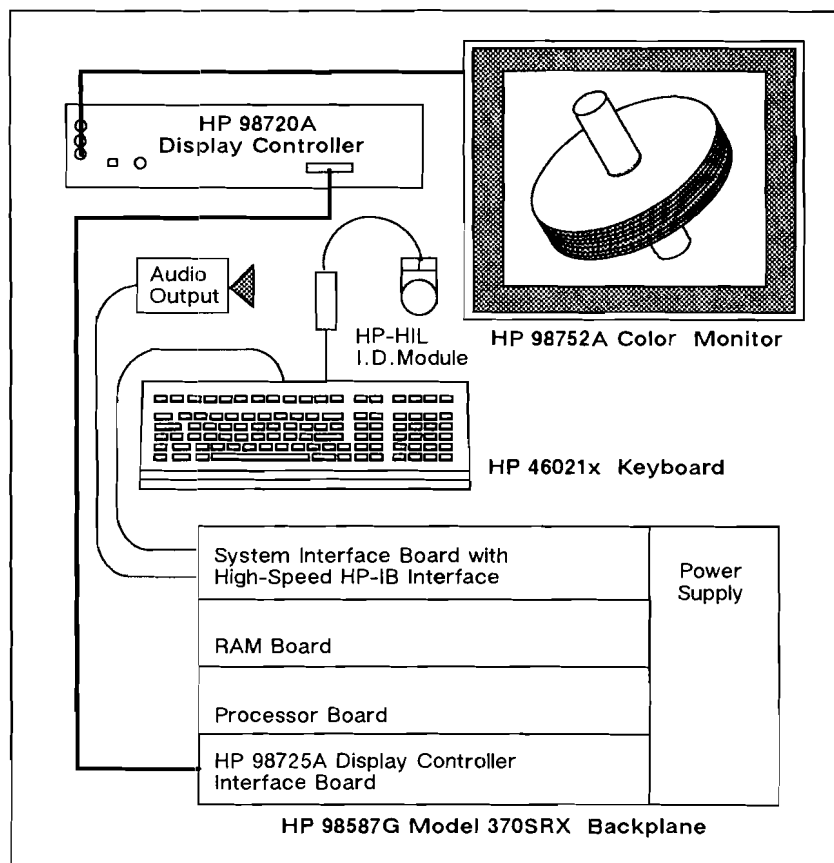


Figure 57. Model 370SRX Backplane Usage and Interconnections

Model 370SRX Workstation, continued

- J. 46084A HP-HIL ID Module.
- K. Installation manuals.
- L. 90-day on-site warranty.

Options

- 011:** Substitutes SCSI single-ended Disk Interface for high-speed HP-IB disk interface.
- 015:** Specifies AUI-type LAN connection (excludes option 017).
- 016:** Adds one 8-plane frame buffer board for a total of 16 planes and increases power supply (excludes options 024 and 032).
- 017:** Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).
- 024:** Adds two 8-plane frame buffer boards for a total of 24 planes and increases power supply (excludes options 016 and 032).
- 032:** Adds three 8-plane frame buffer boards for a total of 32 planes and increases power supply (excludes options 016 and 024).
- 116:** Converts 8 MB parity-checking RAM to 16 MB parity checking RAM (excludes options 208 and 216).
- 208:** Substitutes 8 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 216).
- 216:** Substitutes 16 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 208).
- 716:** Substitutes 98789A 16-inch monitor for 98752A 19-inch monitor.

Add-on Accessories

- 98248B:** Floating Point Accelerator.
- 98258A:** 4 MB Parity-Checking RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98258B:** Adds 4 MB Parity-checking RAM to 98258A.
- 98258C:** Adds 12 MB Parity-checking RAM to 98258A.
- 98264A:** 8 MB ECC RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98264B:** 16 MB ECC RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98568A:** Direct Connect 8-slot I/O Expander.*
- 98570A:** Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*
- 9888A:** 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).
- 98722A:** 8-plane frame buffer board (max. of four 8-plane frame buffers per 98720A).
- 98723A:** Additional power supply for 98720A Display Controller with more than 8 planes of frame buffer memory.

Operational Requirements

- 1. Operating System:** The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.
- 2. System Disk:** A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system.
- 3. Software Installation/ Backup Device:** A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

- Interfacing:** See pages 84-99.
- Terminals:** See pages 127-135.
- Disks:** See pages 136-140.
- Cartridge Tape Subsystems and Magnetic Tape Units:** See pages 141-142.
- Printers:** See pages 143-146.
- Plotters:** See pages 147-152.
- Communications:** See pages 153-158.
- Data Base Management:** See pages 159-160.
- Application Development:** See pages 161-163.
- MS-DOS Support:** See pages 164-166.
- Rack Mounting:** See pages 167-169.

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 370 SPU.

Model 370 TurboSRX Workstation

Description

The HP 9000 Model 370 TurboSRX is an ultra-fast solid rendering 3D color workstation with keyboard and 19-inch color monitor that is based on the powerful Model 370 System Processor Unit. Figures 58 and 59 illustrate the Model 370 TurboSRX functions and backplane usage and interconnections.

SPU: HP 98579B Model 370, described on page 57.

Operating System: License to use HP-UX is included; HP-UX media and manuals must be purchased separately to provide installable software for licensed systems.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Expandability: See Figure 42, page 57, and Figure 43, page 60.

Product Summary

98587H Model 370 TurboSRX Solid Rendering Color Workstation, consisting of:

- A. 98579B System Processor Unit.
- B. 98730A Display Controller with 3D solid rendering graphics accelerator and 8 planes of frame buffer memory.
- C. 98726A 32-bit Display Controller (local graphics bus) Interface.
- D. 98752A 19-inch 1280 by 1024 Color Monitor.
- E. 98290A RGB Cable.
- F. Keyboard, which must be specified by national version option (see page 13).
- G. 46060A HP-HIL Two-button Mouse.
- H. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11). Software and documentation must be ordered separately (see operational requirements, next page).

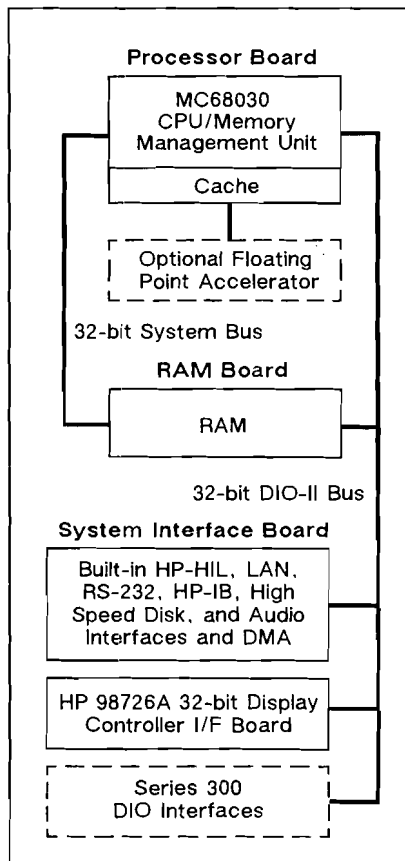


Figure 58. Model 370 TurboSRX Functions

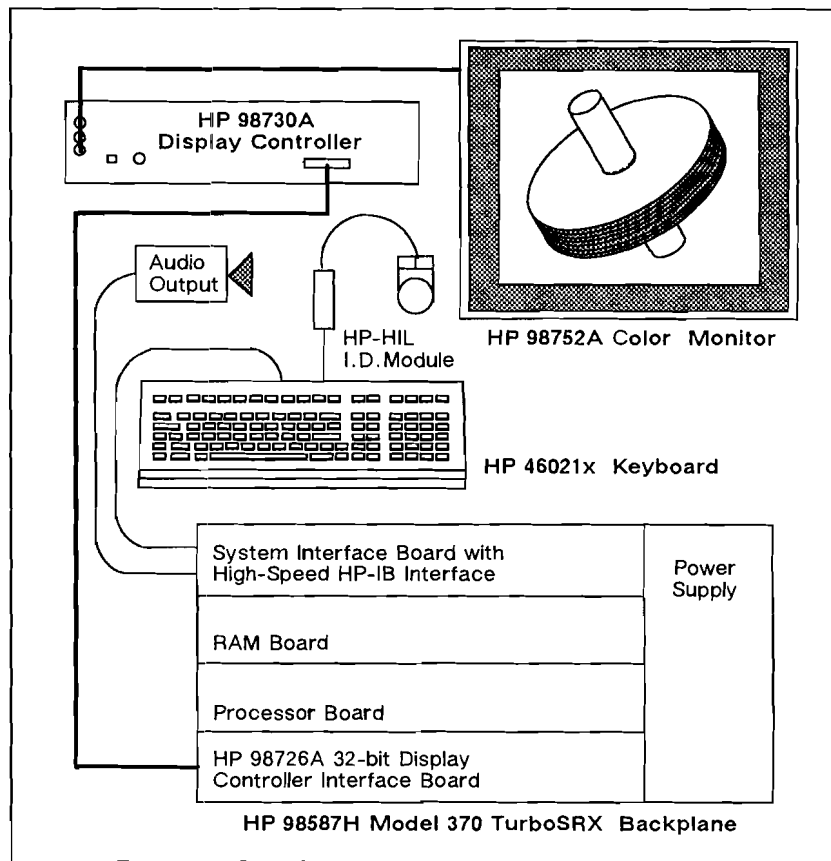


Figure 59. Model 370 TurboSRX Backplane Usage and Interconnections

Model 370 TurboSRX Workstation, continued

- I. 46081A Buffer Box with Speaker
- J. 46084A HP-HIL ID Module.
- K. Installation manuals .
- L. 90-day on-site warranty.

Options

- 011:** Substitutes SCSI single-ended Disk Interface for high-speed HP-IB disk interface.
- 015:** Specifies AUI-type LAN connection (excludes option 017).
- 017:** Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).
- 116:** Converts 8 MB parity-checking RAM to 16 MB parity-checking RAM (excludes options 208 and 216).
- 208:** Substitutes 8 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 216).
- 216:** Substitutes 16 MB ECC RAM for 8 MB parity checking RAM (excludes options 116 and 208).
- 416:** Adds one 8-plane frame buffer board for a total of 16 planes and increases power supply (excludes options 424, 616, and 624).
- 424:** Adds two 8-plane frame buffer boards for a total of 24 planes and increases power supply (excludes options 416, 616, and 624).
- 608:** Adds three accelerators for 3D solids and a full 16-bit Z-buffer.
- 616:** Adds one 8-plane frame buffer board for a total of 16 planes, three accelerators for 3D solids, a full 16-bit Z-buffer, and increases power supply (excludes options 416, 424, and 624).

624: Adds two 8-plane frame buffer boards for a total of 24 planes, three accelerators for 3D solids, a full 16-bit Z-buffer, and increases power supply (excludes options 416, 424, and 616).

716: Substitutes 98789A 16-inch monitor for 98752A 19-inch monitor.

Add-on Accessories

- 98248B:** Floating Point Accelerator.
- 98258A:** 4 MB Parity-Checking RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98258B:** Adds 4 MB Parity-checking RAM to 98258A.
- 98258C:** Adds 12 MB Parity-checking RAM to 98258A.
- 98264A:** 8 MB ECC RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.
- 98264B:** 16 MB ECC RAM controller with 3-slot system bus frontplane connector.
 - 004: Deletes 3-slot system bus frontplane connector.
 - 005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

98568A: Direct Connect 8-slot I/O Expander.*

98570A: Direct Connect I/O Expander with four DIO slots (two DIO slot pairs) and two DIO-II slots.*

9888A: 16-slot DIO Expander (uses one DIO I/O slot - maximum of two).

98722A: 8-plane frame buffer board (max. of four 8-plane frame buffers per 98720A).

98723A: Additional power supply for 98720A Display Controller with more than 8 planes of frame buffer memory.

* Maximum of two 98658A/98570A Direct Connect I/O Expanders per Model 370 SPU.

Operational Requirements

- 1. Operating System:** The HP 98594A Option 022 Media and documentation for 98594L must be available for installation.
- 2. System Disk:** A hard disk with at least 81 MB (see pages 136-140) or comparable support from a LAN-connected network server system.
- 3. Software Installation/Backup Device:** A cartridge tape subsystem (see pages 141-142) or comparable support from a LAN-connected network server system.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-131.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

Rack Mounting: See pages 167-169.

Diskless Workstations

Introduction

HP 9000 Model 340, 360, and 370 workstations and other HP-UX 6.x-based Series 300 systems, linked via a Local Area Network to a network server in an HP-UX cluster can all function without a local disk. The diskless workstations share a common root file system on the disk on the supporting network server system. The network server system includes the cartridge tape subsystem used for software installation and backup and can also be used as a 2D workstation. Network Server Models 15NS and 25NS, pages 79-82, are preconfigured to support diskless workstations.

ThinLAN Connection Example

Figure 60 shows the diskless workstations connected to the network server via ThinLAN connection, although StarLAN 10 connection (next page) can be used instead. When ThinLAN connection is to be used, all diskless workstations and the network server should be ordered with the same LAN connect option to assure interconnect compatibility. Option 017 provides a built-in ThinMAU and BNC connector. Option 015, though more versatile, requires the separate purchase of an HP 28641A ThinMAU for each server and workstation.

The ThinLAN cable must be connected as shown in Figure 60, which lists the product numbers of available cables and terminations. The separately purchased ThinLAN cables, and terminations at each end of the cable, must be connected directly to the BNC "T", which must be connected directly to the ThinLAN connector on the rear of the workstation's system interface board. Insulating boots included with the option 017 must be installed to prevent accidental grounding of the ThinLAN connections, though they are not shown in Figure 60.

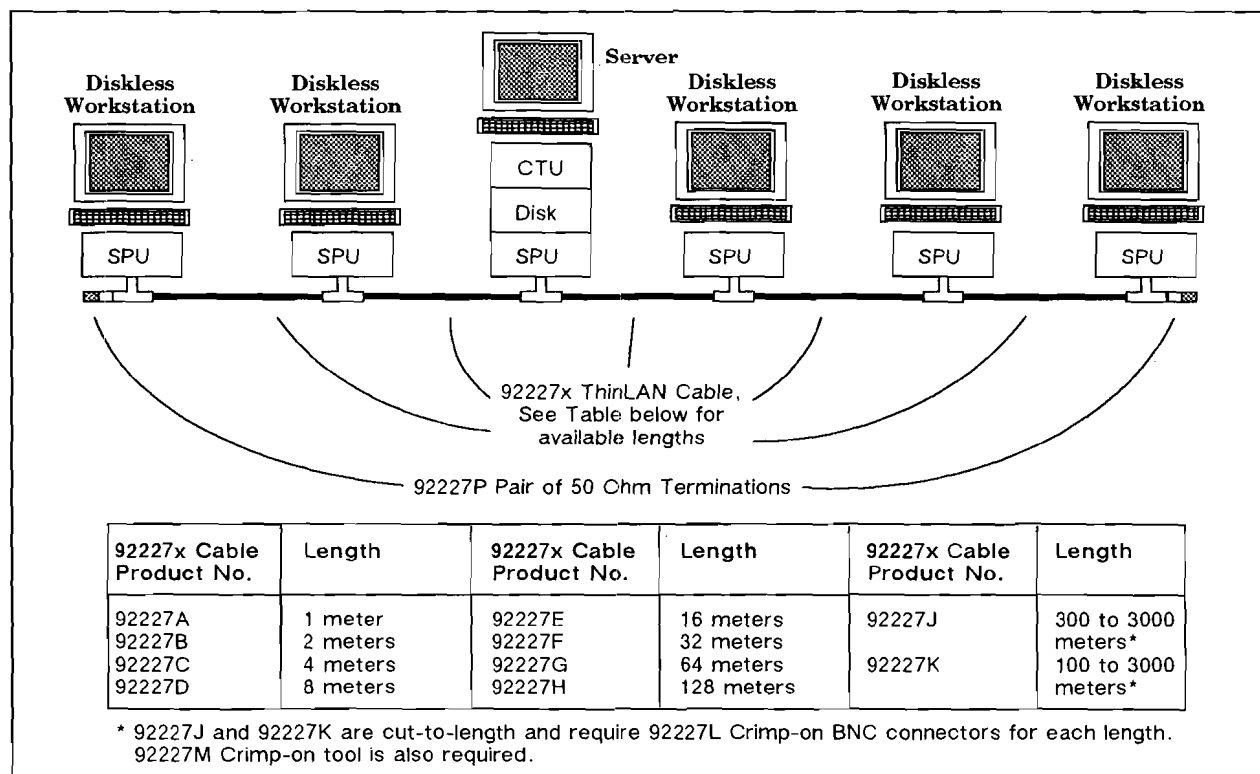


Figure 60. ThinLAN Connection of Diskless Workstations to Network Server

StarLAN 10 Connection Example

Figure 61 shows the diskless workstations and the Network Server connected to each other via an HP 28663A StarLAN Hub. Each StarLAN hub can support up to 12 nodes. When StarLAN connection is to be used, all diskless workstations and the network server should be ordered with option 015 to assure interconnect compatibility. In addition, each workstation or server will require an HP 28664A Twisted Pair MAU and, of course, the length of cable needed to run to the StarLAN Hub, which can be as much as 100 meters.

Swap Space Choices

The Network Server provides disk support for the diskless workstations it serves. Each diskless workstation requires the same amount of application-dependent swap space on the server's disk as it would if it had its own disk. Each Network Server offers a choice of preconfigured swap spaces, ranging from 50 MB to 150 MB (to 200 MB in Model 25NS) in 50 MB increments. The swap space option should be selected to support the maximum requirements of the different applications to be run on the all of the various diskless workstations. Disk capacity used for swap space is, of course, not available for file space.

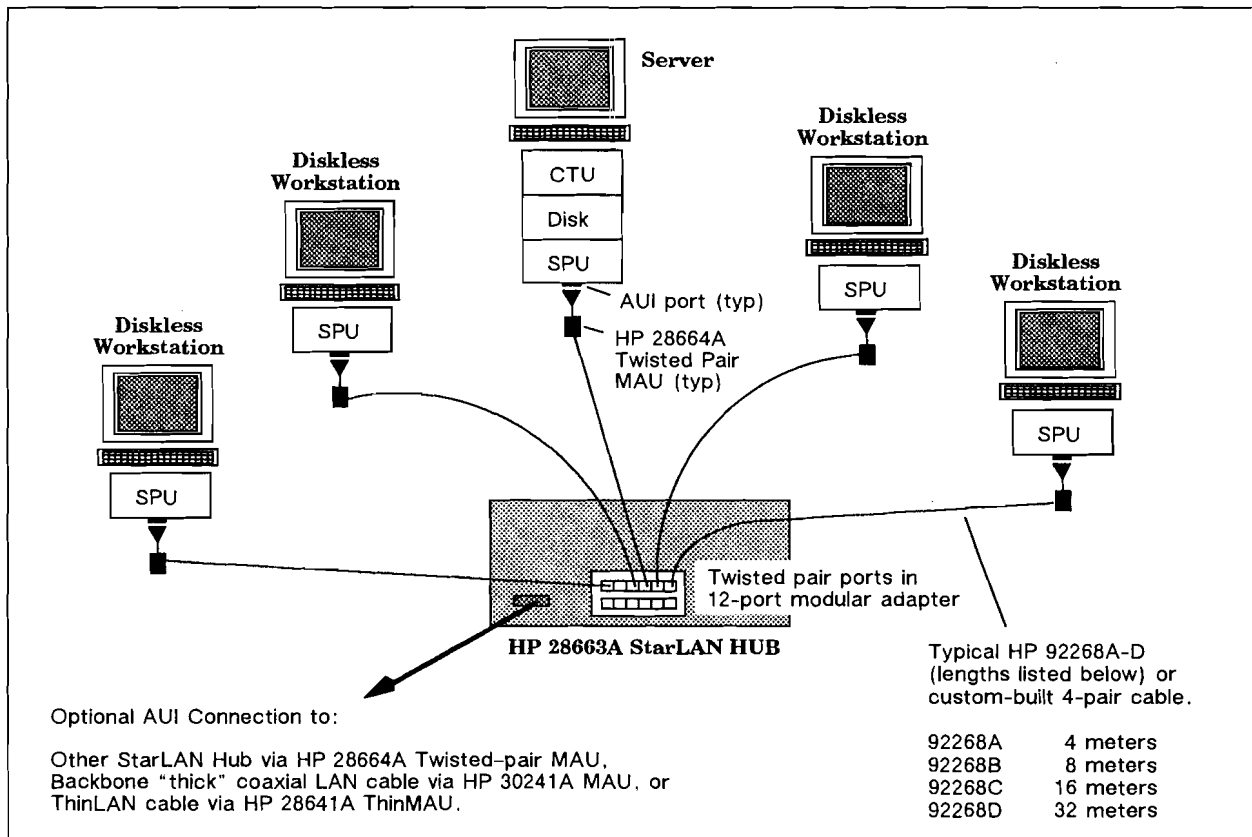


Figure 61. StarLAN 10 Connection of Diskless Workstations to Network Server

Model 15NS Network Server

Description

The HP 9000 Model 15NS is a low-priced, non-extendable, Model 340-based Design Automation Network Server for multiple diskless workstations. It includes 304 MB fixed disk, cartridge tape subsystem, minirack cabinet, and keyboard. The 15NS is integrated at the factory and the HP-UX operating system is preloaded onto the disk. It is available with three different optional (color or monochrome) monitors and it can also function as a 2D workstation. Figure 62 illustrates Model 15NS functions and Figure 63 shows 15NS backplane usage and interconnections.

CPU: MC68030, clocked at 16.7 MHz.

Bus Types: 32-bit memory and 16-bit Direct I/O (DIO) buses.

RAM: 8 MB parity built-in, expandable to 16 MB with 4 MB add-on RAM boards.

Interfaces: Built-in HP-HIL, LAN, RS-232C, and Std HP-IB interfaces and 98625B High-Speed HP-IB interface to disk.

Floating Point Coprocessor: MC68882, clocked at 16.7 MHz, is standard.

Direct Memory Access: Two-channel Direct Memory Access is built-in.

Operating System: License-to-use HP-UX, media, and manuals, are included.

Monitor: Is option selectable (see options 548, 549, and 550).

Product Summary

98564F Model 15NS Design Automation Network Server, consisting of:

- A. Processor - I/O board with:
 1. 32-bit MC68030 16.7 MHz CPU with MC68882 16.7 MHz Floating Point Processor.
 2. 8 MB of on-board parity-checking RAM.
 3. 4 GB virtual memory address space.
 4. 32-bit memory and DIO-II buses.

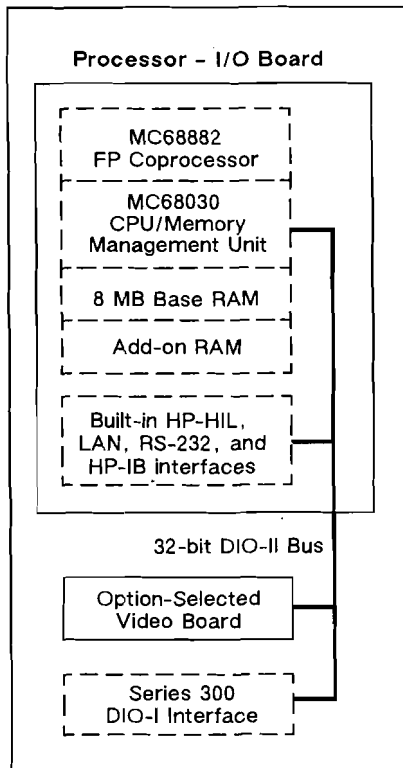


Figure 65. Model 15NS Functions

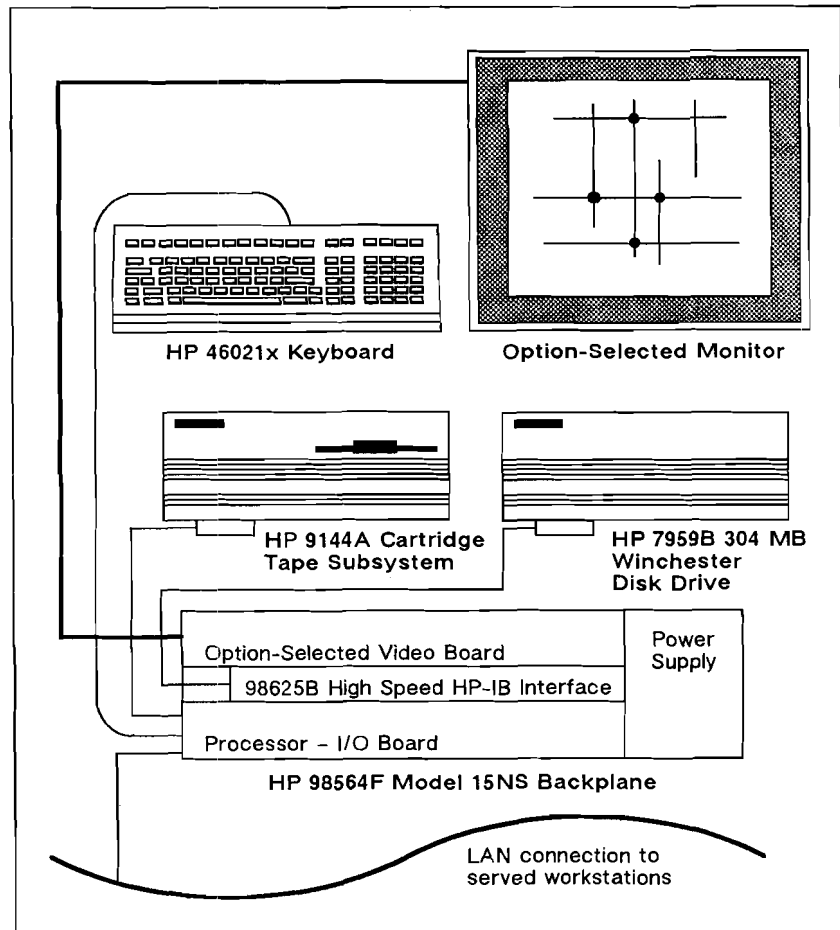


Figure 66. Model 15NS Backplane Usage and Interconnections

Model 15NS Network Server, continued

5. IEEE-488 HP-IB interface and 1 meter HP-IB cable.
6. RS-232C serial interface (1 port).
7. HP-HIL interface and HP-HIL keyboard cable.
8. IEEE 802.3/Ethernet LAN interface.

B. SPU enclosure with power supply.

C. 98625B High-Speed HP-IB Disk Interface.

D. 7959B 304 MB Winchester Disk Drive.

E. 9144A Cartridge Tape Subsystem.

F. Option-selected video interface and monitor.

G. Keyboard, which must be specified by national version option (see page 13).

H. 92211R Minirack Cabinet.

I. Installation manuals.

J. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11).

K. 98594A media and documentation for 98594L software. Software is delivered on 1/4-inch tape cartridge.

L. 98794A HP-UX Programmer's Documentation Set.

M. 90-day on-site warranty.

Options

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

1AP: Pre-loads HP-UX on the disk with 50 MB swap space (Excludes options 1AQ and 1AR).

1AQ: Pre-loads HP-UX on the disk with 100 MB swap space (Excludes options 1AP and 1AR).

1AR: Pre-loads HP-UX on the disk with 150 MB swap space (Excludes options 1AP and 1AQ).

112: Increases total RAM to 12 MB (adds one 98268A 4 MB RAM board - excludes option 116).

116: Increases total RAM to 16 MB (adds two 98268A 4 MB RAM boards - excludes option 112).

401: Substitutes 35401A 536 MB Autochanger Cartridge Tape Subsystem for 9144A 67 MB Cartridge Tape Subsystem.

548: Adds MH Graphics Package, consisting of High-Resolution Monochrome Video Board, 98788A 19-inch 1280 by 1024 Monochrome Monitor, 46060A Two-button Mouse, and 46084A HP-HIL ID module.

549: Adds C+ Graphics Package, consisting of 1024 by 768 Color Video Board, 98785A 16-inch 1024 by 768 Color Monitor, 46060A Two-button Mouse, and 46084A HP-HIL ID module.

550: Adds CH Graphics Package, consisting of 1280 by 1024 Color Video Board, 98752A 19-inch 1280x1024 Color Monitor, 46060A Two-button Mouse, and 46084A HP-HIL ID module.

Add-on Accessories

98268A: 4 MB parity RAM board.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 25NS Network Server

Description

The HP 9000 Model 25NS is a Design Automation Network Server for multiple diskless workstations that is based on the powerful Model 370 System Processor Unit. It includes 571 MB fixed disk in rollabout cabinet, autochanger cartridge tape subsystem, minirack cabinet, and keyboard. The 25NS is integrated at the factory and the HP-UX operating system is preloaded onto the disk. It is available with three different optional (color or monochrome) monitors and can also function as a 2D workstation. Figure 64 illustrates Model 25NS functions and Figure 65 shows 25NS backplane usage and interconnections.

SPU: HP 98579B Model 370, described on page 57.

Monitor: Is option selectable (see options 548, 549, and 550).

Operating System: License-to-use HP-UX, media, and manuals, are included.

Expandability: See Figure 42, page 57, and Figure 43, page 60.

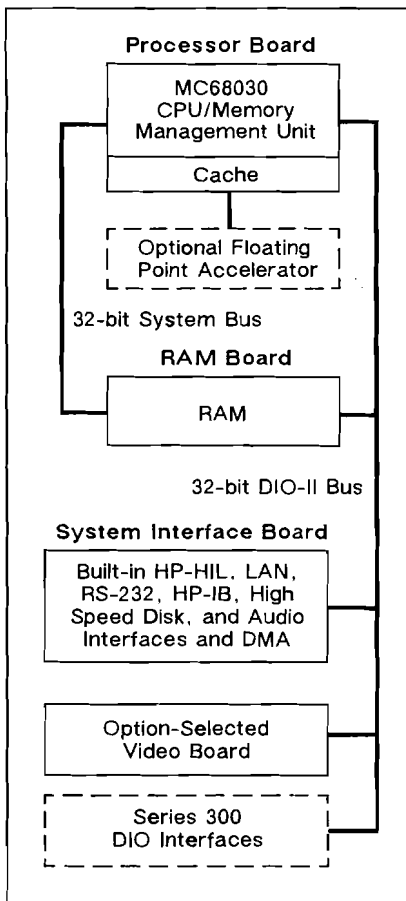


Figure 64. Model 25NS Functions

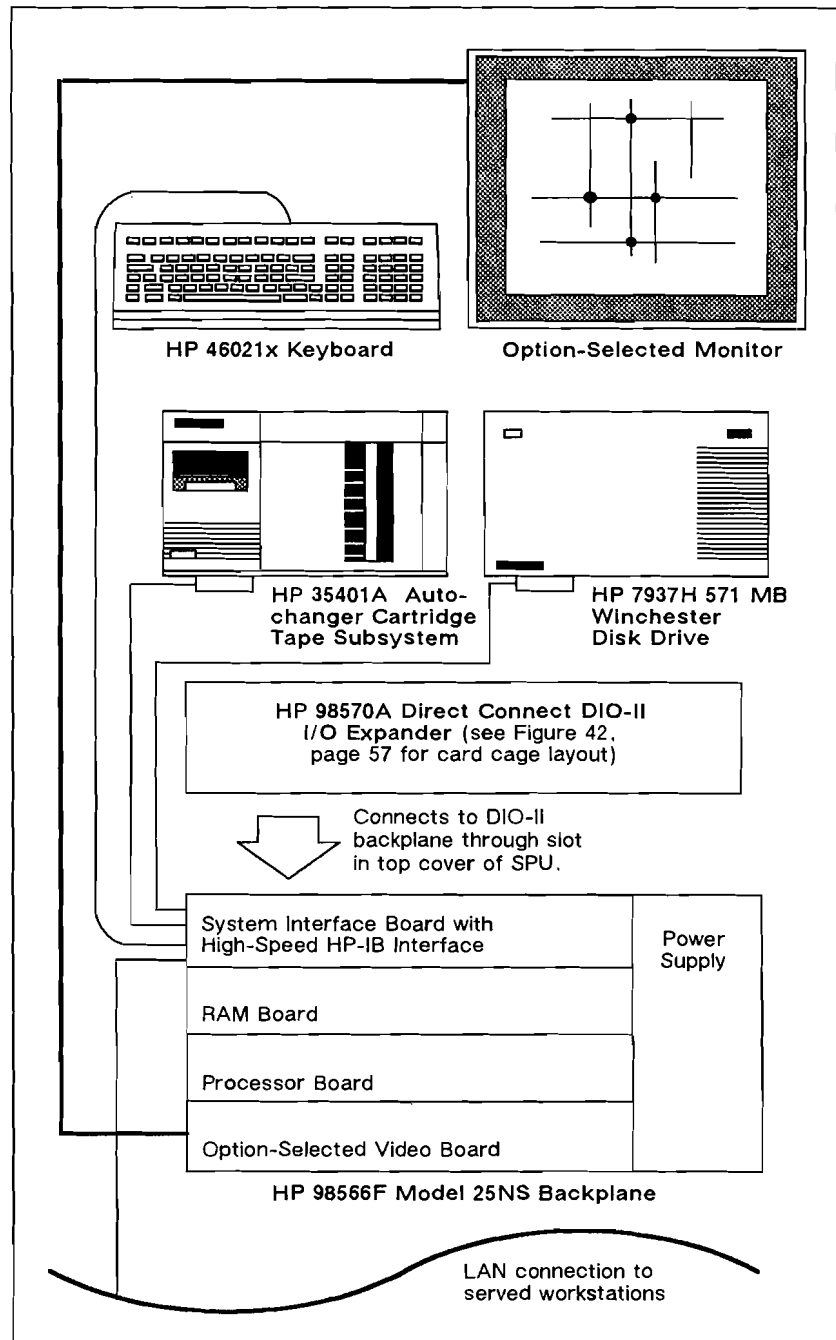


Figure 65. Model 25NS Backplane Usage and Interconnections

Product Summary

98566F Model 25NS Design Automation Network Server, consisting of:

- A. 98579B System Processor Unit with option 208 8 MB ECC RAM instead of 8 MB parity-checking RAM.
- B. 98570A Direct Connect DIO-II Expander.
- C. 7937H 571 MB Winchester Disk Drive and 19511A Disk Cabinet.
- D. 35401A Autochanger Cartridge Tape Subsystem.
- E. Option-selected video interface and monitor.
- F. Keyboard, which must be specified by national version option (see page 13).
- G. 92211R Minirack Cabinet.
- H. Installation manuals.
- I. 98594L HP-UX License to use Application Execution Environment (AXE), Programming Environment (PE), Network Services (NS)-ARPA, Network File System, and X Windows, Version 11 (X11).
- J. 98594A media and documentation for 98594L software. Software is delivered on 1/4-inch tape cartridge.
- K. 98794A HP-UX Programmer's Documentation Set.
- L. 90-day on-site warranty.

Options

015: Specifies AUI-type LAN connection (excludes option 017).

017: Specifies ThinLAN connection (built-in ThinMAU and BNC "T" connector)(excludes option 015).

1AP: Pre-loads HP-UX on the disk with 50 MB swap space (excludes options 1AQ, 1AR, and 1AS).

1AQ: Pre-loads HP-UX on the disk with 100 MB swap space (excludes options 1AP, 1AR, and 1AS).

1AR: Pre-loads HP-UX on the disk with 150 MB swap space (excludes options 1AP, 1AQ, and 1AS).

1AS: Pre-loads HP-UX on the disk with 200 MB swap space (excludes options 1AP, 1AQ, and 1AR).

316: Substitutes 16 MB ECC RAM for 8 MB ECC RAM (excludes option 332).

332: Substitutes 32 MB ECC RAM for 8 MB ECC RAM (excludes option 316).

548: Adds MH Graphics Package, consisting of High-Resolution Monochrome Video Board, 98788A 19-inch 1280 by 1024 Monochrome Monitor, 46060A Two-button Mouse, and 46084A HP-HIL ID module.

549: Adds C+ Graphics Package, consisting of 1024 by 768 Color Video Board†, 98785A 16-inch 1024 by 768 Color Monitor, 46060A Two-button Mouse, and 46084A HP-HIL ID module.

550: Adds CH Graphics Package, consisting of 1280 by 1024 Color Video Board†, 98752A 19-inch 1280 by 1024 Color Monitor, 46060A Two-button Mouse, and 46084A HP-HIL ID module.

Add-on Accessories

98248B: Floating Point Accelerator.

98264B: 16 MB ECC RAM controller with 3-slot system bus frontplane connector.

004: Deletes 3-slot system bus frontplane connector.

005: Substitutes 4-slot system bus frontplane connector for 3-slot connector.

Other Items

Interfacing: See pages 84-99.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

† If a 98556A 2D Graphics Accelerator is added, the graphics board with accelerator daughter board must be installed in the 98570A DIO-II Expander because it cannot be supported in the same 25NS card cage with ECC RAM.

A1082A Workgroup Clusters

Description

System number A1082A identifies a highly flexible set of workgroup cluster solutions that are offered at a system solutions adjustment (discount). As shown in Figure 66, below, an A1082A Workgroup Cluster consists of:

- A 15NS or 25NS Network Server (pages 79 through 82).
- One to four 3D workstations.
- Enough 2D workstations to bring the total number of workstations in the A1082A workgroup cluster to four.

Connections and Swap Space Choices

See the *Diskless Workstations* section, pages 77-78.

Selectable 3D Workstations

- Model 360 TurboSRX, product number 98587T, page 55.
- Model 370SRX, product number 98587G, page 73.
- Model 370 TurboSRX, product number 98587H, page 75.

Selectable 2D Workstations

- Model 340MH, product number 98563G, page 30.
- Model 340C+, product number 98564C, page 24.
- Model 340CH, product number 98564G, page 28.
- Model 360MH, product number 98589W, page 51.

- Model 360C+, product number 98583W, page 45.
- Model 360CH, product number 98588W, page 47.
- Model 370MH, product number 98589G, page 71.
- Model 370C+, product number 98583G, page 65.
- Model 370CH, product number 98588G, page 67.

Selectable Accessories

- 98248B Floating Point Accelerator for Model 370.
- 98570A DIO-II Expander.
- 98568A 8-Slot DIO Expander.

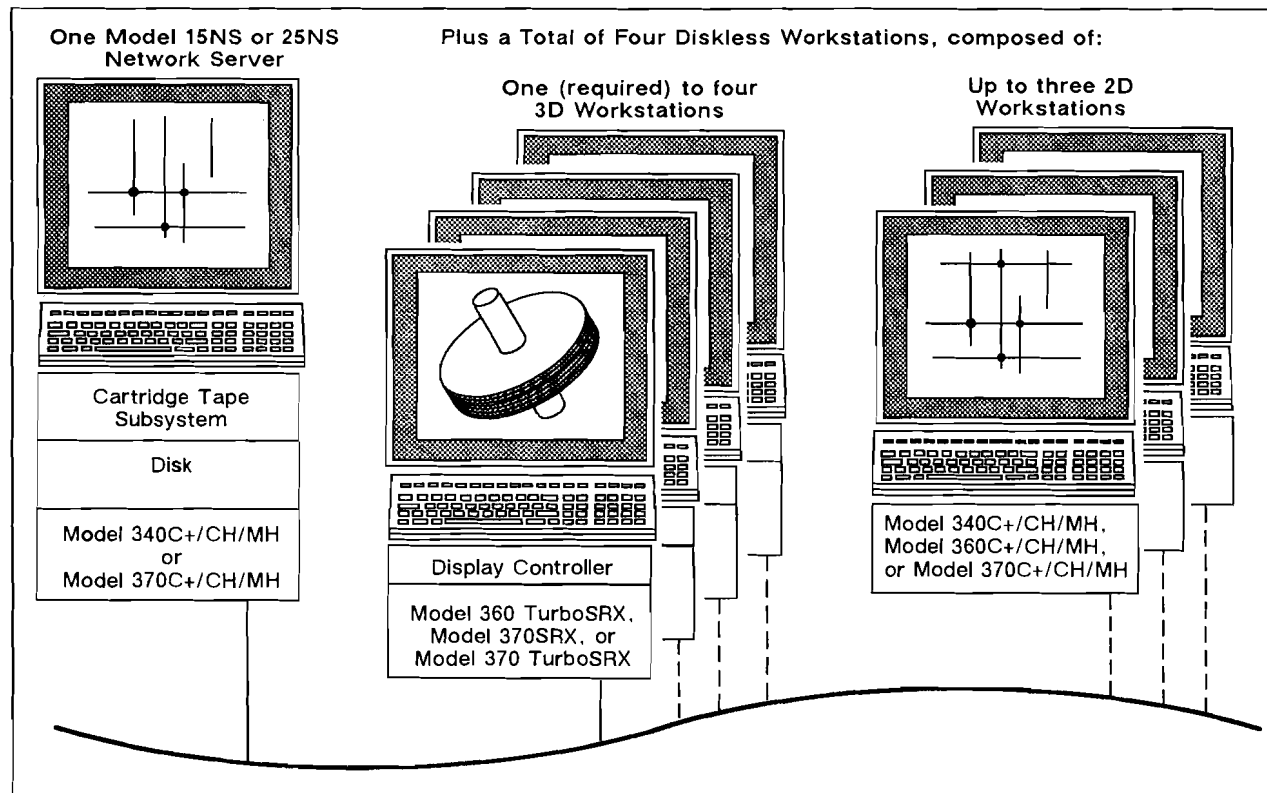


Figure 66. A1082A Workgroup Cluster Summary

Series 300 Interfacing and Accessories

Built-in Interfaces

All HP 9000 Series 300 SPUs, instrument controllers, workstations, and network servers include a basic set of interfaces, as listed in Table 4 at right. In Models 332 and 340 these interfaces are on the Processor - I/O board. In Models 360 and 370 they are on a separate system interface board. These interfaces are described briefly in the following paragraphs.

HP-HIL Interface

The HP-HIL Interface is used to connect the keyboard and up to six other HP-HIL devices to the system. These can include:

- A mouse.
- A digitizer (graphics tablet).
- A rotary control knob for 2-axis cursor positioning.
- A control dial box for multi-axis positioning of displayed objects.
- An ID module for user identification.
- A button box for entry of user-definable functions.
- A bar code reader.
- A touchscreen bezel.
- A trackball.

RS-232C Interface

A single-port RS-232C interface with 9-pin female connector can be used to connect a terminal, printer, plotter, or other serial device to Series 300 systems.

Standard HP-IB Interface

The standard HP-IB interface can be used to connect up to 14 instruments, 91xx disks, printers, plotters, or other standard speed HP-IB devices to Series 300 systems. However, the standard HP-IB interface does not provide maximum speed if used to connect 79xxB/H disks. The high-speed HP-IB interface is recommended for connection of 79xxB/H disks.

Table 4. Built-in Interfaces in HP 9000 Series 300 Systems

Model	332	340	360	370
HP-HIL Interface	Yes	Yes	Yes	Yes
RS-232C Interface	Yes	Yes	Yes	Yes
Standard HP-IB Interface	Yes	Yes	Yes	Yes
Audio Output	Yes	No	Yes	Yes
Video I/F	Yes	Yes	No	No
LAN Interface	No	Yes	Yes	Yes
High-Speed HP-IB Disk I/F	No	Opt.	Opt.	Yes
SCSI Disk Interface	No	Opt.	Opt.	Opt.

Audio Output

To "beep" action completions to the user, HP 9000 Series 300 systems provide an audio output, which comes from a built-in speaker or a female RCA type audio jack that can be connected to an external speaker.

Video Interface

The Model 332 SPU includes a video interface to a 512 by 400 monochrome monitor or a 1024 by 768 monochrome monitor (option 544). For Model 332x Instrument Controllers that provide color display, the built-in monochrome video interface is deleted. Model 340x bundles include the appropriate monochrome or color video interface.

LAN Interface

Models 340, 360, and 370 include a Local Area Network (LAN) interface for communication with other systems on a Local Area Network. The Models 340, 360, and 370 offer an option-specified choice of Attachment Unit Interface (AUI) connection (Option 015) or ThinLAN (Option 017) connection with built-in ThinMAU. In Models 360 and 370, this choice determines the system interface board, which must be replaced if the type of LAN

connection has to be changed. (The Model 332 can be connected to a LAN via a separately-purchased 98643A LAN interface.

High-Speed HP-IB (Disk) Interface

Model 340 and 360 systems can optionally be equipped with a high-speed HP-IB interface that is standard in Model 370 systems. This interface can connect up to eight HP 79xxB/H Disks and 7979A and 7980A/XC Magnetic Tape Units to the system.

Single-ended SCSI Disk Interface

As an alternative to the High-Speed HP-IB interface, Model 340, 360, and 370 systems can optionally be equipped with a single-ended SCSI interface for connection to up to seven HP 79xxS Disks. In the Model 370, the SCSI interface option replaces the standard high-speed HP-IB interface.

Other Interfaces and Accessories

Description and summary of other Series 300 interfaces and accessories starts on page 90.

Series 300 Buses

Direct I/O (DIO) Bus

The Direct I/O (DIO) bus is a 16-bit bus that is used by most Series 300 interfaces and accessories and by the Model 332.

Direct I/O-II (DIO-II) Bus

The Direct I/O-II (DIO-II) bus is the standard bus used in the Model 340, 360, and 370. The doubled width of the 32-bit DIO-II bus, as compared to the 16-bit DIO bus, speeds transfers between the processor and memory cards and I/O cards that use the full 32-bit bus width.

Adaptation from DIO-II to DIO

Connection of 16-bit DIO interfaces to the 32-bit DIO-II bus used in the Model 360 and 370 uses an HP 98242A or 98242B DIO 4-Slot or 2-slot Backplane (adapter). See Figure 67 at right. The 98242A adapter plugs into the top two adjacent DIO-II slots to provide two DIO accessory slots and two DIO I/O slots. The HP 98242B adapter plugs into the top DIO-II slot of a DIO-II backplane to provide one accessory slot and one DIO I/O slot. Only one 98642B is permitted – a 98242A must be used if more than three or four DIO slots are needed.

Series 300 Expanders

Except for the non-expandable Model 340, Series 300 System Processor Units, Instrument Controllers, and Workstations can have their basic backplane capacity expanded. Three different DIO/DIO-II expanders are available, as described in the following paragraphs.

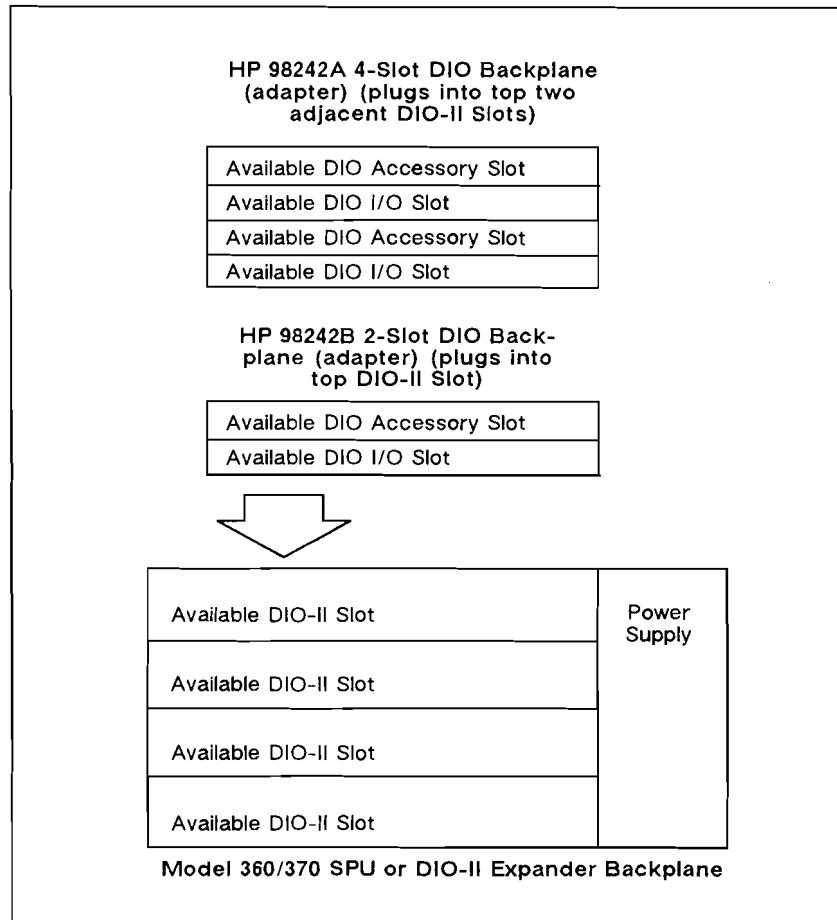


Figure 67. DIO-II to DIO Slot Adapters

98568A 8-Slot DIO Expander

The HP 98568A is an 8-slot, direct-connect DIO Expander that provides four DIO slot pairs – four DIO accessory slots and four DIO I/O slots.

The 98568A stacks directly onto the SPU or other extender it is extending. As indicated in Figure 68, next page, the 98568A connects directly to the backplane of the SPU or extender it is stacked upon through a slot in the top cover. (The slot is actually in the top cover of the Expander and is interchanged with

the top cover of the SPU when the expander is installed.) A second 98568A Expander can be stacked onto the first one to expand a Model 360 or 370, as shown in Figure 68. For use with Model 360 or 370 SPUs and workstations, the first 98568A must be ordered with option 132 to equip it to connect correctly with the DIO-II backplane of those Models.

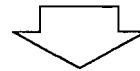
Only one 98568A DIO Expander can be used with the Model 332.

Series 300 Interfacing
and Accessories, continued

NOTE: Second 98568A is not supported with Model 332 SPU.

Available DIO Accessory Slot	Power Supply
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	

HP 98568A Direct-Connect
8-Slot I/O Expander



Connects to DIO backplane through slot in top cover of expander

Available DIO Accessory Slot	Power Supply
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	

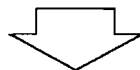
HP 98568A Direct-Connect
8-Slot I/O Expander



Connects to DIO backplane through slot in top cover of SPU

Available DIO Accessory Slot	Power Supply
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	

HP 98568A Option 132 Direct-Connect
8-Slot I/O Expander



Connects to DIO-II backplane through slot in top cover of SPU

Available DIO Accessory Slot	Power Supply
Available DIO I/O Slot	
Available DIO Accessory Slot	
Available DIO I/O Slot	
Available DIO System Slot	
Processor - I/O Board	

Model 332 SPU

Available DIO-II Slot (360) or System Interface Board (370)	Power Supply
System Interface Board (360) or RAM Board (370)	
Processor Board	
Available DIO-II Slot	

Model 360/370 SPU

Figure 68. 98568A DIO Expanders

98570A DIO-II Expander

The HP 98570A is a direct-connect DIO-II Expander that provides two DIO-II slots and two DIO slot pairs. The 98570A Option 004 Expander deletes the two DIO slot pairs to provide a total of four DIO-II slots. Up to two 98570As can connect to the Model 360/370 SPU as shown in Figure 69 at right. Standard and Option 004 Expanders can be mixed as in Figure 69 or both the same. To obtain a 98570A with two DIO slots and three DIO-II slots, select the 98570A option 004 Expander and a 98242B 2-slot DIO Backplane for the top DIO-II slot.

Model 370 system bus connections are supported only in the SPU mainframe. For that reason, although Model 370 RAM and accelerator cards are supported in the 98570A, they will not achieve full rated performance in that expander. Installing the system interface board and video board in the expander leaves maximum space for RAM and accelerator boards in the SPU mainframe.

9888A DIO Bus Expander

The HP 9888A is a DIO Bus Expander that provides eight DIO slot pairs, but uses one DIO I/O slot in the SPU or 98568A/98570A Expander. The 9888A is an external expander that connects to the host SPU or expander via a DIO I/O buffer card and a 1.5 meter shielded ribbon cable. (See Figure 70.) It is designed to be placed on top of a 92211L/R minirack cabinet or in a 19-inch EIA rack cabinet.

Because it is an active expander, the 9888A introduces wait states in bus traffic to and from cards it supports. The maximum degradation is 26% for burst DMA I/O (supported in the 9888A only with Model 332). The minimum performance penalty is 6% for interrupt I/O.

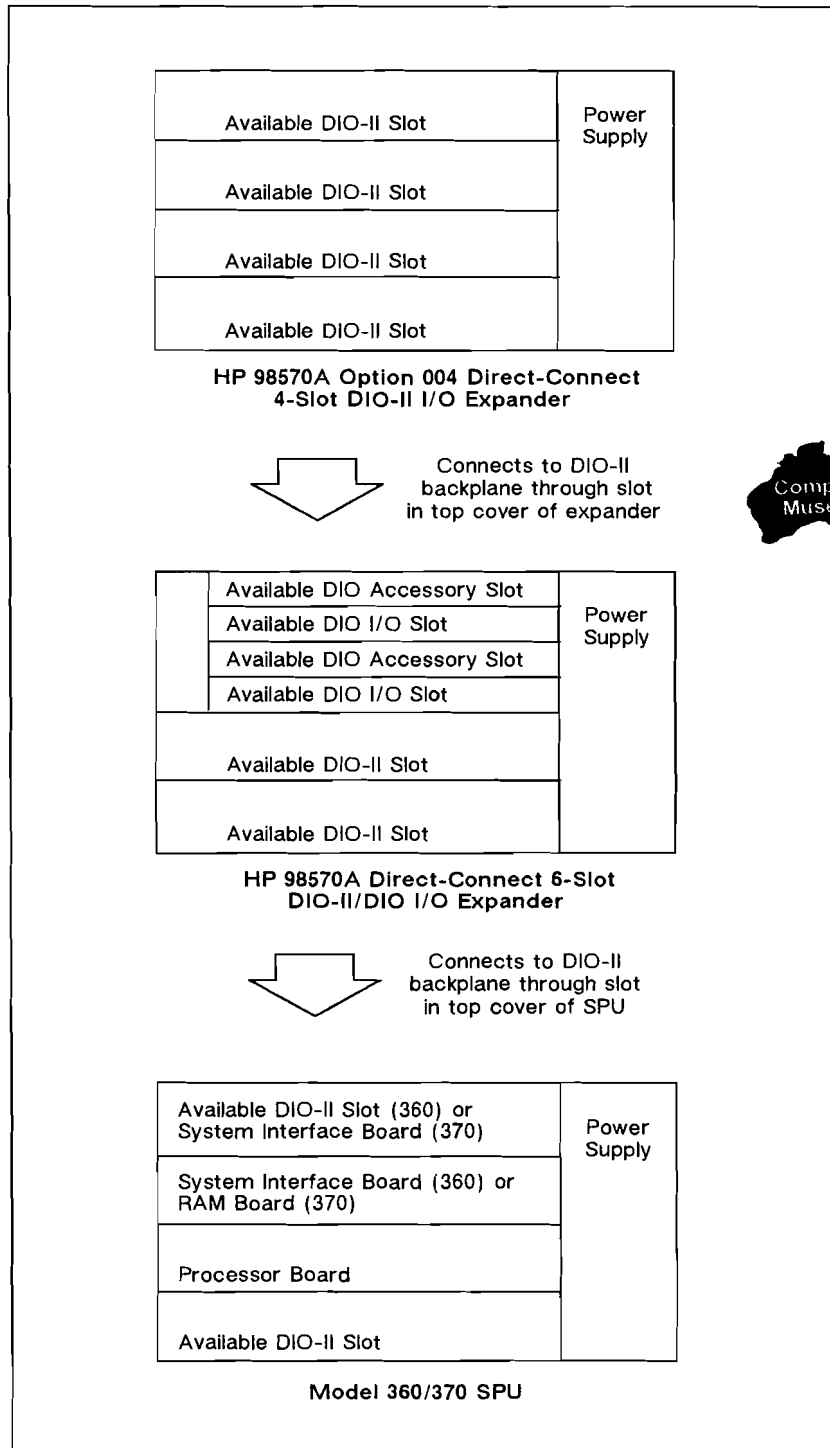


Figure 69. 98570A DIO-II Expanders



Series 300 Interfacing and Accessories, continued

The following restrictions apply to use of the 9888A:

- A maximum of two 9888As for any Series 300 SPU.
- RAM cards and bus masters are not supported.
- Cards using Auto-DTACK are not supported.
- Cards capable of DMA are supported only with the Model 332.

For a 9888A I/O card support summary, see page 99.

VME Bus Connection

The **98577A VME Expander** is a direct-connect backplane that provides four VME C.1 slots for customers wishing to use VME bus interfaces. As indicated in Figure 71, the 98577A connects directly to the DIO-II backplane of the Model 360/370 SPU or 98570A Expander beneath it. No additional expanders can be connected to the top of the 98577A, which limits the system to one 98577A VME Expander. Except for the VME end of the 98646A VME Adapter, The VME cards listed in this interfacing section are transparently supported only in the 98577A VME Expander. The 98577A includes an HP-UX Driver Development Guide and a VME Accessory Development Guide.

98646A VME Adapter. The 98646A VME Adapter consists of a DIO I/O card, a 1.3 meter shielded ribbon cable, and a single VME C.1 card for connection between a Series 300 system and a customer-supplied VME or VXI card cage, such as an HP E1400A VXI mainframe.

Direct Connect Expander Combinations

Figure 72, next page, shows the combinations of direct connect expanders that can be used with Model 360/370 systems. For Model 332, see Figure 68.

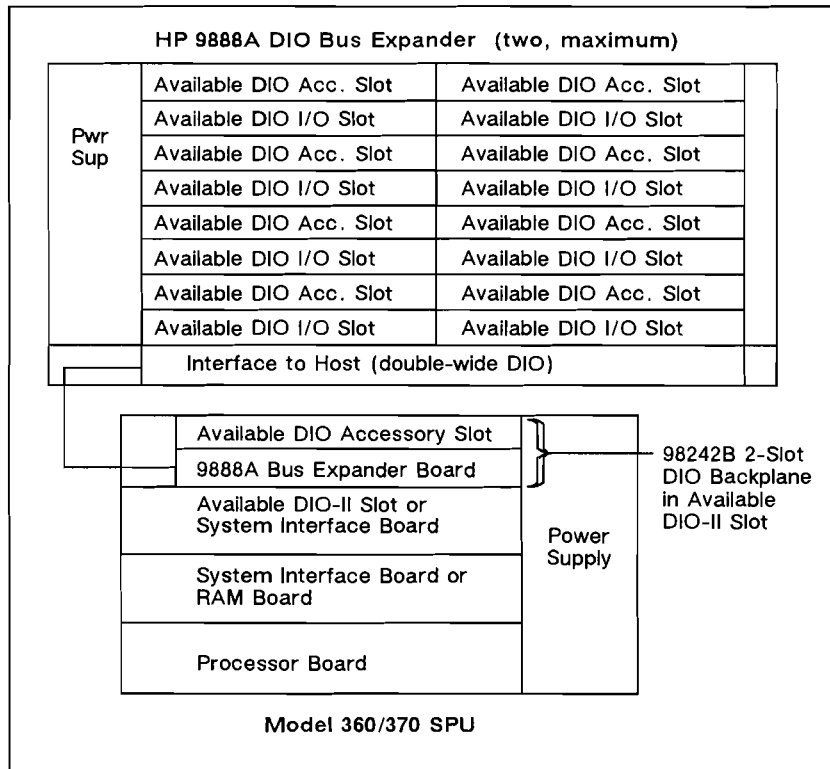


Figure 70. 9888A DIO Bus Expander Connection Example

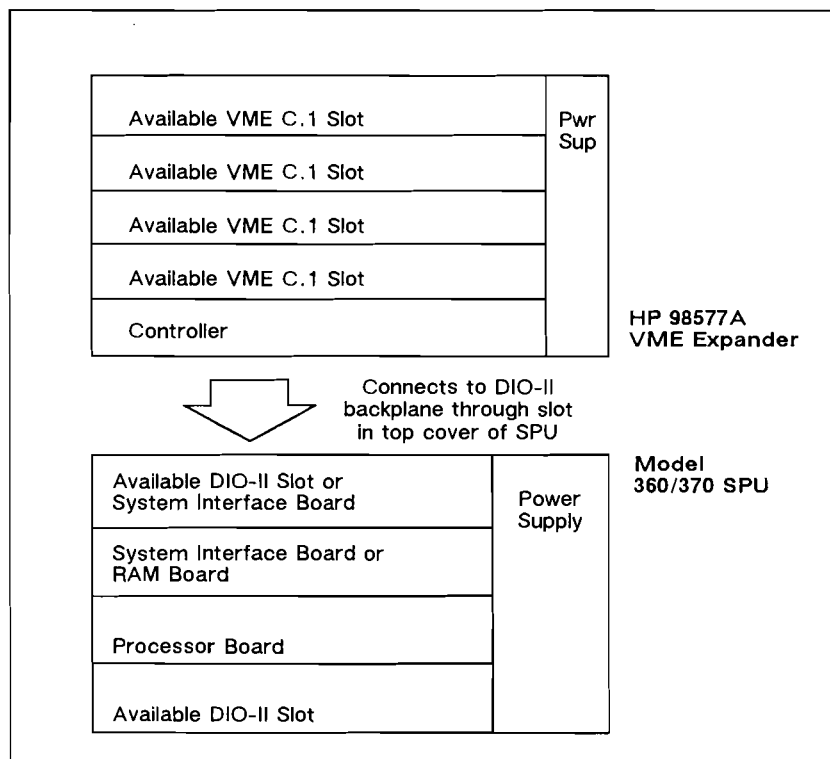


Figure 71. 98577A VME Expander

DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	

- 98568A Opt 132 DIO Exp.
- 98570A Std/Opt 004 DIO-II Exp.
- Model 360/370 SPU.

DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	

- 98568A Standard DIO Exp.
- 98568A Opt 132 DIO Exp.
- Model 360/370 SPU.

DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	

- 98570A Std/Opt 004 DIO-II Exp.
- 98570A Std/Opt 004 DIO-II Exp.
- Model 360/370 SPU.

VME C.1	
VME C.1	
VME C.1	
VME C.1	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	

- 98577A VME Expander
- 98570A Std/Opt 004 DIO-II Exp.
- Model 360/370 SPU.

DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO (pair)	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	

- 98568A Opt 132 DIO Exp.
- Model 360/370 SPU.

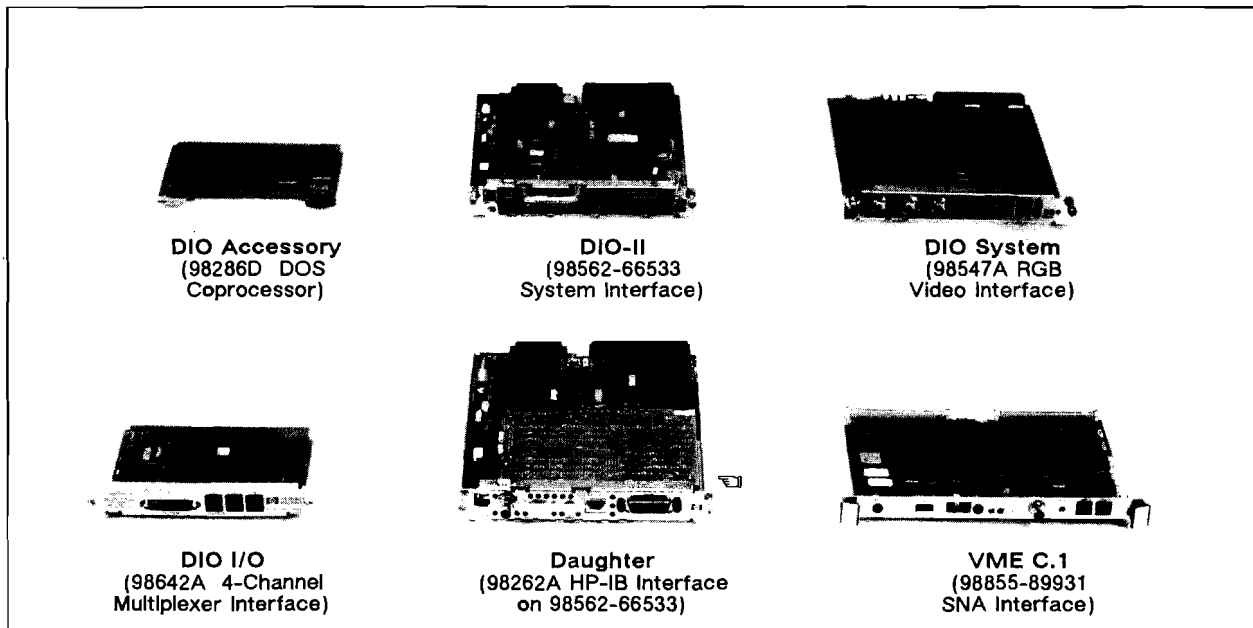
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	

- 98570A Std/Opt 004 DIO-II Exp.
- Model 360/370 SPU.

VME C.1	
VME C.1	
VME C.1	
VME C.1	
DIO-II or DIO (pair)	
DIO-II or DIO (pair)	
DIO-II	
DIO-II	

- 98577A VME Expander
- Model 360/370 SPU.

Figure 72. Direct Connect Expander Combinations



Types of Cards Used in Series 300 Systems

DIO Slots

Except for the single DIO I/O-only slot of the Model 340, DIO System slots, and DIO-II slots, DIO slots occur in slot pairs. The upper slot is designated the "accessory" slot and the lower is the "I/O" slot.

DIO Accessory Cards

A DIO accessory card is a card without cover plate or I/O connection (except for the 98255A EPROM card, which has an external ribbon cable connected to it when it is programmed).

A DIO accessory card is intended to be installed in the upper slot of a DIO slot pair. However, a DIO accessory card can also be installed in a lower I/O slot that is not needed for a DIO I/O card. If that is done or a DIO I/O slot is not occupied, a blank cover plate must be fitted over the slot pair to maintain proper cooling airflow and RFI integrity.

DIO Input/Output (I/O) Cards

A DIO input/output card is a card with a metal plate that covers both slots in the pair. The cover plate usually includes an I/O connector or permanently attached cable to an external device.

DIO System Cards

A DIO system card is a wider card, such as a processor card or video interface card that plugs into a DIO system slot. DIO system slots occupy the same vertical space as a pair of DIO slots. The external side of the card is equipped with an attached or separately attachable cover plate.

DIO-II Cards

A DIO-II card is similar to a DIO system card, but includes an additional backplane connector that expands the 16-bit DIO bus to the 32-bit DIO-II definition.

Although a DIO-II slot supports a DIO system card, DIO-II cards are supported only in DIO-II slots unless a card is identified as supported in both types of slot.

Daughter Boards

Daughter boards are boards that connect to a DIO System card or a DIO-II card to provide additional RAM on a processor or RAM board, an additional interface on the system interface board, an accelerator on a video board, or other augmentation of system capabilities.

VME Cards

VME C.1 cards plug into the 98577A VME Expander. At the present time, aside from the VME C.1 card in the 98646A VME Adapter, Hewlett-Packard offers only one VME C.1 card.

Series 300 Interfaces to Peripheral Devices

Table 5 lists the Series 300 interfaces used for connection to peripheral devices. These include the 98562-66533 and 98562-66534 multi-interface System Interface cards, which provide the built-in interfaces that were discussed on page 84.

SCSI Interfacing

Model 340, 360, and 370 computers all offer a built-in Small System Computer Interface (ANSI X3.131-1986) as an option or field-installable upgrade (98265A). A separate DIO I/O interface (98658A) is also available. For technical details, see the HP 9000 Series 300 SCSI cards data sheet, literature stock number 5951-7100, or a later revision.

All current Series 300 SCSI interfaces are single-ended, are capable of synchronous and asynchronous operations, and are supplied with an ALT-2 50-pin shielded connector or cable and a plug-on termination resistor module.

SCSI is presently supported only in HP-UX. Source code for the HP-UX SCSI driver is provided in the Programming Environment (PE) software product.

Table 5. Series 300 Cards and Daughter Boards for Interfacing to Peripheral Devices

Type	Product or Part Number and Name	Use	Cable or Bus Conn. Included?
DIO I/O	98624A Standard HP-IB Interface	Interfacing to HP-IB instruments, printers, plotters, cart-ridge tape subsystems, and other standard-speed HP-IB devices (14 devices, max.).	No
DIO I/O	98625B High-Speed HP-IB Interface	Interfacing to HP 79xxB/H Disks, 7979A, 7980A, or 7980XC Magnetic Tape Units, or other high-speed HP-IB devices (8 devices, maximum).	No
Daughter	98262A High-Speed HP-IB Interface	Interfacing to 79xxB/H Disks and 7979A/7980A/7980XC Mag Tape Units.	1.0 meter
DIO I/O	98658A SCSI Single-ended Interface	interfacing to 79xxS Disks.	1.0 meter
Daughter	98265A Single-ended SCSI I/F	Interfacing to 79xxS Disks.	1.0 meter
DIO-II	98562-66533 System Interface Card with LAN AUI output	Interfacing to HP-HIL, RS-232C, and HP-IB devices and to LAN via Attachment Unit Interface.	With SPU
DIO-II	98562-66534 System Interface Card with ThinLAN output	Interfacing to HP-HIL, RS-232C, and HP-IB devices and to LAN via ThinLAN (BNC output) connection.	With SPU
DIO I/O	98626A RS-232C Serial (single-port) Interface Option 001 Option 002	Interfacing to modem, terminal, printer, plotter, or other RS-232C device. (98644A is preferable.) Adds 5061-4215 Male DTE cable Adds 5061-4215 Female DCE cable	No 4.6 meters 4.6 meters
DIO I/O	98628A Data Communications (single-port) Interface Option 001 Option 002 Option 003	Interfacing to RS-232C (CCITT V.28), RS-422, RS-423, and RS-449 devices. It supports asynchronous serial and HP asynchronous multipoint (MTS or DSN/DL slave) protocol. Adds 5061-4215 Male DTE cable Adds 5061-4215 Female DCE cable Adds 5061-4250 Male DTE RS-449/423 cable	No 4.6 meters 4.6 meters 4.6 meters
DIO I/O	98642A 4-channel RS-232C Multiplexer Interface	Interfacing to modem, terminals, printers, plotters, or other RS-232C devices.	Yes
DIO I/O	98644A RS-232C Serial (single-port) Interface 17255D 40242C 40242G 40242M	Interfacing to modem, terminal, printer, plotter, or other RS-232C device. Female DCE-terminated cable Female DTE-terminated cable Male DCE-terminated cable Male DTE-terminated cable	No 1.7 meters 5.0 meters 5.0 meters 5.0 meters

Series 300 Interfacing and Accessories, continued

SCSI is implemented in two different ways:

1. As an HP 98265A DIO-II daughter board with 1 meter cable, supporting a maximum 4 MB/sec data rate. The daughter board is orderable as option 011 in Model 360 and 370 systems.
2. As an HP 98658A DIO I/O card with 1 meter cable, supporting a maximum 2.7 MB/sec data rate. This DIO I/O card is orderable as option 011 in Model 340 systems.

An SCSI interface supports a maximum of 7 device addresses (1-7); the interface is address 0. Only devices having pairs of ALT-2 connectors are supportable.

Cabling topology is a single daisy-chained string, up to 6 meters long, including internal device cables. Any mix of supported SCSI devices can be operated on the same bus with minimal performance degradation.

SCSI Cables and Components

Cables for SCSI devices may have to be purchased separately. The following are available.

Product or Part Number	Description
1252-2297	Termination Resistor.
92222A	0.5m Dev-Dev Cable
92222B	1.0m Dev-Dev Cable
92222C	2.0m Dev-Dev Cable
92222D	1.0m Extension Cable
98265-90010	SCSI Technical Reference Manual
98577-90010	Driver Development Guide

SCSI Bus Termination

Bus loading is provided by a 1252-2297 termination resistor module included with the SCSI interface or option 011 SPU.

This module is plugged onto the last device in the chain. Some non-HP devices have internal termination resistors. Only one such device is permitted per bus, it must be the last device in the chain, and the external termination resistor module is not used.

Supported SCSI Devices

Through release 6.5 of HP-UX, only direct-access SCSI devices, such as disks, are supported. The use of Series 300 SCSI interfaces with serial devices, such as tapes, requires non-trivial modifications to the SCSI driver.

HP-IB (IEEE-488) Interfacing

The Hewlett-Packard Interface Bus (HP-IB) is Hewlett-Packard's implementation of IEEE standard 488-1978 and the equivalent IEC 625-1 and ANSI MC1.1 standards. A standard HP-IB interface supports devices representing a maximum of 15 device loads. High speed HP-IB interfaces support up to 8 device loads.

Standard HP-IB cards support a maximum DMA rate of 300 KB per second and a non-DMA rate of 50 KB per second. The maximum rates for High-speed HP-IB cards are 1.2 MB per second via DMA and 50 KB per second without DMA. Overhead per transaction is 5 milliseconds, except with the 98624A card, which takes 15 milliseconds because it lacks interrupt on parallel poll response capability.

HP-IB Speed Modes

Standard speed permits a maximum rate of approximately 500 KB/sec (300 KB/sec, maximum, in Series 300). Most Hewlett-Packard HP-IB devices, particularly instruments, are compatible with standard speed. Standard speed devices often operate at much less than the maximum transfer rate.

High speed permits a maximum rate of 1.2 MB/sec. Most Hewlett-Packard HP-IB peripherals, particularly disks, cartridge tape subsystems, and magnetic tape units are compatible with high speed mode. Some of those require high speed mode.

HP-IB Cables

HP-IB cables for connection of HP-IB devices may have to be purchased separately. The following cables are available:

Product Number	Length	Comments
10834A	0.0m	Stand-off for recessed conn.
92220R	0.3m	Right-angle conn. on one end.
10833D	0.5m	
10833A	1.0m	Right-angle conn. on one end.
82977A	1.0m	
10833B	2.0m	Right-angle conn. on one end.
82977B	2.0m	
10833C	4.0m	
8120-3448	6.0m	Check device loads before using
8120-3449	8.0m	

The 82977A/B cables with right-angle connectors on one end are recommended for use with stacked 325 mm wide *Design-Plus* components.

The maximum cable length allowed depends on the interface used and several attributes of the devices connected to the interface.

1. When only standard speed devices are used, the total HP-IB cabling on a standard speed interface is limited to 2 meters per standard device load or 20 meters total, whichever is less.

2. When any high-speed device or interface is used, the total HP-IB cabling is limited to 1 meter per device load or 15 meters total, whichever is less.
3. The cable length between any two devices (or the interface and first device) may be any length, as long as the total length does not exceed that specified by rule 1 or 2, as appropriate.
4. The recommended topology for HP-IB cabling is a single run of multi-drop (daisy-chained) segments, and not a star configuration. Unlike SCSI, a termination resistor is not required.

HP-IB Device Connection Recommendations

For best performance:

1. Use a high speed interface to connect HP 793xH, 795xA/B, and 796xB Disks.
2. Use the built-in standard speed interface to connect cartridge tape subsystems or disks that have cartridge tape drives.
3. Use a separate standard speed interface to connect instruments, plotters, and low cost printers.
4. Use a separate standard speed interface to connect 256xB Line Printers.

However, any mix of the following devices can be safely connected to the same bus without serious performance impairment:

- 256xA/B Line Printers.
- Any supported HP-IB Disks.
- Any supported Cartridge Tape Subsystems.
- Any supported Magnetic Tape Units.

HP-IB Extension

HP 37204A or 37201A HP-IB Extenders can be used to exceed the total cable limit on standard speed HP-IB connection. These

units translate local bus traffic and, with high data integrity, exchange it with one or more remote buses served by another extender. Each adds one external device load to the local bus.

Extender Feature	37204A	37201A
Topology	Multi-drop	Point-to-point
Interconnect via	Simplex coax or duplex fiber optic cable	Dual twisted pair or RS-232C
Max Length - ext-to-ext	1.2 km	1 km/unlimited*
- total ext.	31 km	not appl.
Max transfer rate	60 KB/sec	775 bytes/second
Prog?	No (transp)	Yes
Ext Bus Addr	None	1
Pass Control Transparent?	Yes	No
PPOLL Transparent?	Yes†	No

* RS-232C connection length is unlimited, via appropriate cables, repeaters, modems, etc.

† Use of 37204A Extenders introduces a 0.025 to 1 μ s propagation delay. The HP-UX Device I/O Library sets a PPOLL sense delay timeout of 0.1 μ s.

More than one extender can be connected to each local (computer hosted) bus. Each remote bus is essentially a new bus for device-load purposes, but not for address purposes.

RS-232C Serial Interfacing

All Series 300 computers include a "built-in" 25-pin EIA RS-232C asynchronous serial interface (CCITT v.24/V.28) equivalent to 98644A. Additional interfaces listed in Tables 5 and 6 (next page) are available in several implementations, including a

4-channel multiplexer, one of whose channels supports full modem control.

Data Terminal Equipment (DTE) devices transmit on pin 2 and receive on pin 3. Nominally DTE devices are actual terminals, host computers, and hardcopy peripherals.

Data Communications Equipment (DCE) devices transmit on pin 3 and receive on pin 2. Nominally DCE devices are modems and protocol converters.

To make an electrical connection which has a complete data path, each DTE termination must mate with a DCE termination and, of course, each pair of connectors must be of the opposite sex. Table 6 (next page) summarizes the connections from Series 300 RS-232C serial interfaces.

Any arbitrary DTE/DCE connection only guarantees that transmit (TxD), receive (RxD) and ground lines are present and correctly mated. The devices at each end must also be configured identically for bit rate (bps), bits-per-character, start bits, stop bits, parity, character codes, and flow control. All Series 300 RS-232C interfaces support the following capabilities:

Data Rates	110, 134.5, 150, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, and 38400* bps
Start Bits	1
Char Size	5, 6, 7, or 8 bits
Parity	Odd, even, or none
Stop Bits	1 or 2 (at 6, 7, or 8 bits per character)
Char Codes	Transparent. HP Operating systems support ASCII, HP ROMAN8, and HP/15 (Asian, HP-UX only)

* 38400 bps is not available on 98628A

Series 300 Interfacing and Accessories, continued

RS-232C Interfacing Recommendations

The single-byte buffered interfaces (98626A and 98644A) are not recommended for any application that generates burst mode input to the computer, such as 4800 bps or faster modems (UUCP, *cu*(1)), graphics terminals, serial instruments, industrial controllers, and other serial "black boxes".

Aggregate multiplexer throughput is card-limited to 76,800 bps continuous input data. A busy system may further reduce this figure, but no data loss should occur if a handshake (such as host-initiated Xon/Xoff receive pacing) is used.

To ensure that no data is lost due to overruns, applications at data rates above 1200 bps should implement some type of flow control between DTE and DCE. The flow control that is supported under the various Series 300 operating systems is summarized in Table 7, below.

Table 6. Series 300 Serial Interfacing Summary

RS-232C Interface	No. of Ports	Cable Length	Type of Conn.	Buffer Size	Comment
Built-in Serial w/40242G cable w/40242M cable w/17255D cable w/40242G cable	1	0.3m* 5.0m 5.0m 1.4m 5.0m	DTE (25F) DTE(25F) DTE(25M) DCE(25F) DCE(25M)	1 byte	Full modem control Full modem control Full modem control TxD, RxD, & DTR only TxD, RxD, & DTR only
98626A Serial w/Opt 001 cable w/Opt 002 cable	1	None 4.6m 4.6m	50-pin DTE(25M) DCE(25F)	1 byte	Full modem control TxD & RxD only
98628A Datacomm w/Opt 001 cable w/Opt 002 cable	1	None 4.6m 4.6m	50-pin DTE(25M) DCE(25F)	256 bytes	Full modem control TxD & RxD only
98642A Multiplexer w/Opt 100	1 3	5.0m 5.0m Deleted	DTE(25M) DCE(25M) See Note	128 bytes/ port	Full modem control TxD & RxD only
98644A Low-Cost Serial w/40242G cable w/40242M cable w/17255D cable	1	None 5.0m 5.0m 1.4m	DTE (25F) DTE(25F) DTE(25M) DCE(25F)	1 byte	Full modem control Full modem control Full modem control TxD, RxD, & DTR only

* 0.3m is length of 9F to 25F adapter cable included with the built-in interface.

NOTE: 98642A Option 100 deletes all cables. At the cover plate, Port 0 is a DTE (25F) connection and Ports 1 through 3 are three-wire RJ-11C. If you specify 98642A Option 100, use cables for 98644A for Port 0 of 98642A.

Table 7. Series 300 RS-232C Flow Control

	In HP BASIC/UX	In HP BASIC/WS	In HP-UX	In Pascal/WS
Built-in, 98644A, or 98626A Opt 001*	Outbound CTS† or bidirectional Xon/Xoff	Outbound CTS†, DSR, CD, or RI	Outbound CTS† or bidirectional Xon/Xoff	Outbound CTS†, DSR, CD, or RI, bidirectional Xon/Xoff, or Enq/Ack
98628A Opt 001*	Outbound CTS† or bidirectional Xon/Xoff	Outbound CTS†, DSR, CD, RI bidirectional Xon/Xoff, or Enq/Ack	Outbound CTS† or bidirectional Xon/Xoff	Outbound CTS†, DSR, CD, RI, bidirectional Xon/Xoff, or Enq/Ack
98642A Port 0	Outbound CTS† or or bidirectional Xon/Xoff	Card not supported	Outbound CTS† or bidirectional Xon/Xoff	Card not supported
98642A Ports 1 - 3	Bidirectional Xon/Xoff	Card not supported	Bidirectional Xon/Xoff	Card not supported

* Most HP and non-HP peripherals use DTR (Data Terminal Ready) for hardware flow control. The HP 17255D (male/female), 17355F (female/female), and 40242G (male/male) cables wire DTR on one end to CTS (Clear To Send) and to DSR (Data Set Ready) on the other. One of these cables is generally necessary when hardware flow control is desired.

† With cable option 002, output hardware flow control is possible only in HP BASIC/WS and Pascal/WS, and only with external lines CTS and DTR, which are wired, respectively, to CD (Carrier Detect) and RI (Ring Indicator) at the card.

NOTE: Flow control in HP-UX/DOS depends upon the application.

RS-232C Cabling Distances

RS-232C connections commonly provide satisfactory service to distances of 1000 feet or more. However, HP commits to resolve only problems that can be demonstrated at a distance of 50 feet, the EIA specified maximum, or less.

Workstation Display Interfaces

Table 8, below, lists the Series 300 interfaces used for connection to the monochrome and color monitors that are used for instrument controller and workstation displays.

Communications Interfaces

Table 9, next page, lists the Series 300 interfaces that are available for system-to-system communications.

Table 8. Series 300 Cards and Daughter Boards for Interfacing to Workstation Display Monitors

Type	Product or Part Number and Name	Use	Cables Included?
DIO I/O	98287A† Display Station I/F	Interfacing to 98700H Display Station.	2.0 meter
DIO Syst	98542A 512 by 400 Monochrome Video Output	Interfacing to 35731A Monochrome Monitor.	2.4 meter
DIO Syst	98543A 512 by 400x4 Color Video Output	Interfacing to 35741A Color Monitor.	Three 2.4 meter
DIO Syst	98544B 1024 by 768 Monochrome Video Output	Interfacing to 98786A Monochrome Monitor.	2.4 meter
DIO I/O and DIO Acc.	98546A† Display Compatibility Interface	Interfacing to 35741A Color or 35731A Monochrome monitor for use with software that requires a high degree of compatibility with Series 200 displays. (Bit-mapped video output also requires a built-in or 98542A monochrome video output or a 98543A color video output.)	2.4m and 0.6m BNC-RCA, 2.4m RCA-RCA, and 0.6m BNC-BNC
DIO Syst	98547A 1024 by 768 by 6 "C" Color Video Output	Interfacing to 98751A or 98785A Color Monitor.	3 meter
DIO-II or DIO Syst	98548A 1280 by 1024 "MH" Monochrome Video Output	Interfacing to 98788A Monochrome Monitor.	Yes
DIO-II or DIO Syst	98549A 1024 by 768 by 6 "C+" Color Video Output	Interfacing to 98751A or 98785A Color Monitor.	Yes
DIO-II or DIO Syst	98550A 1280 by 1024 by 8 "CH" Color Video Output	Interfacing to 98752A or 98788A Color Monitor.	Yes
Daughter	98556A Integer-based 2D "CHX" Graphics Accelerator for 98549A or 98550A	Acceleration of 2D graphics output via 98549A or 98550A Color Video Output. DIO-II addressing is required for use of the accelerator.	n/a
DIO I/O	98627A† Color Video I/F	Interfacing to (discontinued) 13279B Color Monitor.	2.4 meters
DIO I/O	98724A† Display Controller (local graphics bus) Interface	Interface to 98720A SRX Display Controller.	Yes
DIO Syst	98725A Display Controller (local graphics bus) Interface	Interface to 98720A SRX Display Controller.	Yes
DIO-II only	98726A† Display Controller (local graphics bus) Interface	Interface to 98730A TurboSRX Display Controller.	Yes

† This interface is not supported in Model 340C+/M/CH/SRX Workstation.

Series 300 Interfacing and Accessories, continued

Other Series 300 Interfaces

Table 10, next page, lists the Series 300 interfaces that are available for miscellaneous general-purpose and special purpose connections.

Maximum I/O Cards

The hardware architecture limit is 23 DIO cards, if that number of I/O slots is available. The reason is that only select codes 8 and 10 through 31 are available for plug-in I/O cards. Select codes 0 through 6 are not available for plug-in interfaces in BASIC and Pascal. Select codes 7 and 9 are used for built-in HP-IB and RS-232C and cannot be disabled. Consult an HP Systems Engineer for assistance with configuration of large Series 300 systems.

Direct Memory Access

Direct Memory Access (DMA) supports transfer of data between RAM and an I/O card at high speed and in parallel with other CPU and I/O operations. A DMA controller is standard on all Series 300 computers. A maximum of one two-channel DMA controller is supported on any Series 300 computer.

Table 9. Series 300 Cards for Communications Interfacing

Type	Product or Part Number and Name	Use	Cable or Bus Conn. Included?
DIO I/O	36592A HP-UX SNA Link (98649A interface card)	Interfacing standalone system to SNA Link to IBM 370 or plug-compatible system.	Yes
DIO I/O	36593A HP-UX Gateway SNA Link (98649A interface card)	Interfacing gateway system to SNA Link to IBM 370 or plug-compatible system.	Yes
DIO I/O	36941A X.25/300 Link	Interfacing system to public or private X.25 Packet switching network.	Yes
DIO I/O	50955A° IBM 3278 Display Station Emulator	Interfacing to IBM or plug-compatible mainframe, emulating an IBM 3278 Display Station.	No
DIO I/O	50962A Shared Resource Management Interface	Interfacing to Shared Resource Management (coaxial Network).	No
Daughter	98235A AUI LAN connection (Model 340 only)	Interfacing of Model 340 to Local Area Network via Attachment Unit Interface.	No
Daughter	98237A ThinLAN connection (Model 340 only)	Interfacing of Model 340 to Local Area Network via ThinLAN (BNC output) connection.	BNC Tee
DIO-II	98562-66533 System Interface Card with LAN AUI output.	Interfacing to HP-HIL, RS-232C, and HP-IB devices and to LAN via Attachment Unit Interface. SPU	With
DIO-II	98562-66534 System Interface Card with ThinLAN output.	Interfacing to HP-HIL, RS-232C, and HP-IB devices and to LAN via ThinLAN (BNC output) connection.	With SPU
DIO I/O	98641A RJE Interface Interface	Emulation of IBM 2780 or 3780 workstation for Remote Job Entry to an IBM 360/370 or plug-compatible system.	4.6 meters
DIO I/O	98643A LAN AUI Interface Option 241	Interfacing to Local Area Network via ThinLAN. Delete ThinMAU and BNC Tee	BNC Tee
DIO I/O	98691A Programmable Datacommunications Interface Option 001 Option 002 Option 003	Interfacing to user-developed communications applications. Adds 5061-4215 Male DTE cable Adds 5061-4215 Female DCE cable Adds 5061-4250 Male DTE RS-449/423 cable	No 4.6 meters 4.6 meters 4.6 meters
VME C.1	98855-89931 IBM 5080 Emulator	Interface to IBM or plug-compatible system.	No

° Discontinued product, listed here for reference.

Table 10. Miscellaneous Series 300 Interface Cards

Type	Product or Part Number and Name	Use	Cable or Bus Conn. Included?
DIO I/O	98622A General Purpose I/O (GPIO) Interface Option 001 Option 002	Interfacing to a variety of devices via input and output up to 16 bits wide. Adds 5061-4209 Unterminated cable. Adds 5061-4210 Cable to 6940B Multiprogrammer	No 4.6 meters 4.6 meters
Cable	98053A GPIO Cable	Connection to Versatec Plotter.	4.6 meters
DIO I/O	98623A Binary Coded Decimal (BCD) Interface Option 001	Connection of BCD inputs (43 input lines) and control outputs (8 output lines) to instruments or other BCD or digital devices. Adds 5061-4217 Unterminated cable	No 4.6 meters
DIO I/O	98630A Breadboard Interface Option 001	User-development of interface for unique needs. Adds 98630-66502 Service Extender Card	No
DIO I/O	98633A Multiprogrammer Interface 14704A 14704B 14704C	Interfacing to 6944A Multiprogrammer Cable to Multiprogrammer Cable to Multiprogrammer Cable to Multiprogrammer	No 1.0 meter 2.0 meters 4.0 meters
DIO I/O	98640A 7-channel Analog Input Interface	Interfacing to multiple analog inputs (supported by 98645A Measurement Library in BASIC/WS and Series 200/300 Pascal operating systems only)	No
DIO I/O & VME	98646A DIO-to-VME Adapter	Interfacing to customer-furnished VME or VXI card cage.	Yes

Two independent, dynamically-assignable DMA channels are provided by the DMA controller. Only two DMA-compatible I/O cards can be using DMA at any instant in time. DMA channels are allocated automatically by the operating system.

If three or more DMA-compatible I/O cards are present and a third DMA I/O request is made while the two channels are busy, the operation proceeds in fast-handshake (non-DMA) mode. The algorithms for arbitrating DMA contention vary among operating systems. There is no supported way for users or system

programmers to guarantee that any given I/O request will be granted a DMA channel. There is also no supported way to disable DMA on cards that support it.

Accessory and Memory Cards

Table 11, next page, lists the accessory and memory cards that are available for Series 300 computers.

Power Limitations

The only power limitation presently imposed on Series 300 computers is that a 98549A "C+" or 98550A "CH" video card with a 98556A accelerator must not be used in the same card cage as 98264A/B ECC memory. Generally, this means that the video card is installed in a 98570A DIO-II Expander.

DIO Card Support in 9888A Expander

Table 12, page 99, summarizes the supportability of DIO cards in the 9888A Expander.

Series 300 Interfacing
and Accessories, continued

Table 11. Series 300 Accessory and Memory Cards

Type	For Model	Product or Part Number and Name	Use	Cable or Bus Conn. Included?
DIO-II & System Bus	360 370 (or 330)	98248B Floating Point Accelerator Option 004 Option 005	Speeds floating point calculations in Model 360, 370, (or 330). Deletes 3-station system bus conn. Adds 4-station system bus connector.	3-station system bus 4-station
DIO Acc	332 360 370	98253A† EPROM Development Kit with EPROM programmer interface.	Supports development of EPROM programs and programming of the EPROM memory card.	No
DIO Acc	All	98255A EPROM Memory Card	Provides EPROM storage that emulates a read-only disk in BASIC/WS or Pascal/WS operating system.	No
DIO-II & System Bus Daughter Daughter	370 (or 330* or 350)	98258A 4 MB RAM Controller Option 004 98258B 4 MB Add-on RAM 98258C 12 MB Add-on RAM	Provision of 4 MB of parity memory*, expandable to 8 MB or 16 MB. Deletes 3-station system bus conn.* Increases RAM on 98258A Card to 8 MB Increases RAM on 98258A Card to 16 MB	3-station system bus n/a n/a
DIO Acc	332 360 370	98259A 128 KB Bubble Memory	As 128 KB electronic disk in BASIC/WS or Pascal/WS operating system.	n/a
DIO-II & System Bus	370 (or 350)	98264A 8 MB ECC RAM Controller Option 004 Option 005	Provision of 8 MB of ECC memory for Model 370 (or 350). Deletes 3-station system bus conn. Adds 4-station system bus connector	3-station system bus 4-station
DIO-II & System Bus	370 (or 350)	98264B 16 MB ECC RAM Controller Option 004 Option 005	Provision of 16 MB of ECC memory for Model 370 (or 350). Deletes 3-station system bus conn. Adds 4-station system bus connector.	3-station system bus 4-station
Daughter	360	98267A 4 MB add-on RAM	Adds 4 MB Parity-Checking RAM.	n/a
Daughter	360	98267B 8 MB add-on RAM	Adds 8 MB Parity-Checking RAM.	n/a
Daughter	360	98267C 12 MB add-on RAM	Adds 12 MB Parity-Checking RAM.	n/a
Daughter	340	98268A 4 MB add-on RAM	Adds 4 MB Parity-Checking RAM.	n/a
Daughter	332	98269A 1 MB RAM	Provides 1 MB Parity-Checking RAM.	n/a
Daughter	332	98269B 4 MB RAM	Provides 4 MB Parity-Checking RAM.	n/a
DIO Acc	All 300	98286A DOS Coprocessor	Adds ability to execute DOS programs.	n/a
DIO Acc	All 300	98603B ROM-based BASIC 5.1	Provides BASIC 5.1 executable from ROM.	n/a

† The HP 98253A EPROM Development Kit is not supported in Model 340C+/M/CH/SRX Workstation.

* The HP 98258A 4 MB RAM Controller, not expandable with 98258B/C add-on RAM board, can also be used to add memory to Model 330; Option 004 should also be ordered to delete the unneeded system bus frontplane connector.

Table 12. Series 300 DIO Card Supportability in 9888A Expander

Card Product or Part Number	Name	Supported?
09826-66544	Service Extender	Depends upon handshaking modes implemented by designer of circuitry on the extended card.
36592A/36593A 50955A° 50961A° 50962A 98204B°	SNA Link (includes 98649A interface) IBM 3278 Coaxial Interface SRM Coaxial Interface SRM Coaxial Interface 512x340 Monochrome Video Interface	Yes Yes Yes Yes Yes
98255A 98256A 98257A 98259A 98286A/S	EPROM Memory Card 256 KB RAM 1 MB RAM 128 KB Bubble Memory DOS Coprocessor	No No No Yes No
98287A 98546A 98603A 98603B 98620A°/B	98700H Display Station Interface 512x390 Video Compatibility Interface ROM-based BASIC 4.0 ROM-based BASIC 5.1 DMA Controller	No Yes No No No
98622A 98623A 98624A 98625A°/B 98626A	General-Purpose I/O Interface Binary Coded Decimal (BCD) Interface HP-IB Interface (standard speed) High-Speed HP-IB Interface RS-232C Serial Interface	Only in Model 332 (and Models 310° and 320°) Yes Only in Model 332 (and Models 310° and 320°) Only in Model 332 (and Models 310° and 320°) Yes
98627A 98628A 98629A° 98630-66502 98633A	576x455x4 Color Video Output Interface Data Communications Interface SRM Interface Service Extender Card 6944A Multiprogrammer Interface	Yes Yes Yes Depends upon card plugged into the service extender. Only in Model 332 (and Models 310° and 320°)
98640A 98641A 98642A 98643A 98644A	7-Channel Analog Input Interface RJE 2780/3780 Interface 4-Channel RS-232C Multiplexer Interface Local Area Network (LAN) AUI Interface RS-232C Serial Interface	Yes Yes Yes Yes Yes
98646A 98647A 98649A 98658A 98691A	DIO-to-VME Adapter PC-IB Interface SNA Interface SCSI Single-Ended Interface Programmable Datacomm Interface	No No Yes No Yes
98695A° 98724A 9888A	IBM 3270 Coaxial Interface Display Controller Interface to 98720A Daisy-chained additional 9888A	Yes No No

° Identifies discontinued product listed here for reference.

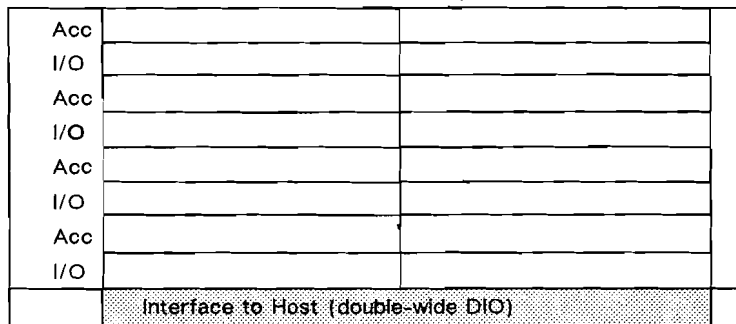
Model 360/370 Expanders Backplane Use Records

Please make a copy of this page and the next page as needed to use to keep track of your Model 360/370 configuration as you select it. Cross out expanders that are not used. A maximum of two of the direct-connect expanders shown on this page is permitted per Model 360/370 SPU.

HP 98577A VME Expander		
VME C.1	Pwr Sup	
VME C.1		
VME C.1		
VME C.1		
Controller		
HP 98568A 8-Slot DIO Expander		
Acc	Power Supply	
I/O		
Acc		
I/O		
Acc		
I/O		
Acc		
I/O		
HP 98570A 6-slot DIO-II/DIO Expander		
Acc	Power Supply	
I/O		
Acc		
I/O		
DIO-II		
DIO-II		
HP 98568A Option 132 8-Slot DIO Expander		
Acc	Power Supply	
I/O		
Acc		
I/O		
Acc		
I/O		
Acc		
I/O		
HP 98570A Option 004 4-slot DIO-II Expander		
DIO-II		Power Supply
DIO-II		
DIO-II		
DIO-II		
HP 98570A 6-slot DIO-II/DIO Expander		
Acc	Power Supply	
I/O		
Acc		
I/O		
DIO-II		
DIO-II		
HP 98570A Option 004 4-slot DIO-II Expander		
DIO-II		Power Supply
DIO-II		
DIO-II		
DIO-II		

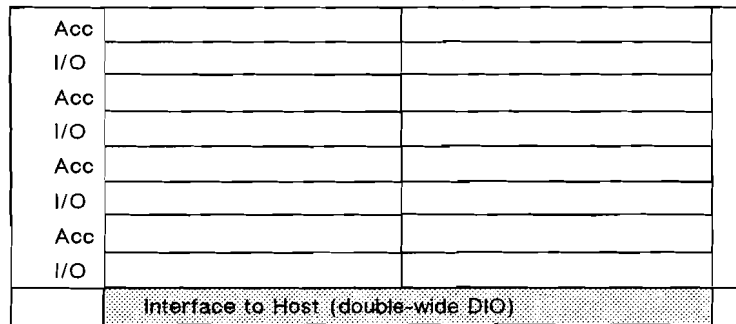
A maximum of two of the 9888A DIO Bus Expanders shown on this page is permitted per Model 360/370 SPU. This is in addition to the two direct-connect expanders that can be selected on the previous page.

HP 9888A DIO Bus Expander



To DIO I/O Slot in host SPU or Expander ←

HP 9888A DIO Bus Expander



To DIO I/O Slot in host SPU or Expander ←

Model 825CHX Superworkstation

Description

The HP 9000 Model 825CHX is a 2D color Superworkstation with 2D integer-based graphics accelerator, keyboard, and a 19-inch 1280 by 1024 color monitor. Figures 73 and 74 illustrate the Model 825CHX functions and backplane usage and interconnections.

CPU: HP-PA Model 825, clocked at 12.5 MHz.

Cache: 16 KB.

Bus Types: 64-plus-8-ECC-bit memory bus, 32-bit CTB bus, and 16-bit CIO bus.

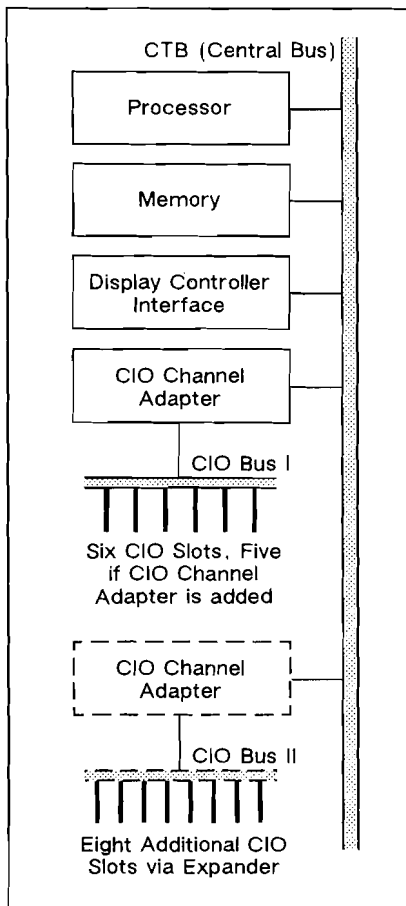
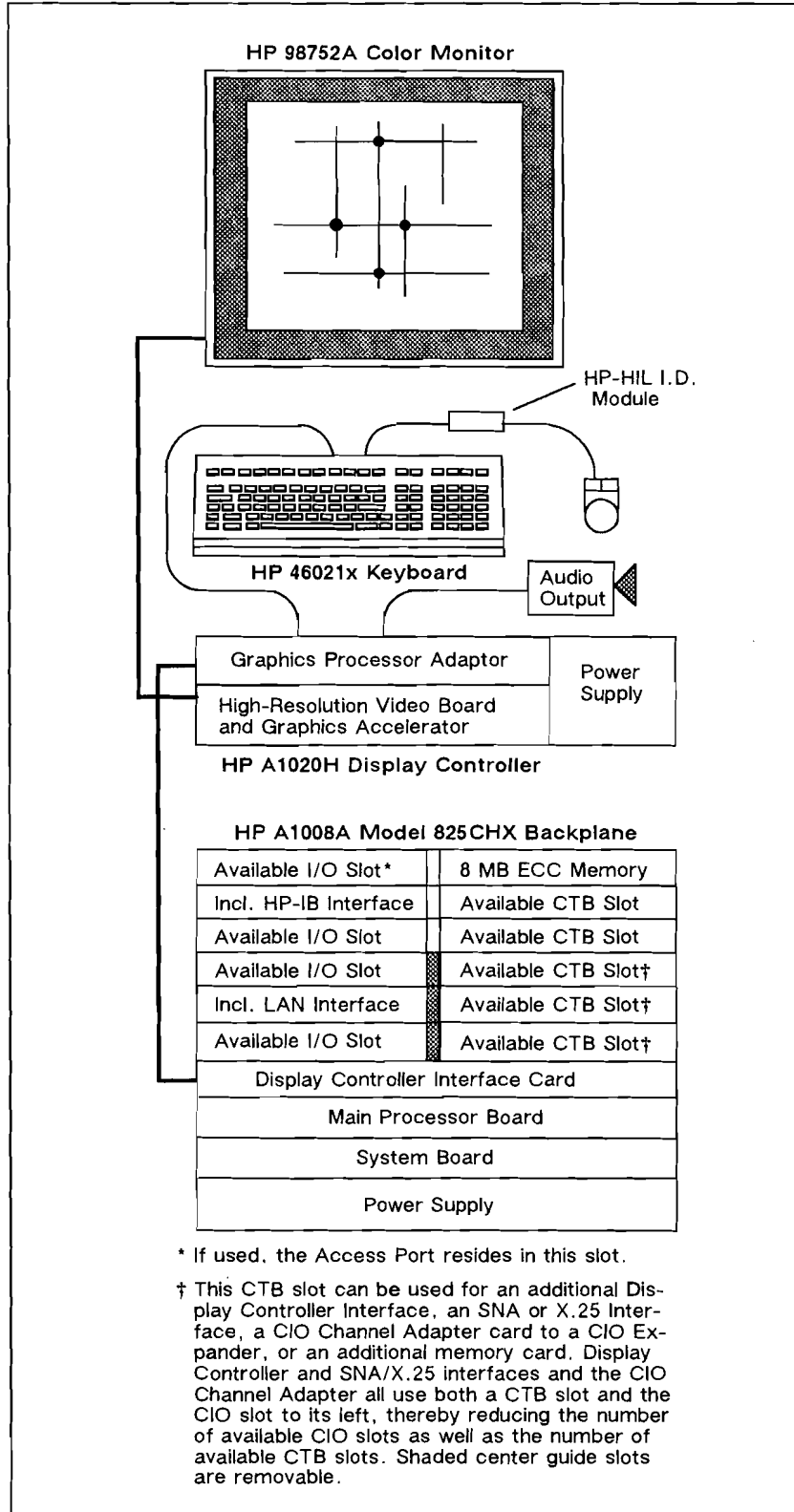


Figure 73. Model 825CHX Functions



* If used, the Access Port resides in this slot.

† This CTB slot can be used for an additional Display Controller Interface, an SNA or X.25 Interface, a CIO Channel Adapter card to a CIO Expander, or an additional memory card. Display Controller and SNA/X.25 interfaces and the CIO Channel Adapter all use both a CTB slot and the CIO slot to its left, thereby reducing the number of available CIO slots as well as the number of available CTB slots. Shaded center guide slots are removable.

Figure 74. Model 825CHX Backplane Usage and Interconnections

Model 825CHX Super-workstation, continued

Included Interfaces: HP-IB Disk interface and LAN/9000 Series 800 Link interface.

RAM: 8 MB ECC, expandable to 96 MB (each CTB slot used for other uses reduces maximum memory capacity by 16 MB).

Floating Point Processor: 0.65 MFLOPs Floating Point Coprocessor.

Direct Memory Access: One channel direct memory access via CIO bus is standard, second channel is available by adding a CIO Expander.

Operating System: HP-UX operating system with 16-user license is included.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Product Summary

A1008A Model 825CHX Superworkstation, consisting of:

- A. System Processor Unit (SPU), including:
1. 32-bit HP-PA Model 825 CPU with floating point coprocessor.
 2. A1010A 8 MB ECC Memory Array Card.
 3. 27110B HP-IB interface to system disk(s) and cartridge tape subsystem.
 4. 91786B LAN/9000 Series 825 Link.
 5. Enclosure with 4 available CIO slots for I/O cards, 5 available CTB slots for additional memory or other CTB cards, and power supply.

- B. 2D Graphics Subsystem, including:
1. A1020H High-Resolution Color Graphics Subsystem, including:
 - A1017A Display Controller Interface.
 - A1020A 2D Graphics Processor Adapter.
 - 98550A High Resolution Video Board and RGB Cable.
 2. 98556A 2D Integer-Based Graphics Accelerator.
 3. 46021x Keyboard.
 4. 46060A HP-HIL Two-button Mouse.
 5. 46081A Buffer Box with Speaker.
 6. 46084A HP-HIL ID Module.
 7. 98752A 19-inch Color Monitor.

- C. Software, including:
1. 92452A HP-UX with 16-user License (requires media option).
 2. 50981A ARPA/BSD Model 825 Networking Software.
 3. 92445A Starbase Graphics Library.
 4. 92524A X Windows System, Version 10.4.

D. Manuals.

E. Installation.

F. 90-day on-site warranty.

Software Media Options

AA0: All software on 1/4-inch, 16-track cartridge tape.

AA1: All software on 1/2-inch, 1600 cpi, 9-track magnetic tape.

Other Options

002: Adds 8 MB ECC RAM card.

003: Adds 28641A ThinMAU.

004: Adds 30241A ThickMAU.

005: Deletes 98556A Graphics Accelerator.

006: Adds an accelerated 19-inch graphics display (includes product summary items B-1, 2, and 7, but not items B-3 through 6).

007: Adds an accelerated 16-inch graphics display (includes 98789A 16-inch color monitor and product summary items B-1 and 2, but not items B-3 through 7).

515: Replaces 8 MB ECC RAM card with 16 MB ECC RAM card.

516: Adds 16 MB ECC RAM card.

531: Replaces 8 MB ECC RAM card with two 16 MB ECC RAM cards.

716: Replaces 98752A 19-inch Color Monitor with 98789A 16-inch Color Monitor.

0E1: Adds Battery Backup System.

Add-on Accessories

A1010A: 8 MB ECC RAM card.

A1037A: 16 MB ECC RAM card.

A1013A: CIO Expander with CIO Channel Adapter (adds 7 CIO slots and uses one CTB slot).

A1014A: Battery Backup System.

A1015A: Access Port.

45911A: 11 by 11 inch Graphics Digitizer Tablet.

46087B: 8.5 by 11.7 inch Graphics Digitizer Tablet.

46088B: 11.7 by 17 inch Graphics Digitizer Tablet.

97099A: 19-inch Rack Mount Kit for Model 825CHX.

19500B: 19-inch Rack Mount Kit for Model 825CHX Battery Backup System.

92211R: Minirack for Model 825CHX, including its display controller, and the available CIO Expander and battery backup system.

92211S: Mounting rail kit for 92211R Minirack.

92211T: Filler panel kit for 92211R Minirack.

Upgrade Products

A1036A: Upgrades Model 825CHX to Model 835CHX without CIO Expander supportability (replaces Model 825 processor and PDH boards with those used in the Model 835). NOTE: Order A1038A if CIO Expander is desired.

A1038A: Upgrades Model 825CHX to Model 835CHX with CIO Expander (replaces Model 825 processor and PDH boards with those used in the Model 835SE, adds CIO Expander (deletable with option 1AB), adds 16 MB ECC RAM, and upgrades HP-UX to 64-user license).

Operational Requirements

- 1. System Disk:** A hard disk with at least 132 MB (see pages 136-140).
- 2. Software Installation/Backup Device:** A cartridge tape subsystem or magnetic tape unit (see pages 141-142).

Other Items

Interfacing: See pages 122-124.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 825SRX Superworkstation

Description

The HP 9000 Model 825SRX is a 3D solid-rendering color Superworkstation with keyboard and a 19-inch 1280 by 1024 color monitor. Figures 75 and 76 illustrate the Model 825SRX functions and backplane usage and interconnections.

CPU: HP-PA Model 825, clocked at 12.5 MHz.

Cache: 16 KB.

Bus Types: 64-plus-8-ECC-bit memory bus, 32-bit CTB bus, and 16-bit CIO bus.

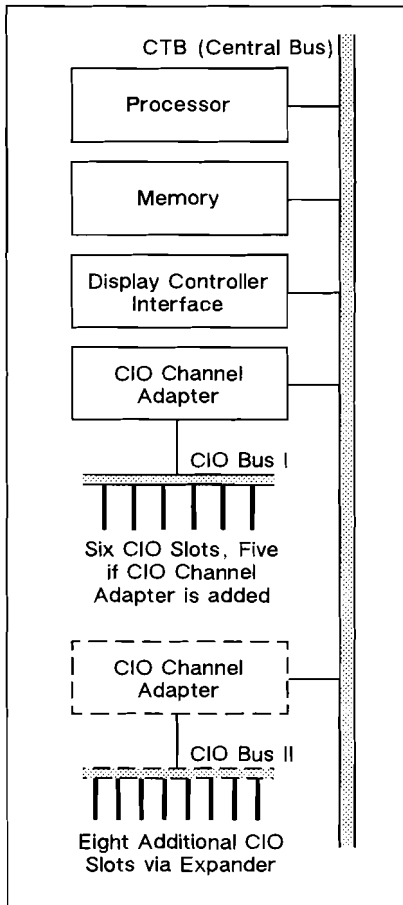
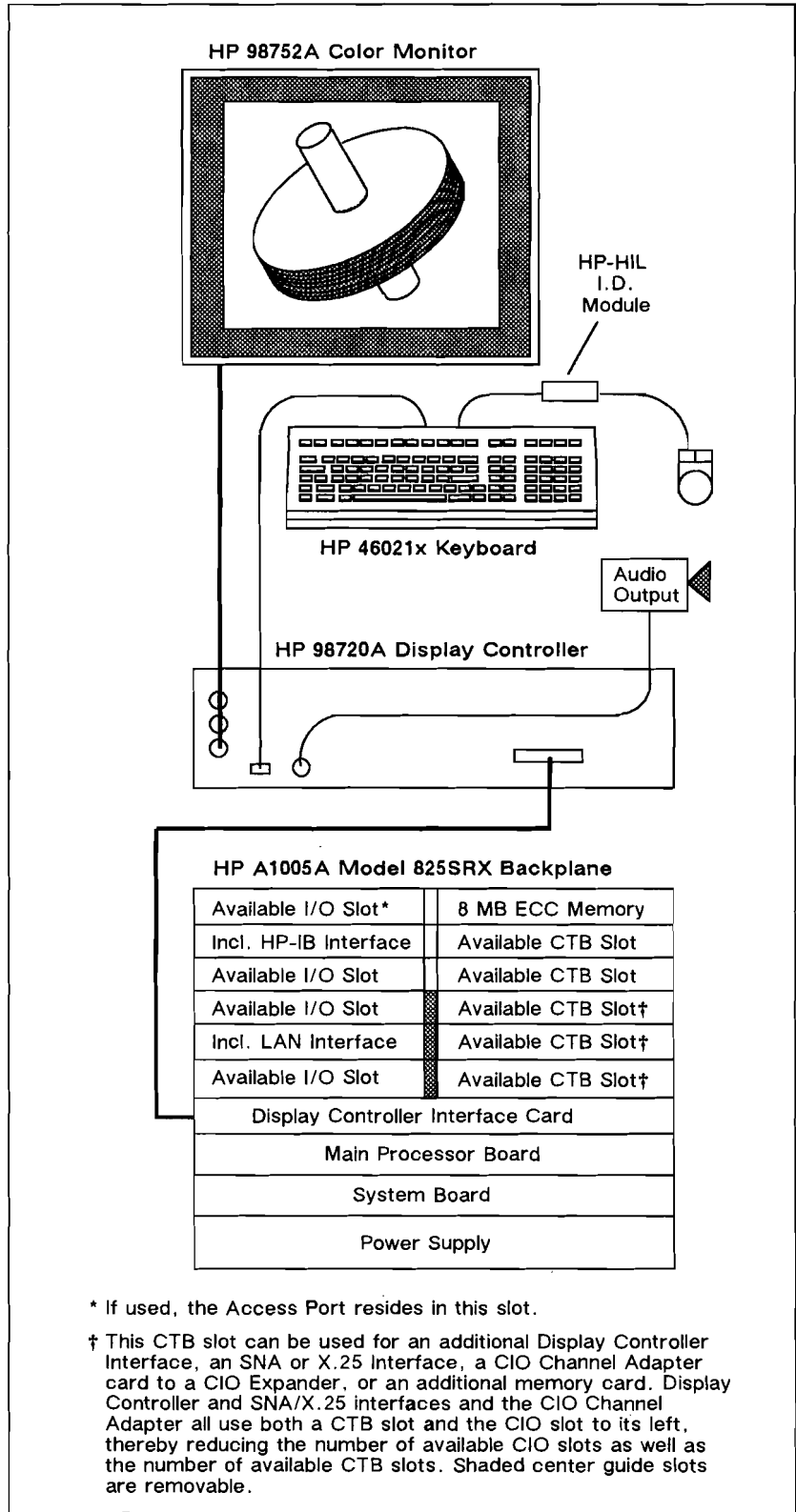


Figure 75. Model 825SRX Functions



* If used, the Access Port resides in this slot.

† This CTB slot can be used for an additional Display Controller Interface, an SNA or X.25 interface, a CIO Channel Adapter card to a CIO Expander, or an additional memory card. Display Controller and SNA/X.25 interfaces and the CIO Channel Adapter all use both a CTB slot and the CIO slot to its left, thereby reducing the number of available CIO slots as well as the number of available CTB slots. Shaded center guide slots are removable.

Figure 76. Model 825SRX Backplane Usage and Interconnections

Included Interfaces: HP-IB Disk interface and LAN/9000 Series 800 Link interface.

RAM: 8 MB ECC, expandable to 96 MB (each CTB slot used for other uses reduces maximum memory capacity by 16 MB).

Floating Point Processor: 0.65 MFLOPs Floating Point Coprocessor.

Direct Memory Access: One channel direct memory access via CIO bus is standard, second channel is available by adding a CIO Expander.

Operating System: HP-UX operating system with 16-user license is included.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Product Summary

A1005A Model 825SRX Superworkstation, consisting of:

- A. System Processor Unit (SPU), including:
1. 32-bit HP-PA Model 825 CPU with floating point coprocessor.
 2. A1010A 8 MB ECC Memory Array Card.
 3. 27110B HP-IB interface to system disk(s) and cartridge tape subsystem.
 4. 91786B LAN/9000 Series 825 Link.
 5. Enclosure with 4 available CIO slots for I/O cards, 5 available CTB slots for additional memory or other CTB cards, and power supply.

- B, 3D Solid Rendering Display Subsystem, including:
1. A1017A Display Controller Interface.
 2. 98720A Display Controller with 4-plane memory overlay.
 3. 98721A 3D Solid Graphics Accelerator.
 4. 98722A 8-plane Frame Buffer.
 5. 46021x Keyboard.
 6. 46060A HP-HIL Two-button Mouse.
 7. 46081A Buffer Box with Speaker.
 8. 46084A HP-HIL ID Module.
 9. 98752A 19-inch Color Monitor.
 10. 98290A RGB Cables.

- C. Software, including:
1. 92452A HP-UX with 16-user License (requires media option).
 2. 50981A ARPA/BSD Model 825 Networking Software.
 3. 92445A Starbase Graphics Library.
 4. 92524A X Windows System, Version 10.4.

D. Manuals.

E. Installation.

F. 90-day on-site warranty.

Software Media Options

AA0: All software on 1/4-inch, 16-track cartridge tape.

AA1: All software on 1/2-inch, 1600 cpi, 9-track magnetic tape.

Other Options

002: Adds 8 MB ECC RAM card.

003: Adds 28641A ThinMAU.

004: Adds 30241A ThickMAU.

024: Adds two 8-plane frame buffer cards and power supply for 24 planes of graphics memory.

032: Adds three 8-plane frame buffer cards and power supply for 32 planes of graphics memory.

515: Replaces 8 MB ECC RAM card with 16 MB ECC RAM card.

516: Adds 16 MB ECC RAM card.

531: Replaces 8 MB ECC RAM card with two 16 MB ECC RAM cards.

0E1: Adds Battery Backup System.

Add-on Accessories

A1010A: 8 MB ECC RAM card.

A1037A: 16 MB ECC RAM card.

A1013A: CIO Expander with CIO Channel Adapter (adds 7 CIO slots and uses one CTB slot).

A1014A: Battery Backup System.

A1015A: Access Port.

Model 825SRX Super-workstation, continued

45911A: 11 by 11 inch Graphics Digitizer Tablet.

46085A: Control Dial Module for three-axis positioning of displayed images.

46087B: 8.5 by 11.7 inch Graphics Digitizer Tablet.

46088B: 11.7 by 17 inch Graphics Digitizer Tablet.

98722A: 8-Plane Frame Buffer Card.

98723A: Additional power supply for 98720A Display Controller with more than 8-planes of frame buffer memory.

97099A: 19-inch Rack Mount Kit for Model 825SRX.

19500B: 19-inch Rack Mount Kit for Model 825SRX Battery Backup System.

92211R: Minirack for Model 825SRX, including its display controller, and the available CIO Expander and battery backup system.

92211S: Mounting rail kit for 92211R Minirack.

92211T: Filler panel kit for 92211R Minirack.

Upgrade Products

A1036A: Upgrades Model 825SRX to Model 835SRX without CIO Expander supportability (replaces Model 825 processor and PDH boards with those used in the Model 835). NOTE: Order A1038A if CIO Expander is desired.

A1038A: Upgrades Model 825SRX to Model 835SRX with CIO Expander (replaces Model 825 processor and PDH boards with those used in the Model 835SE, adds CIO Expander (deletable with option 1AB), adds 16 MB ECC RAM, and upgrades HP-UX to 64-user license).

Operational Requirements

1. System Disk: A hard disk with at least 132 MB (see pages 136-140).

2. Software Installation/ Backup Device: A cartridge tape subsystem or magnetic tape unit (see pages 141-142).

Other Items

Interfacing: See pages 122-124.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 835CHX Superworkstation

Description

The HP 9000 Model 835CHX is a 2D color Superworkstation with 2D integer-based graphics accelerator, keyboard, and a 19-inch 1280 by 1024 color monitor. Figures 77 and 78 illustrate the Model 835CHX functions and backplane usage and interconnections.

CPU: HP-PA Model 835, clocked at 15 MHz.

Cache: 128 KB.

Bus Types: 64-plus-8-ECC-bit memory bus, 32-bit CTB bus, and 16-bit CIO bus.

Included Interfaces: HP-IB Disk interface and LAN/9000 Series 800 Link interface.

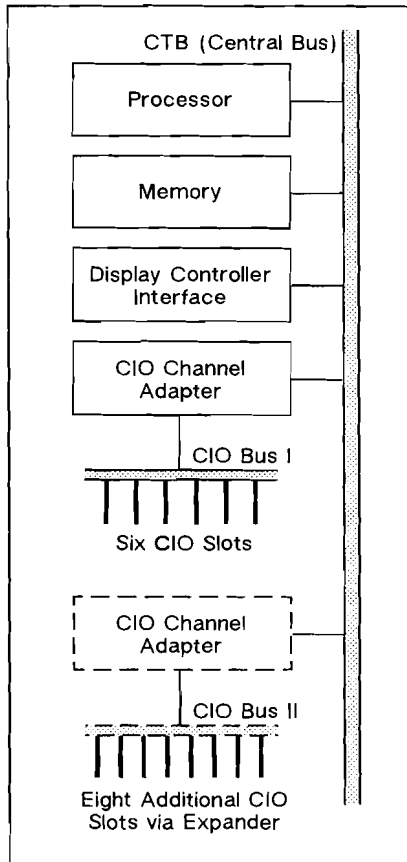
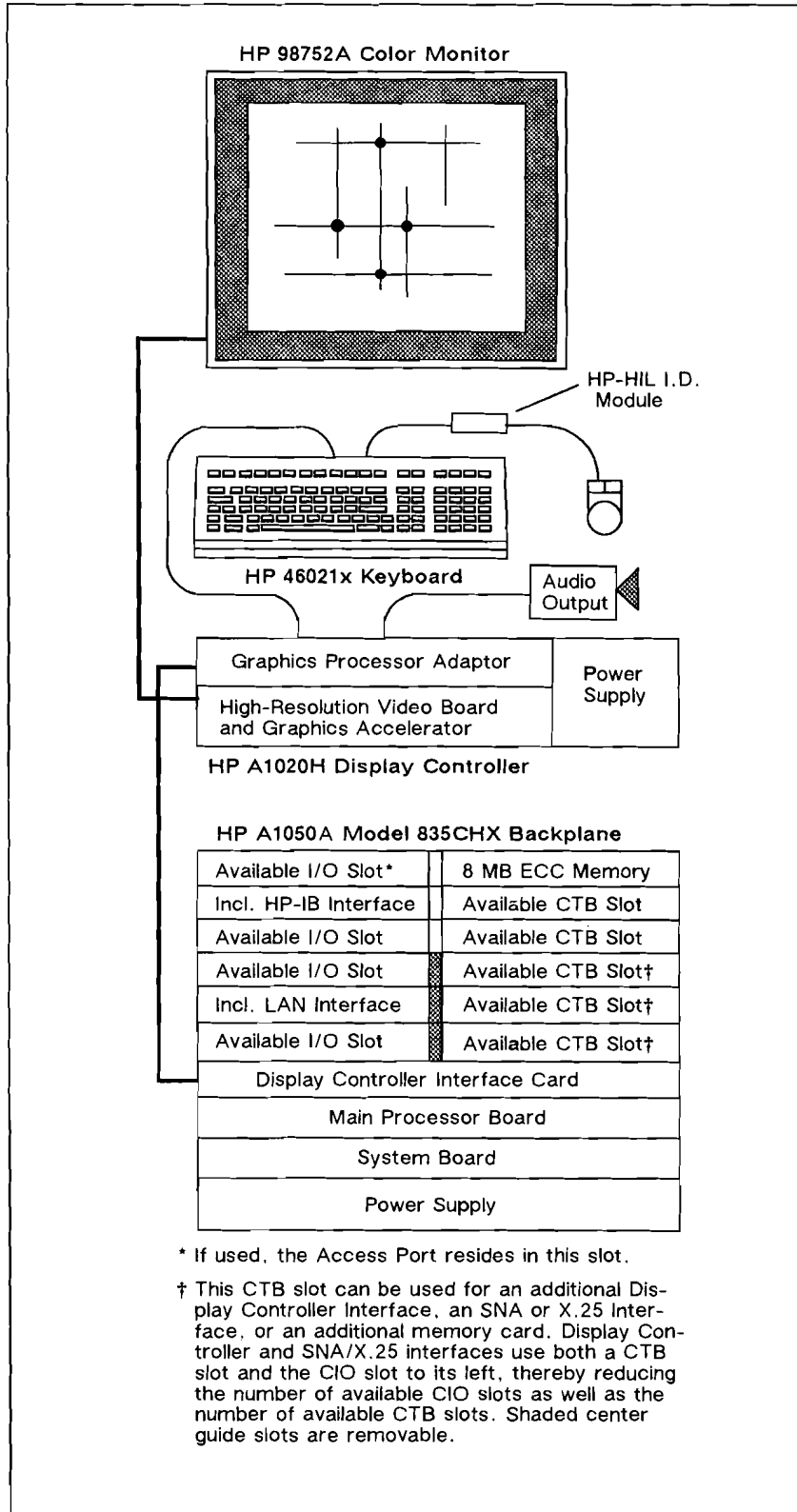


Figure 77. Model 835CHX Functions



* If used, the Access Port resides in this slot.

† This CTB slot can be used for an additional Display Controller Interface, an SNA or X.25 Interface, or an additional memory card. Display Controller and SNA/X.25 interfaces use both a CTB slot and the CIO slot to its left, thereby reducing the number of available CIO slots as well as the number of available CTB slots. Shaded center guide slots are removable.

Figure 78. Model 835CHX Backplane Usage and Interconnections

Model 835CHX Superworkstation, continued

RAM: 8 MB ECC, expandable to 96 MB (each CTB slot used for other uses reduces maximum memory capacity by 16 MB).

Floating Point Processor: 2.02 MFLOPs Floating Point Coprocessor.

Direct Memory Access: One channel direct memory access via CIO bus is standard, second channel is available by ordering an A1039A Upgrade, which adds a CIO Expander.

Operating System: HP-UX operating system with 16-user license is included.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Product Summary

A1050A Model 835CHX Superworkstation, consisting of:

- A. System Processor Unit (SPU), including:
1. 32-bit HP-PA Model 835 CPU with floating point coprocessor.
 2. A1010A 8 MB ECC Memory Array Card.
 3. 27110B HP-IB interface to system disk(s) and cartridge tape subsystem.
 4. 91786B Series 825 Link.
 5. Enclosure with 4 available CIO slots for I/O cards, 5 available CTB slots for additional memory or other CTB cards, and power supply.

B. 2D Graphics Subsystem, including:

1. A1020H High-Resolution Color Graphics Subsystem, including:
 - A1017A Display Controller Interface.
 - A1020A 2D Graphics Processor Adapter.
 - 98550A High Resolution Video Board and RGB Cable.
2. 98556A 2D Integer-Based Graphics Accelerator.
3. 46021x Keyboard.
4. 46060A HP-HIL Two-button Mouse.
5. 46081A Buffer Box with Speaker.
6. 46084A HP-HIL ID Module.
7. 98752A 19-inch Color Monitor.

C. Software, including:

1. 92452A HP-UX with 16-user License (requires media option).
2. 50981A ARPA/BSD Model 825 Networking Software.
3. 92445A Starbase Graphics Library.
4. 92524A X Windows System, Version 10.4.

D. Manuals.

E. Installation.

F. 90-day on-site warranty.

Software Media Options

AA0: All software on 1/4-inch, 16-track cartridge tape.

AA1: All software on 1/2-inch, 1600 cpi, 9-track magnetic tape.

Other Options

002: Adds 8 MB ECC RAM card.

003: Adds 28641A ThinMAU.

004: Adds 30241A ThickMAU.

005: Deletes 98556A Graphics Accelerator.

006: Adds an accelerated 19-inch graphics display (includes product summary items B-1, 2, and 7, but not items B-3 through 6).

007: Adds an accelerated 16-inch graphics display (includes 98789A 16-inch color monitor and product summary items B-1 and 2, but not items B-3 through 7).

515: Replaces 8 MB ECC RAM card with 16 MB ECC RAM card.

516: Adds 16 MB ECC RAM card.

531: Replaces 8 MB ECC RAM card with two 16 MB ECC RAM cards.

716: Replaces 98752A 19-inch Color Monitor with 98789A 16-inch Color Monitor.

0E1: Adds Battery Backup System.

Add-on Accessories

A1010A: 8 MB ECC RAM card.

A1037A: 16 MB ECC RAM card.

A1014A: Battery Backup System.

A1015A: Access Port.

45911A: 11 by 11 inch Graphics Digitizer Tablet.

46087B: 8.5 by 11.7 inch Graphics Digitizer Tablet.

46088B: 11.7 by 17 inch Graphics Digitizer Tablet.

97099A: 19-inch Rack Mount Kit for Model 835CHX.

19500B: 19-inch Rack Mount Kit for Model 835CHX Battery Backup System.

92211R: Minirack for Model 835CHX, including its display controller, and the and battery backup system.

92211S: Mounting rail kit for 92211R Minirack.

92211T: Filler panel kit for 92211R Minirack.

Upgrade Products

A1039A: Upgrades Model 835CHX to Model 835CHX with CIO Expander (replaces Model 835 PDH board with that used in the Model 835SE, adds CIO Expander, adds 16 MB ECC RAM, and upgrades HP-UX to 64-user license).

Operational Requirements

1. System Disk: A hard disk with at least 132 MB (see pages 136-140).

2. Software Installation/ Backup Device: A cartridge tape subsystem or magnetic tape unit (see pages 141-142).

Other Items

Interfacing: See pages 122-124.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 835SRX Superworkstation

Description

The HP 9000 Model 835SRX is a 3D solid-rendering color Superworkstation with keyboard and a 19-inch 1280 by 1024 color monitor. Figures 79 and 80 illustrate the Model 835SRX functions and backplane usage and interconnections.

CPU: HP-PA Model 835, clocked at 15 MHz.

Cache: 128 KB.

Bus Types: 64-plus-8-ECC-bit memory bus, 32-bit CTB bus, and 16-bit CIO bus.

Included Interfaces: HP-IB Disk interface and LAN/9000 Series 800 Link interface.

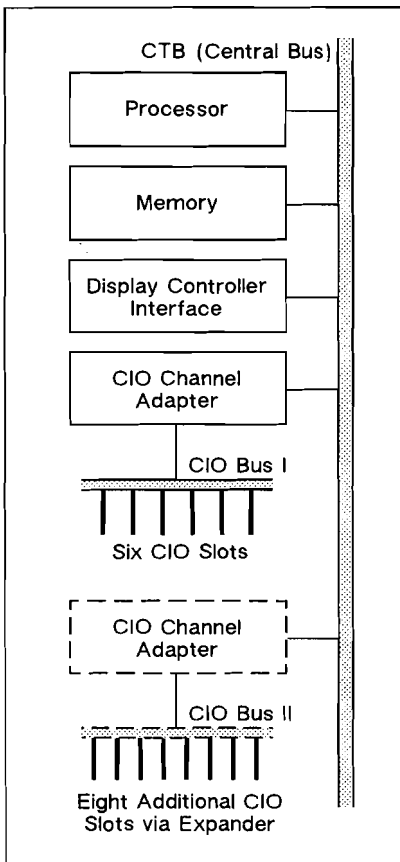
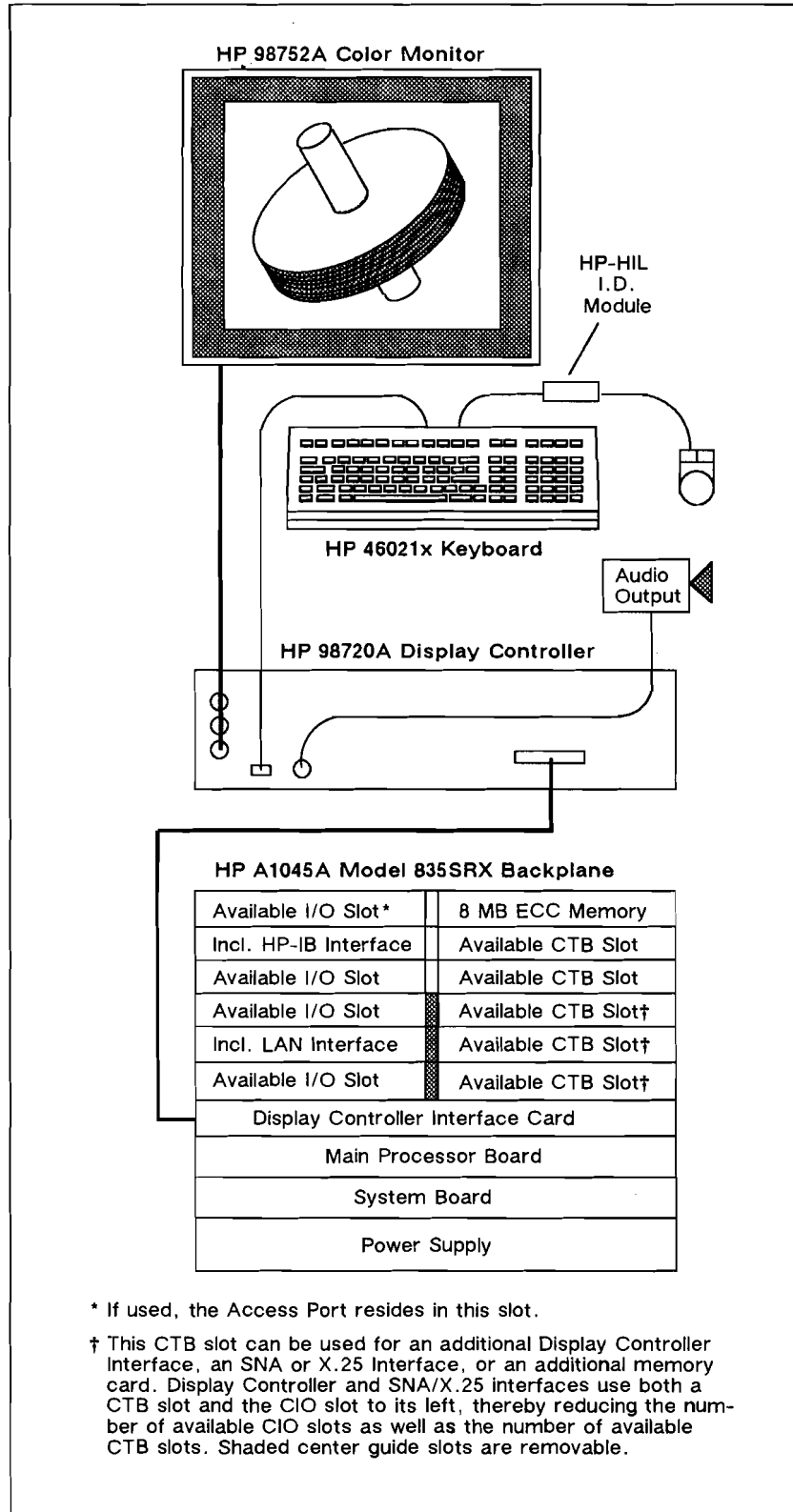


Figure 79. Model 835SRX Functions



* If used, the Access Port resides in this slot.

† This CTB slot can be used for an additional Display Controller Interface, an SNA or X.25 Interface, or an additional memory card. Display Controller and SNA/X.25 interfaces use both a CTB slot and the CIO slot to its left, thereby reducing the number of available CIO slots as well as the number of available CTB slots. Shaded center guide slots are removable.

RAM: 8 MB ECC, expandable to 96 MB (each CTB slot used for other uses reduces maximum memory capacity by 16 MB).

Floating Point Processor: 2.02 MFLOPs Floating Point Coprocessor.

Direct Memory Access: One channel direct memory access via CIO bus is standard, second channel is available by ordering an A1039A Upgrade, which adds a CIO Expander.

Operating System: HP-UX operating system with 16-user license is included.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Product Summary

A1045A Model 835SRX Superworkstation, consisting of:

- A. System Processor Unit (SPU), including:
1. 32-bit HP-PA Model 835 CPU with floating point coprocessor.
 2. A1010A 8 MB ECC Memory Array Card.
 3. 27110B HP-IB interface to system disk(s) and cartridge tape subsystem.
 4. 91786B LAN/9000 Series 825 Link.
 5. Enclosure with 4 available CIO slots for I/O cards, 5 available CTB slots for additional memory or other CTB cards, and power supply.

- B, 3D Solid Rendering Display Subsystem, including:
1. A1017A Display Controller Interface.
 2. 98720A Display Controller with 4-plane memory overlay.
 3. 98721A 3D Solid Graphics Accelerator.
 4. 98722A 8-plane Frame Buffer.
 5. 46021x Keyboard.
 6. 46060A HP-HIL Two-button Mouse.
 7. 46081A Buffer Box with Speaker.
 8. 46084A HP-HIL ID Module.
 9. 98752A 19-inch Color Monitor.
 10. 98290A RGB Cables.

- C. Software, including:
1. 92452A HP-UX with 16-user License (requires media option).
 2. 50981A ARPA/BSD Model 825 Networking Software.
 3. 92445A Starbase Graphics Library.
 4. 92524A X Windows System, Version 10.4.

D. Manuals.

E. Installation.

F. 90-day on-site warranty.

Software Media Options

AA0: All software on 1/4-inch, 16-track cartridge tape.

AA1: All software on 1/2-inch, 1600 cpi, 9-track magnetic tape.

Other Options

002: Adds 8 MB ECC RAM card.

003: Adds 28641A ThinMAU.

004: Adds 30241A ThickMAU.

024: Adds two 8-plane frame buffer cards and power supply for 24 planes of graphics memory.

032: Adds three 8-plane frame buffer cards and power supply for 32 planes of graphics memory.

515: Replaces 8 MB ECC RAM card with 16 MB ECC RAM card.

516: Adds 16 MB ECC RAM card.

531: Replaces 8 MB ECC RAM card with two 16 MB ECC RAM cards.

0E1: Adds Battery Backup System.

Add-on Accessories

A1010A: 8 MB ECC RAM card.

A1037A: 16 MB ECC RAM card.

A1014A: Battery Backup System.

A1015A: Access Port.

45911A: 11 by 11 inch Graphics Digitizer Tablet.

46085A: Control Dial Module for three-axis positioning of displayed images.

46087B: 8.5 by 11.7 inch Graphics Digitizer Tablet.

Model 835SRX Super-workstation, continued

46088B: 11.7 by 17 inch Graphics Digitizer Tablet.

98722A: 8-Plane Frame Buffer Card.

98723A: Additional power supply for 98720A Display Controller with more than 8-planes of frame buffer memory.

97099A: 19-inch Rack Mount Kit for Model 835SRX.

19500B: 19-inch Rack Mount Kit for Model 835SRX Battery Backup System.

92211R: Minirack for Model 835SRX, including its display controller and battery backup system.

92211S: Mounting rail kit for 92211R Minirack.

92211T: Filler panel kit for 92211R Minirack.

Upgrade Products

A1039A: Upgrades Model 835SRX to Model 835SRX with CIO Expander (replaces Model 835 PDH board with that used in the Model 835SE, adds CIO Expander, adds 16 MB ECC RAM, and upgrades HP-UX to 64-user license).

Operational Requirements

- 1. System Disk:** A hard disk with at least 132 MB (see pages 136-140).
- 2. Software Installation/Backup Device:** A cartridge tape subsystem or magnetic tape unit (see pages 141-142).

Other Items

Interfacing: See pages 122-124.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Model 835 TurboSRX Superworkstation

Description

The HP 9000 Model 835 TurboSRX is an ultra-fast 3D solid-rendering color Superworkstation with keyboard and a 19-inch 1280 by 1024 color monitor. Figures 81 and 82 illustrate the Model 835 TurboSRX functions and backplane usage and interconnections.

CPU: HP-PA Model 835, clocked at 15 MHz.

Cache: 128 KB.

Bus Types: 64-plus-8-ECC-bit memory bus, 32-bit CTB bus, and 16-bit CIO bus.

Included Interfaces: HP-IB Disk interface and LAN/9000 Series 800 Link interface.

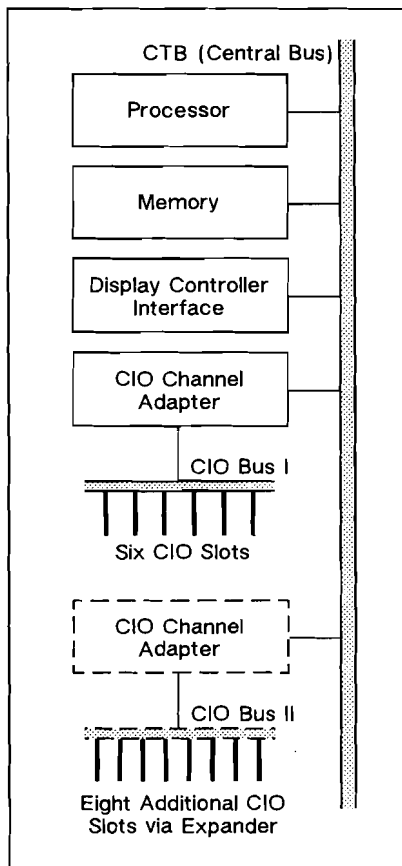
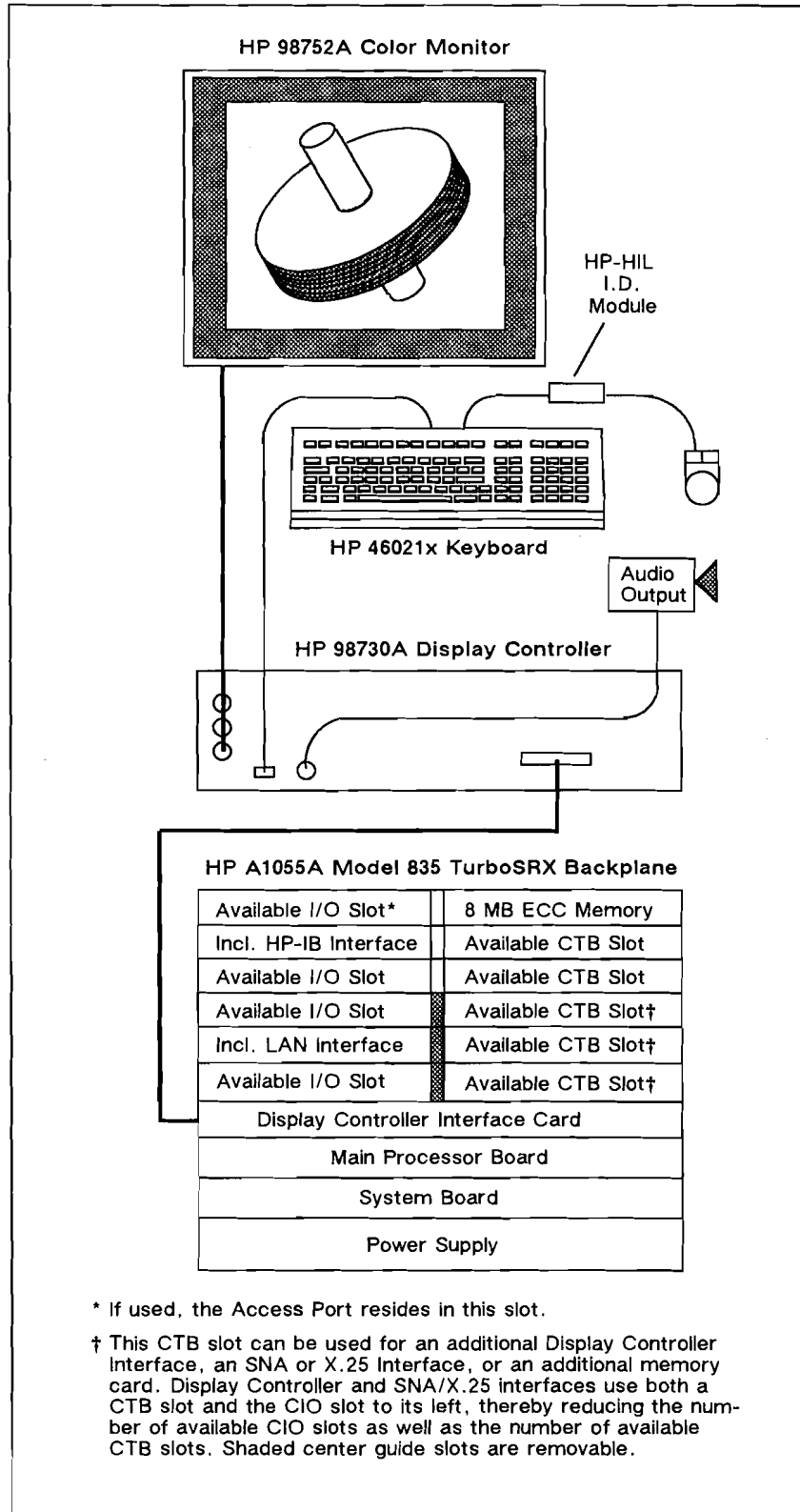


Figure 81. Model 835 TurboSRX Functions



* If used, the Access Port resides in this slot.

† This CTB slot can be used for an additional Display Controller interface, an SNA or X.25 interface, or an additional memory card. Display Controller and SNA/X.25 interfaces use both a CTB slot and the CIO slot to its left, thereby reducing the number of available CIO slots as well as the number of available CTB slots. Shaded center guide slots are removable.

Figure 82. Model 835 TurboSRX Backplane Usage and Interconnections

Model 835 TurboSRX Superworkstation, continued

RAM: 8 MB ECC, expandable to 96 MB (each CTB slot used for other uses reduces maximum memory capacity by 16 MB).

Floating Point Processor: 2.02 MFLOPs Floating Point Coprocessor.

Direct Memory Access: One channel direct memory access via CIO bus is standard, second channel is available by ordering an A1039A Upgrade, which adds a CIO Expander.

Operating System: HP-UX operating system with 16-user license is included.

Monitor: 19-inch 1280 by 1024 Color Monitor.

Product Summary

A1055A Model 835 TurboSRX Superworkstation, consisting of:

- A. System Processor Unit (SPU), including:
1. 32-bit HP-PA Model 835 CPU with floating point coprocessor.
 2. A1010A 8 MB ECC Memory Array Card.
 3. 27110B HP-IB interface to system disk(s) and cartridge tape subsystem.
 4. 91786B LAN/9000 Series 825 Link.
 5. Enclosure with 4 available CIO slots for I/O cards, 5 available CTB slots for additional memory or other CTB cards, and power supply.

- B, 3D Solid Rendering Display Subsystem, including:
1. A1017A Display Controller Interface.
 2. 98730A Display Controller with 4-plane memory overlay, 8-plane frame buffer memory, and RGB cables.
 3. 46021x Keyboard.
 4. 46060A HP-HIL Two-button Mouse.
 5. 46081A Buffer Box with Speaker.
 6. 46084A HP-HIL ID Module.
 7. 98752A 19-inch Color Monitor.

- C. Software, including:
1. 92452A HP-UX with 16-user License (requires media option).
 2. 50981A ARPA/BSD Model 825 Networking Software.
 3. 92445A Starbase Graphics Library.
 4. 92524A X Windows System, Version 10.4.

D. Manuals.

E. Installation.

F. 90-day on-site warranty.

Software Media Options

AA0: All software on 1/4-inch, 16-track cartridge tape.

AA1: All software on 1/2-inch, 1600 cpi, 9-track magnetic tape.

Other Options

002: Adds 8 MB ECC RAM card.

003: Adds 28641A ThinMAU.

004: Adds 30241A ThickMAU.

416*: Adds one 8-plane frame buffer card and power supply for 16 planes of graphics memory.

424*: Adds two 8-plane frame buffer cards and power supply for 24 planes of graphics memory.

515: Replaces 8 MB ECC RAM card with 16 MB ECC RAM card.

516: Adds 16 MB ECC RAM card.

531: Replaces 8 MB ECC RAM card with two 16 MB ECC RAM cards.

608*: Adds three accelerators for 3D solids and full 16-bit Z-buffer.

616*: Adds one 8-plane frame buffer card and power supply for 16 planes of graphics memory and three accelerators for 3D solids and full 16-bit Z-buffer.

624*: Adds two 8-plane frame buffer cards and power supply for 24 planes of graphics memory and three accelerators for 3D solids and full 16-bit Z-buffer.

716: Substitutes 98789A 16-inch color monitor for 98752A 19-inch color monitor.

747: Substitutes A1047A Graphics Animation Interface for A1017A Display Controller Interface.

0E1: Adds Battery Backup System.

* Excludes all other options 416, 424, 608, 616, and 624.

Add-on Accessories

A1010A: 8 MB ECC RAM card.

A1037A: 16 MB ECC RAM card.

A1014A: Battery Backup System.

A1015A: Access Port.

45911A: 11 by 11 inch Graphics Digitizer Tablet.

46085A: Control Dial Module for three-axis positioning of displayed images.

46087B: 8.5 by 11.7 inch Graphics Digitizer Tablet.

46088B: 11.7 by 17 inch Graphics Digitizer Tablet.

98722A: 8-Plane Frame Buffer Card.

98723A: Additional power supply for 98720A Display Controller with more than 8-planes of frame buffer memory.

98732A: Three 3D Graphics Accelerators and 16-bit Z-buffer.

97099A: 19-inch Rack Mount Kit for Model 835 TurboSRX.

19500B: 19-inch Rack Mount Kit for Model 835 TurboSRX Battery Backup System.

92211R: Minirack for Model 835 TurboSRX, including its display controller and battery backup system.

92211S: Mounting rail kit for 92211R Minirack.

92211T: Filler panel kit for 92211R Minirack.

Upgrade Products

A1039A: Upgrades Model 835 TurboSRX to Model 835 TurboSRX with CIO Expander (replaces Model 835 PDH board with that used in the Model 835SE, adds CIO Expander, adds 16 MB ECC RAM, and upgrades HP-UX to 64-user license).

Operational Requirements

1. **System Disk:** A hard disk with at least 132 MB (see pages 136-140).
2. **Software Installation/Backup Device:** A cartridge tape subsystem or magnetic tape unit (see pages 141-142).

Other Items

Interfacing: See pages 122-124.

Terminals: See pages 127-135.

Disks: See pages 136-140.

Cartridge Tape Subsystems and Magnetic Tape Units: See pages 141-142.

Printers: See pages 143-146.

Plotters: See pages 147-152.

Communications: See pages 153-158.

Data Base Management: See pages 159-160.

Application Development: See pages 161-163.

MS-DOS Support: See pages 164-166.

Rack Mounting: See pages 167-169.

Series 800 Interfacing

The Interfaces

HP 9000 Model 825 and 835 Superworkstations use CIO interfaces for most applications. They also use CTB interfaces for graphics connection to display controllers and for SNA communication with IBM and plug-compatible systems or for communication with X.25 packet switching networks. Table 13, below, lists the available interfaces by CIO or CTB and their category of use.

In superworkstations, the CTB interfaces actually occupy the width of both a CTB slot and the adjacent CIO slot, which is made possible by removable center guide slots, as shown in Figures 74, 76, 79, 80, and 82. With its

piggybacked SBX module, the 28667A RTI interface is too thick to fit into a single CIO slot, so Table 13 provides an interface card size column that indicates how many slots each interface occupies.

Multi-Device Interface Connections

Multiple devices connect to the HP 27110B HP-IB interface, HP 27111A HP-FL interface, and the HP 98196A 6-Channel Multiplexer as shown in Figures 83 through 85 on the next page.

HP-IB represents the full name "Hewlett-Packard Interface Bus", which is Hewlett-Packard's im-

plementation of IEEE Standard 488-1978 and the equivalent IEC 625-1 and ANSI MC1.1 standards. The HP-IB interface connects to multiple devices via a bus cable whose connection should daisy-chain from one device to the next, as illustrated in Figure 83.

HP-FL represents the full name "Hewlett-Packard Fiber Link", which is a fiber optic connection to as many as eight HP-FL discs, as shown in Figure 84.

Multiple devices connect to the multiplexer via its 6-connector panel, as shown in Figure 85.

Table 13. HP 9000 Series 800 Input/Output Interfaces

Category	Product Number and Name	Use	Interface Card Size
CIO Multi-device	HP 27110B HP-IB Interface	Interfacing discs, cartridge tape subsystems, magnetic tape units, printers, plotters, and other HP-IB devices to the system.	One CIO slot
	HP 27111A HP-FL Interface	Interfacing HP-FL discs (up to 8 discs per interface).	One CIO slot
	HP 98196A 6-Channel Multiplexer	Interfacing terminals, printers, plotters, and other serial devices to the system.	One CIO slot
CIO System-to-System Comm.	HP 91786B LAN/9000 Series 825 Link Interface	Communication with other HP and non-HP systems via IEEE 802.3 Local Area Network connection.	One CIO slot
CIO Real-Time Interface	HP 28667A Real-Time Interface	Via HP 28672A 8-channel Serial SBX module or other SBX Module, connects system to real-time processes that require faster real-time response than the host system can routinely provide.	Two CIO slots
Other CIO Interfaces	HP 27114A Parallel Asynchronous FIFO Interface	Interfacing 8 or 16-bit data buses to the system.	One CIO slot
CTB Graphics Interfaces	HP A1017A Display Controller Interface	Interfacing graphics display controllers to the system. (Not usable in same system with A1047A interface.)	One CTB+ CIO slot
	HP A1047A Graphics Animation Interface	Interfacing TurboSRX display controller to Model 835. (Not usable in same system with A1017A interface.)	One CTB+ CIO slot
CTB Interface to IBM System	HP 98191A or 98193A HP-UX SNA Link Interface	Interfacing standalone or gateway system to SNA Link to IBM or plug-compatible system.	One CTB+ CIO slot
CTB Interface to X.25 Network	HP 36940A X.25/800 Link Interface for Model 825/835	Communication via private or public X.25 Packet Switching Network.	One CTB+ CIO Slot

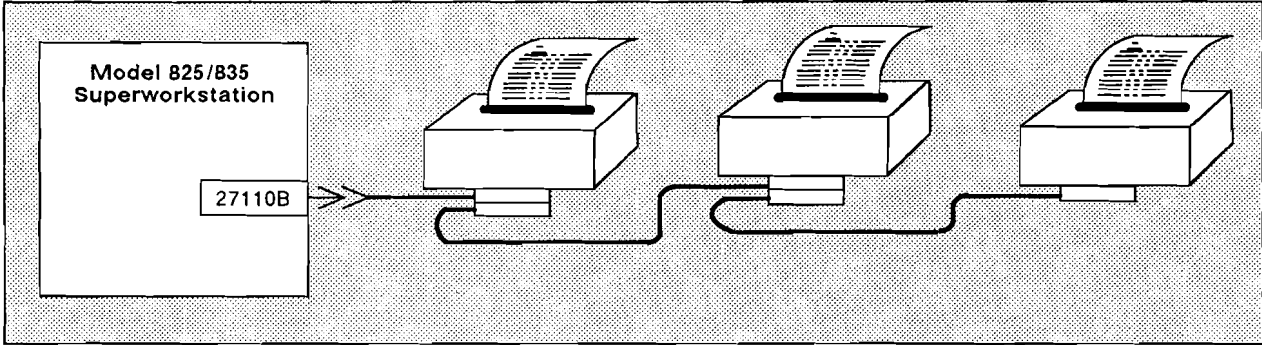


Figure 83. HP-IB Device Connections via 27110B HP-IB Interface

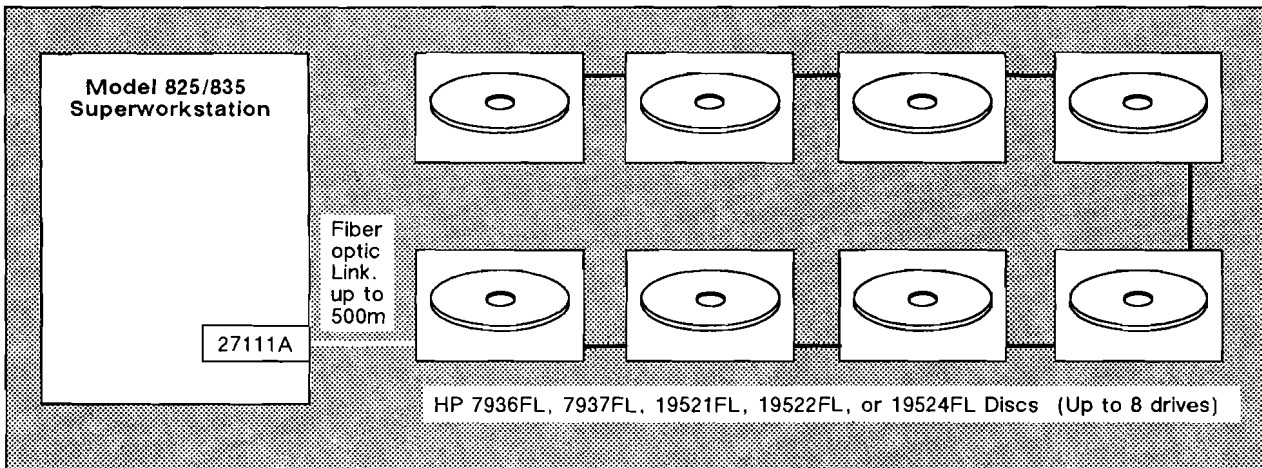


Figure 84. HP-FL Connections to Discs via 27111A HP-FL Interface

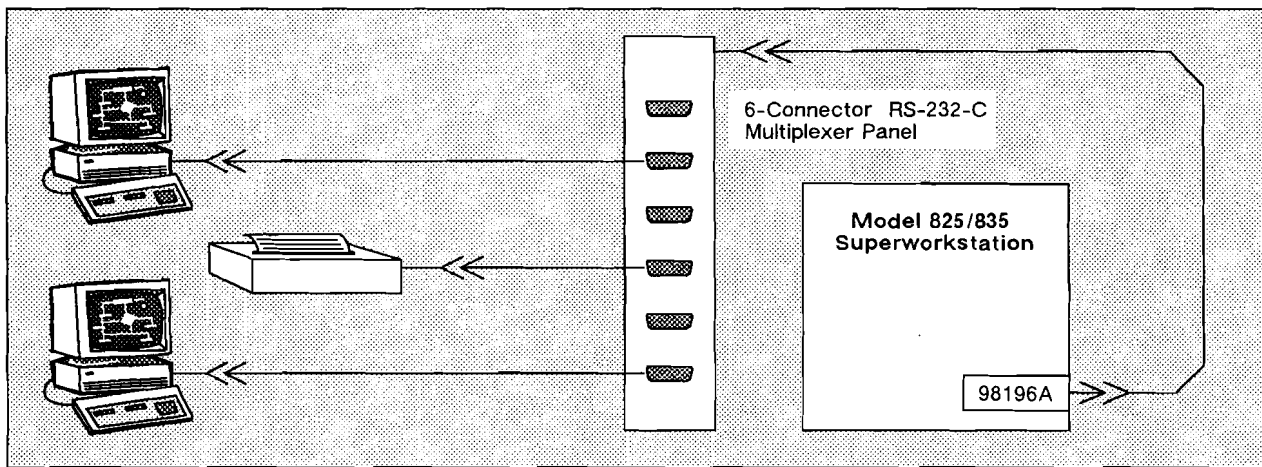


Figure 85. RS-232-C Device Connections via 98196A 6-Channel Multiplexer

Series 800 Interfacing, continued

HP-IB Cables

HP-IB cables for connection of HP-IB devices may have to be purchased separately. The following cables are available:

Product Number	Length	Comments
10834A	0.0m	Stand-off for recessed conn.
92220R	0.3m	Right-angle conn. on one end.
10833D	0.5m	
10833A 82977A	1.0m 1.0m	Right-angle conn. on one end.
10833B 82977B	2.0m 2.0m	Right-angle conn. on one end.
10833C	4.0m	
8120-3448 8120-3449	6.0m 8.0m	Check device loads before using

The cables with right-angle connectors on one end are recommended for use with stacked 325 mm wide *Design-Plus* components.

The maximum cable length allowed depends on the interface used and several attributes of the devices connected to the interface.

1. When only standard speed devices are used, the total HP-IB cabling on a standard speed interface is limited to 2 meters per standard device load or 20 meters total, whichever is less.
2. When any high-speed device or interface is used, the total HP-IB cabling is limited to 1 meter per device load or 15 meters total, whichever is less.
3. The cable length between any two devices (or the interface and first device) may be any length, as long as the total length does not exceed that specified by rule 1 or 2, as appropriate.

4. The recommended topology for HP-IB cabling is a single run of multi-drop (daisy-chained) segments, and not a star configuration.

HP-IB Speed Modes

Standard speed permits a maximum rate of approximately 500 KB/sec (300 KB/sec, maximum, in Series 300). Most Hewlett-Packard HP-IB devices, particularly instruments, are compatible with standard speed. Standard speed devices often operate at much less than the maximum transfer rate.

High speed permits a maximum rate of 1.2 MB/sec. Most Hewlett-Packard HP-IB peripherals, particularly disks, cartridge tape subsystems, and magnetic tape units are compatible with high speed mode. Some of those require high speed mode.

HP-IB Device Connection Recommendations

For connections to Model 825/ 835 Superworkstations, use:

1. A 27110B set to high speed to connect HP 793xH, 795xA/B, and 796xA Disks and 35401A or 914xA Cartridge Tape Subsystems*, up to four per interface.
2. A separate 27110B set to high speed to connect HP 7979A, 7980A, and 7980XC magnetic tape units, up to four per interface.
3. A separate 27110B set to standard speed to connect printers, up to four per interface.
4. A separate 27110B set to standard speed to connect plotters, up to four per interface.
5. A separate 27110B set to standard speed to connect instruments, up to eight per interface.

* For best performance, use separate HP-IB interfaces for disks and cartridge tape subsystems.

HP-IB Extension

HP 37204A or 37201A HP-IB Extenders can be used to exceed the total cable limit on standard speed HP-IB connection. These units translate all local bus traffic and, with high data integrity, exchange it with one or more remote buses served by another extender. Each adds one external device load to the local bus.

Extender Feature	37204A	37201A
Topology	Multi-drop	Point-to-point
Interconnect via	Simplex coax or duplex fiber optic cable	Dual twisted pair or RS-232C
Max Length - ext-to-ext	1.2 km	1 km/unlimited* not appl.
- total ext.	31 km	
Max transfer rate	60 KB/sec	775 bytes/second
Prog?	No(transp)	Yes
Ext Bus Addr	None	1
Pass Control Transparent?	Yes	No
PPOLL Transparent?	Yes†	No

* RS-232C connection length is unlimited, via appropriate cables, repeaters, modems, etc.

† Use of 37204A Extenders introduces a 0.025 to 1 ms propagation delay. The HP-UX Device I/O Library sets a PPOLL sense delay timeout of 0.1 ms.

More than one extender can be connected to each local (computer hosted) bus. Each remote bus is essentially a new bus for device-load purposes, but not for address purposes.

Superworkstation Backplane/Interface Use Records

Superworkstation Backplane Use Record

Please make a copy of this page and the next page and use the copies to keep track of your Superworkstation configuration as you select it. Enter CIO or CTB cards by product number in the appropriate SPU or expander card cage as items are selected. Identify multiple multiplexer interfaces as 98196A-1, -2, etc., HP-IB interfaces as 27110B-D1, -M1, PR1, etc., and HP-FL interfaces as 27111A-D1, -D2, etc. for keying with the interface use records on the next page.

Part of the division between CIO slots and CTB slots in the diagram below is shaded to indicate that the center guide slots can be removed to install CTB interfaces, such as the A1017A Display Controller Interface or the (98191A or 98193A) HP-UX SNALink interface, which occupy

the full width of adjacent CTB and CIO slots. Interfaces in affected CIO slots have to move up to make room for CTB interfaces.

Note that connection of an A1013A CIO Expander to a Model 825CHX or SRX Superworkstation requires the installation of a CIO Channel Adapter in the CTB (and CIO) slot immediately above the Display Controller Interface Card.

As you determine the need and add memory or CIO interfaces, enter the respective product numbers into the card cage record. Remember that the HP 28667A Real-Time Interface requires two adjacent CIO slots.

The Interface Use Records

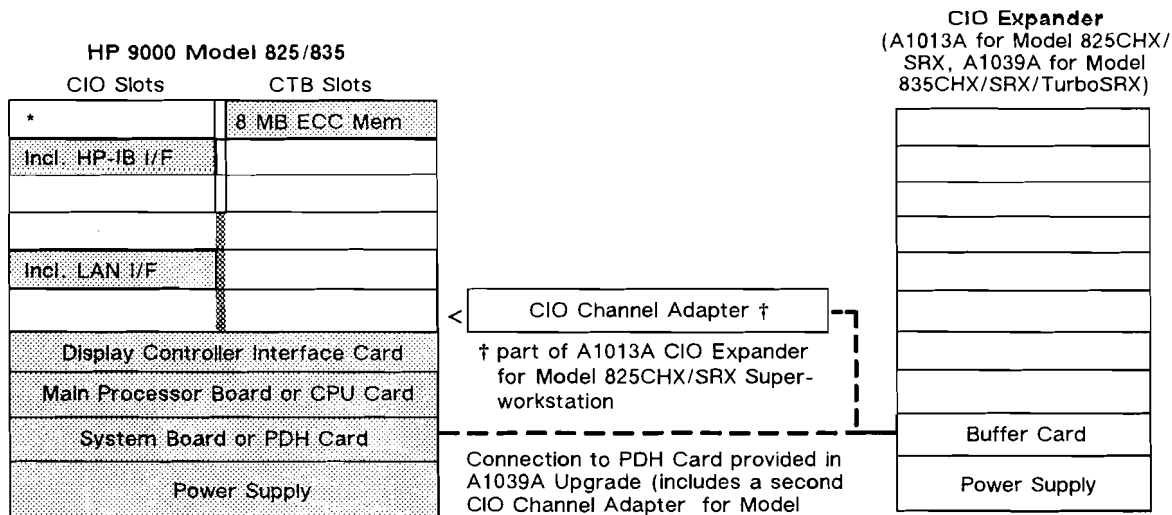
On the next page are Multiplexer, HP-IB, and HP-FL Inter-

face Use records. Into these records, enter the product numbers of the various terminals, printers, and plotters, and the cables used to connect them via 98196A 6-channel Multiplexer Interfaces. Similarly, enter the product numbers of the discs, cartridge tape subsystems, magnetic tape units, printers, plotters, etc. into the record sections for 27110B HP-IB interfaces or the discs into the records for the 27111A HP-FL interfaces. An 27110B HP-IB interface dedicated to disc connections is designated D1, one dedicated to magnetic tape connections is designated M1, and one dedicated to printer connections is designated PR1. One 27110B HP-IB disk interface is standard, and indicated as such in the record. These various record sections provide a graphic means of keeping track of device interfacing capacity as it is used for the configuration.



MODEL 825 AND 835 SUPERWORKSTATION BACKPLANE USE RECORD

Enter memory and I/O Cards by product number in the appropriate backplane for your system as items are selected in later sections of this guide. Identify multiplexer interfaces as 98196A-1, -2, etc., HP-IB interfaces as 27110B-D1, -M1, -PR1, etc., and HP-FL interfaces as 27111A-D1, -D2 for keying with the use records on the next page.



* This slot is reserved for the Access Port if used; can be used for other interface if not used for the Access Port.

† part of A1013A CIO Expander for Model 825CHX/SRX Superworkstation
 Connection to PDH Card provided in A1039A Upgrade (includes a second CIO Channel Adapter for Model 835CHX/SRX/TurboSRX Superworkstation)

Superworkstation Backplane/Interface Use Records, continued

MULTIPLEXER, HP-IB, AND HP-FL INTERFACE USE RECORD

As each multiplexer, HP-IB, and/or HP-FL interface is selected for the configuration, place a check by its title and enter the product numbers of each of the devices it interfaces and the cable used for connection of that device. (Device and cable product numbers are given in later sections of this guide.) In this way you will be able to continuously keep track of how many more devices can be connected by the multiplexers, HP-IB, and HP-FL interfaces you've selected, and thereby determine if and when you have to select the next interface. If necessary to accommodate all interfaces of a particular type, make additional copies of this record page.

98196A Multiplexer No. 1

Device P/N	Cable P/N

98196A Multiplexer No. 2

Device P/N	Cable P/N

98196A Multiplexer No. 3

Device P/N	Cable P/N

27110B HP-IB Interface No. D1 for Discs and CTUs (Std)

Device P/N	Cable P/N
	Included with I/F

27110B HP-IB Interface No. D2 for Discs and CTUs

Device P/N	Cable P/N
	Included with I/F

27110B HP-IB Interface No. M1 for Magnetic Tape Units

Device P/N	Cable P/N
	Included with I/F

27110B HP-IB Interface No. PR1 for Printers

Device P/N	Cable P/N
	Included with I/F

27110B HP-IB Interface No. PR2 for Printers

Device P/N	Cable P/N
	Included with I/F

27110B HP-IB Interface No. PL1 for Plotters

Device P/N	Cable P/N
	Included with I/F

27110B HP-IB Interface No. G1 for General HP-IB Devices

Device P/N	Cable P/N
	Included with I/F

27110B HP-IB Interface No. G2 for General HP-IB Devices

Device P/N	Cable P/N
	Included with I/F

27110B HP-IB Interface No. G3 for General HP-IB Devices

Device P/N	Cable P/N
	Included with I/F

27111A HP-FL Interface No. D1

Device P/N	Cable P/N

27111A HP-FL Interface No. D2

Device P/N	Cable P/N

NOTE: HP 27111A HP-FL interfaces can connect up to eight discs when they are selected as the 19524FL 4 GB package, which contains all eight drives in a single, tall cabinet. Otherwise, the maximum number of discs supported per 27111A interface is six.

User Communications

User Communications Components

HP 9000 Series 300 systems and workstations and HP 9000 Model 825/835 Superworkstations can use the following components for user communication:

- Workstation Display Subsystem (see Table 14) and HP-HIL Keyboard (see Figure 86), below, and Figure 87 (next page).
- Display Terminals and PCs (see Table 15, page 130, and Figures 88 and 89, pages 131 and 132).
- HP-HIL Devices (see Table 16, page 133, and Figure 90, page 134).
- Bar Code Readers (see Table 17 and Figure 91, page 135).

Table 14. Workstation Display Subsystems

Monitor P/N Size/Type Resolution	35731A 12" Mono 512 by 400	35741A 12" Color 512 by 400	98751A 19" Color 1024 by 768	98752A 19" Color 1280 by 1024	98785A 16" Color 1024 by 768	98786A 17" Mono 1024 by 768	98788A 19" Mono 1280 by 1024	98789A 16" Color 1280 by 1024
Series 300 Video and Display Controller (Local Graphics Bus) Interfaces	332MMA, built-in	98543A, CMA	340C+, built-in	340CH, built-in	340C+, built-in	340M, built-in	340MH, built-in	340CH, built-in
	98542A, MMA	----- -----	98549A, C+	98550A, CH/CHX/ AIC	98549A, C+	98544B, MMAX	98548A, MH/AIM	340SRX, built-in
	98546A, Compat- ibility	----- -----	98547A, C	98725A & 98720A, SRX	98547A, C	----- -----	----- -----	98725A & 98720A, SRX
	----- -----	----- -----	----- -----	98726A & 98730A, TurboSRX	----- -----	----- -----	----- -----	98726A & 98730A, TurboSRX
Series 800 Display Controller Interfaces	----- -----	----- -----	----- -----	A1017A & A1020H, CHX	----- -----	----- -----	----- -----	A1017A & A1020H, CHX
	----- -----	----- -----	----- -----	A1017A & 98720A, SRX	----- -----	----- -----	----- -----	----- -----
	----- -----	----- -----	----- -----	A1017A & 98730A, TurboSRX	----- -----	----- -----	----- -----	----- -----

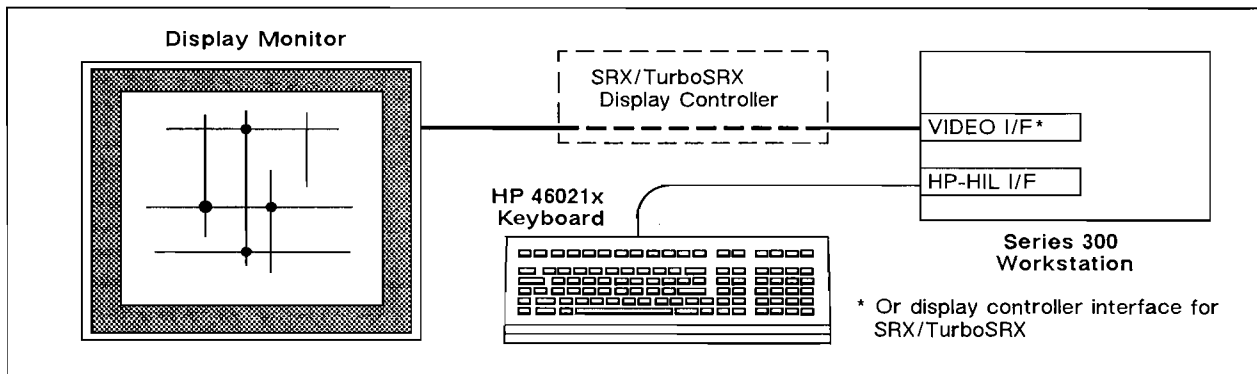


Figure 86. Display Monitor and Keyboard Connections to Series 300 Workstations

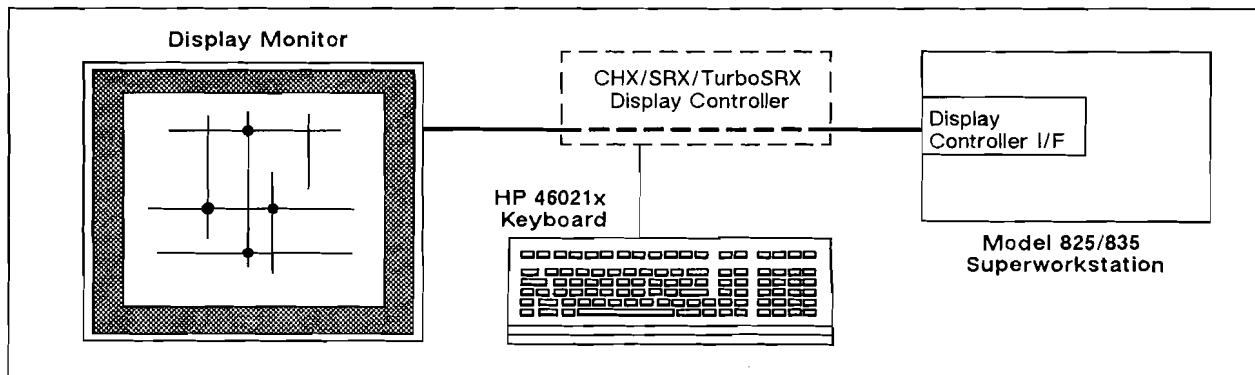


Figure 87. Display Monitor and Keyboard Connections to Model 825/835 Superworkstations

System Console

In Series 300 Systems

Series 300 operating systems normally require a system console to initiate boot-up, receive system commands, and display serious error messages. On all models, this function may be served by a keyboard connected to the built-in HP-HIL interface and any supported built-in or plug-in alpha color or monochrome video display monitor. In HP-UX, a terminal may be used as the system console.

HP BASIC/WS Console. There may be none or one alpha console in BASIC/WS. The default console is the first found of:

- Plug-in bit-mapped display (CRTB binary is loaded and switch-configurable card is set to internal address space).
- 98546A compatibility video interface (if interface is present and CRTA binary is loaded).
- Plug-in bit-mapped display (CRTB binary is loaded and switch-configurable card is set to external address space).

The default graphics "CRT" device is the same as the alpha device if the alpha display has graphics capability. If the alpha display is the 98546A with its

graphics card removed, the default graphics is chosen as above.

Output is possible from only one display at a time. The alpha content of the prior alpha display is lost when switching. Display color maps are reset to their defaults when switching graphics displays (with PLOTTER IS), and the next display is erased if GINIT has been performed since the next display was last addressed. HP BASIC/WS can switch between the default bit-mapped display and the 98546A interface with a CONTROL statement.

HP-UX Console. There must be one alpha console in HP-UX and there may be additional terminals. The default alpha console is the first-found of:

- A built-in, 98626A, 98628A, 98642A (port 1), or 98644A RS-232C serial interface with the "remote" switch/jumper on/installed. If more than one is present, the one with the lowest select code is used.
- "Internal" bit-mapped display. Plug-in video interfaces set to "external" addresses are always ignored.
- 98546A compatibility video interface (if present).

- A built-in, 98626A, 98628A, 98642A (port 1), or 98644A RS-232C serial interface with the "remote" switch/jumper off/not installed. If more than one is present, the one with the lowest select code is used.

A terminal is presumed to be connected to the selected interface. The default configuration is 9600 bps, 8 bits/char, no parity, 1 stop bit, Xon/Xoff flow control. This may be changed by editing */etc/inittab* after HP-UX installation.

The system console in HP-UX is used for displaying boot ROM messages and for entering commands during system installation. After HP-UX is installed and running, it uses the console only when in the single-user state or for displaying certain serious error messages; it otherwise functions as an ordinary user terminal.

The Series 300 boot ROM, HP-UX install process and several system administration tools assume that a 24 line x 80 character HP *term0* command set compatible device is being used as the console. For a terminals-only HP-UX system, the lowest-priced supported console is the 700/92 (product number C1001A/G/W).

There is no supported method for enabling an ignored (non-console) 98546A as an alpha device. Both *Starbase* and DGL can address any installed graphics display.

If a plug-in video interface is designated the console, a kernel process known as the ITE (Internal Terminal Emulator) is attached to it. The ITE provides a sufficient subset of *term0* simulation on any supported bit-mapped or 98546A memory-mapped video interface.

Only one copy of the ITE process can be active, although HP Windows and the X-Window System may be dispatched to multiple bit-mapped displays. Only one HP-HIL interface is available on Series 300 systems.

Pascal/WS Console. There may be none or one alpha console in Pascal/WS. The console is chosen according to the ordering of the display modules in "INIT_LIB" (user specified). There is no supported method for switching alpha displays after system start-up.

"External" bit-mapped displays are never chosen. The use of the 98627A as an alpha display interface is not supported by HP.

Graphics output may be sent to one display at a time. Display color maps are reset to their defaults when switching graphics displays, but the next display contents are preserved if the DISPLAY_INIT has control bit 7 set to 1.

In Series 800 Superworkstations

The system console function in Model 825/835 Superworkstations may be provided by:

- Keyboard connected to the HP-HIL interface of the display controller and the Superworkstation's bit-mapped display. OR

- HP C1001A/G/W (700/92) Terminal or HP 2392A Option S12 Terminal (discontinued), connected to the system via port 1 of the 98196A Multiplexer Interface.

Display Terminal Interfacing

Via RS-232C Interfaces

Series 300 SPUs and Workstations and Model 825 and 835 Superworkstations connect to display terminals and PCs via RS-232C interfaces as shown in Figure 88, page 131, and cables as summarized in Table 15, next page. The Series 300 system console can connect to any of the single-port RS-232C interfaces, but must connect to Port 0 of the 98642A four-port multiplexer. A display terminal used as system console in a Model 825 or 835 Superworkstation uses one of the six multiplexer ports and the optional access port uses another. No single-port RS-232C interface is available for Model 825 or 835 Superworkstations.

Via 8-Port Terminal Server

Terminals can also connect to Series 300 SPUs and Workstations and Model 825 or 835 Superworkstations via an HP 2342A HP LAN 8-Port Terminal Server, as shown in Figure 89, page 132, and summarized in the last column of Table 15, next page.

Customers who already have ThinLAN or ThickLAN cabling installed can use those existing cables to expedite connection to clusters of terminals at remote locations, saving the implementation time and costs of running new cables from multiplexers to the terminals. Moreover, the terminals can be located at a greater distance from the system than if they were directly-

connected via a multiplexer. The system connects to the LAN via LAN/9000 Series 300/800 Link (the interface card and lower level LAN software).

Connection via the LAN terminal server affords great flexibility of use of the LAN-connected terminals. Up to 24 sessions (3 per port) are supported by the Terminal Server. Asynchronous devices connected to the Terminal Server can access any system on the LAN that either implements the industry-standard ARPA Telenet-TCP/IP Ethernet protocol, or uses RS-232C multiplexer accessed via "back-to-back" connection using a second multiplexer-connected 2342A terminal server. For information on "back-to-back" connection (required for HP 1000 systems or HP 3000 MPE-V systems), see the 2342A data sheet in the HP AdvanceNet Specification Guide, 5956-4144, or a later revision. This "host switching" affords a very wide access to applications running on different systems on the same LAN. From the Series 300 SPU or Workstation or the Model 825/835 Superworkstation, the same LAN card can support access to terminals and to other systems on the LAN.

In addition to the server, the LAN terminal server connection requires a Vectra ES or ES/12 PC with HP 2350A LSM Installation Kit. The Vectra PC and the LSM installation kit together function as a Local Server Manager that downloads software to the terminal servers during initial start-up, and also in the event of restart after a power failure. The Local Server Manager can support multiple HP 2342A LAN terminal servers and can also perform other functions provided they do not involve use of interfaces other than that needed to use the HP 2350A LSM Installation Kit.

User Communications,
continued

Table 15. Display Terminals and PCs Supported for User Communication in Series 300 (HP-UX based) and Model 825/835 Superworkstations

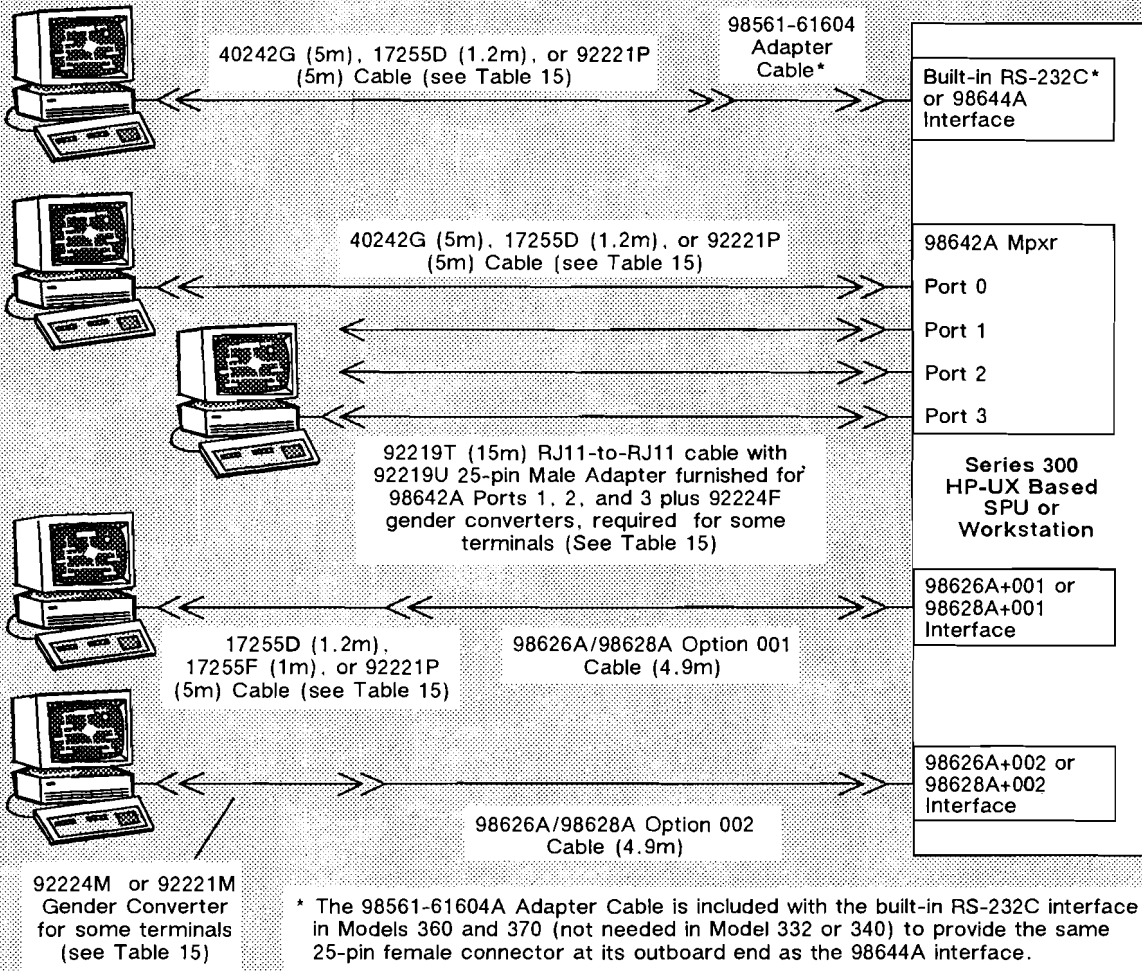
Product No.	Name or Description	Command Set	Console Sup.	Cable Required for Connection From:					
				Series 300				Series 800	Series 300/800
				Built-in, 98642A Port 0, 98644A	98626A/98628A Opt 001	98626A/98628A Opt 002	98642A Ports 1, 2, and 3	98196A Ports	2342A Term Server Ports
C1001A/G/W†	700/92 Alpha	<i>term0</i>	Yes	40242G	17255D	92224M	Cbl. Incl.	40242M	40242Y
C1002A/G/W†	700/94 Alpha	<i>term0</i>	S300 only	40242G	17255D	92224M	Cable Included	40242M	40242Y
C1003A/G†	700/41 Alpha	WYSE30	No	40242G	17255D	92224M	Cbl. Incl.	40242Y	40242Y
C1004A/G/W†	700/22 Alpha	VT100	No	17255D	17255F	Cable Included	92224F	40242M+92224F	40242Y+92224F
C1006A/G/W†	700/43 Alpha	WYSE30	No	40242G	17255D	92224M	Cbl. Incl.	40242M	40242Y
C1007A/G/W†	700/44 Alpha	VT100	No	17255D	17255F	Cable Included	92224F	40242M+92224F	40242Y+92224F
2392A°	Alpha	<i>term0</i>	Yes‡	40242G	17255D	92224M	Cbl. Incl.	40242M	40242Y
2393A	Mono Graphics	<i>term0</i>	S300 only	40242G	17255D	92224M	Cable Included	40242M	40242Y
2397A	Color Graphics	<i>term0</i>	S300 only	40242G	17255D	92224M	Cbl. Incl.	40242M	40242Y
45711A°-D°	HP <i>Portable Plus</i>	<i>term0</i>	Unsup	92221P	92221P+92224F	92221M	92221M+92224F	92221M	Not Spec'd
45711E/F	HP <i>Portable Plus</i>	<i>term0</i>	Unsup	92221P	92221P+92224F	92221M	92221M+92224F	92221M	Not Spec'd
9666A	Industrial 2397A	<i>term0</i>	S300 only	40242G	17255D	92224M	Cable Included	40242M	40242Y

† C100x suffix letters A/G/W, respectively identify display color as Amber/Green/White background.

° Discontinued product, listed here for reference.

‡ 2392A requires option S12 to function as system console for Model 825/835 Superworkstation.

CONNECTIONS TO SERIES 300 SPU_s AND WORKSTATIONS



CONNECTIONS TO MODEL 825/835 SUPERWORKSTATIONS

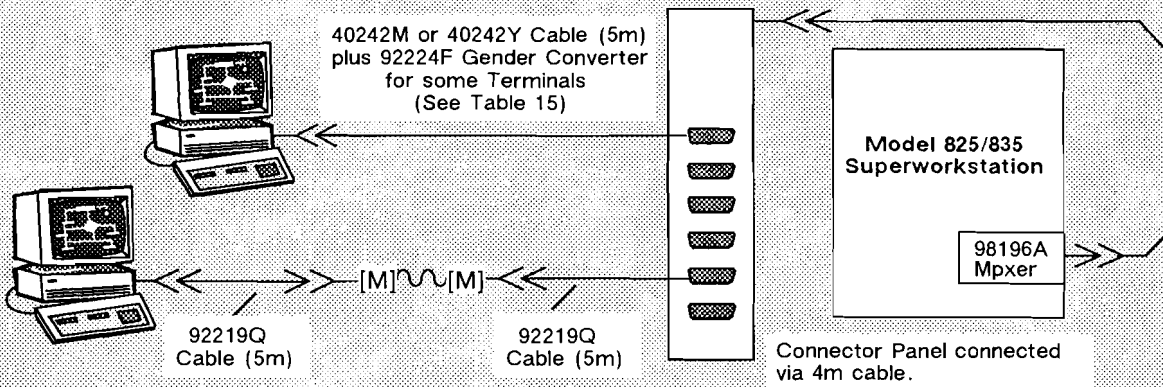


Figure 88. Display Terminal RS-232C Connections to Series 300 SPU_s and Workstations and Model 825/835 Superworkstations

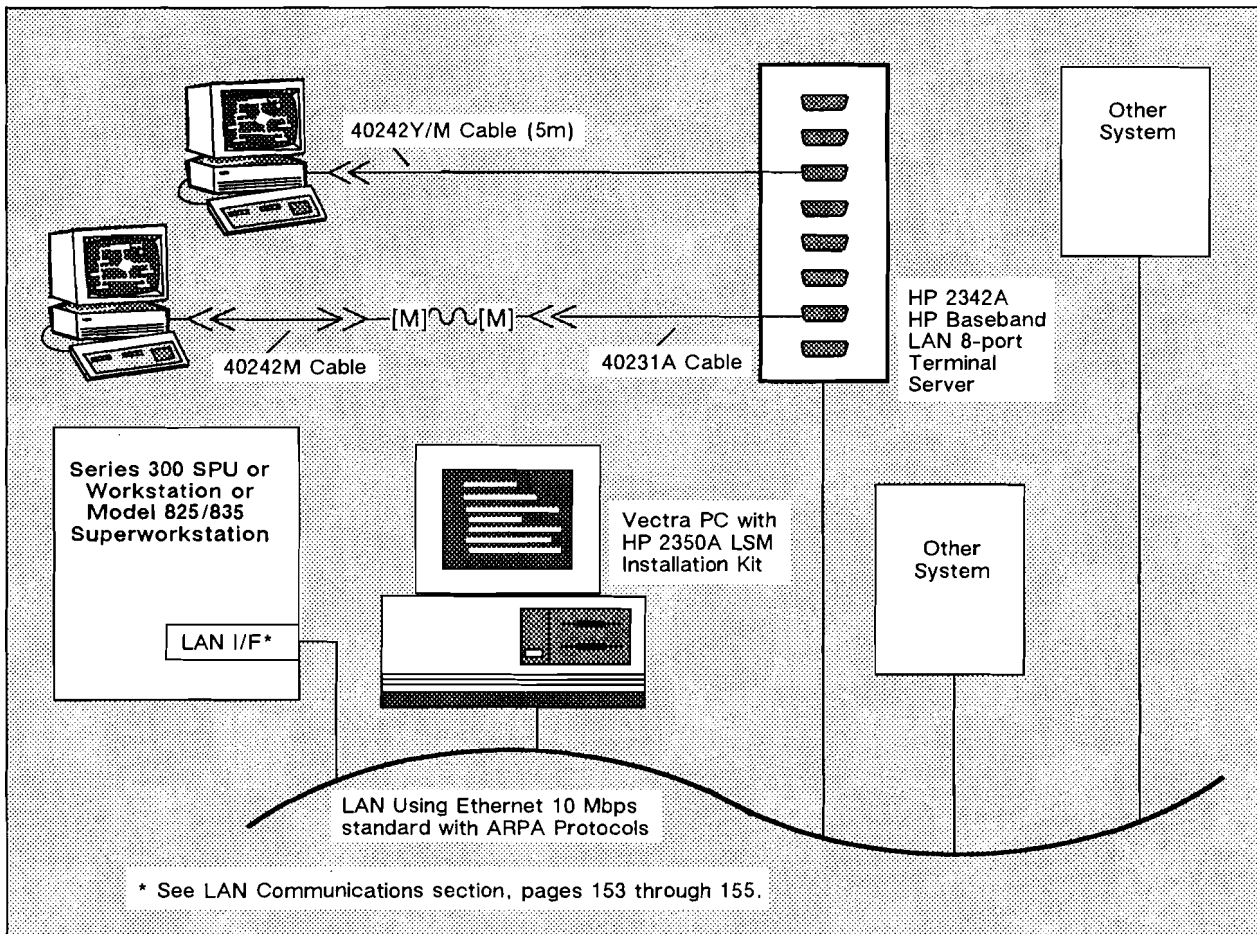


Figure 89. Display Terminal Connections to Series 300 SPU or Workstation or Model 825/835 Superworkstation via LAN 8-Port Terminal Server

HP-HIL Interfacing

The Hewlett-Packard Human Interface Link (HP-HIL) is a proprietary 4-wire serial link for connecting input devices (see Table 16, at right, for a list of HP-HIL devices) to a wide variety of HP computers and peripherals.

All Series 300 computers include a built-in HP-HIL host interface as do the display controllers of Model 825 and 835 Superworkstations. Most HP-HIL devices have a "towards host" (●) and an "away from host" (●●) female connector. Using appropriately keyed and coded HP-HIL cables, which are available in various lengths, multiple HP-HIL devices are daisy-chained from the single host interface. See Figure 90 connection example on next page.

HP-HIL devices may be used with:

- The built-in HP-HIL interface of a Series 300 mainframe or a Model 825 or 835 Superworkstation Display Controller.
- The HP-HIL interface of a 2393A or 2397A Terminal (HP-UX only).

The HP-HIL port of 98700H (CX), 98720A (SRX), and 98730A (TurboSRX) Display Controllers is not supported by any Series 300 operating system.

All Series 300 SPUs and bundles include an 0.8-3m coiled HP-HIL cable. The bundles also include a 46021x keyboard and may include a 46060A 2-button mouse, a 46081A HP-HIL Extension, and a 46084A ID Module.

Table 16. HP-HIL Devices for Series 300 and Series 800 Workstations

Product Number	Name/Description	Cable Incl.	Addr. Used.	Power (mA)†
Keyboards				
46021x	Keyboard (46021A through 46021AZ; see page 13 for list of national versions)	None	1	106
Graphics Pointing/Picking Devices				
M1309A*	3-button trackball	0.8-3m	1	100
35723A	HP-Touch bezel for 357x1A Monitor	0.7m	1	200
46060A*	2-button HP Mouse	1.4m	1	200
46060B*	3-button HP Mouse	1.4m	1	200
46094A	Quadrature Port	0.5m	1	200
46095A	3-button HP Mouse Interfacing to 46094A Quadrature Port	1.2m	None	80
46083A	Rotary Control Knob	0.4m	1	100
46085A	Control Dials Box (for 3-axis control of displayed objects)	0.4m	3	320
46086A	Button Box	0.8-3m	1	60
Digitizers and Tablets				
45911A	1-button 11 x 11 inch Tablet	0.8-3m	1	150
46087B	3-button A-Size Digitizer	0.8-3m	1	200
46088B	3-button B-Size Digitizer	0.8-3m	1	200
46089B	4-button cursor for 46087B/46088B	Incl.	None	None
Bar Code Reader				
92916A	Bar Code Reader	0.5m	None	200
Software Security Device				
46084A	ID Module	0.4m	1	60
HP-HIL Extensions and Cables				
46080A	HP-HIL Extension, no audio	2.4m	None	25
46081A	HP-HIL Extension, with audio	2.4m	None	25
46082A	HP-HIL 15m Extension and RGB 0.5m coax cable extension with audio Deletes module-module & RGB cables Deletes RGB cables	15m & 0.5m	None	40
Opt 015 Opt 343				
46082B	HP-HIL 30m Extension and RGB 0.5m coax cable extension with audio	30m & 0.5m	None	40
46080-61601	2.4m, flat, male-male cable	2.4m	None	n/a
46083-61601	0.4m, flat, male-male cable	0.4m	None	n/a
46020-60001	0.8m to 3.0m, coiled, male-male cable	0.8 - 3.0m	None	n/a

† HP-HIL interface can supply up to 1000 mA.

* Only one device from this set of devices may be used on a single HP-HIL interface because none of them provide a "downstream" connector for additional devices.

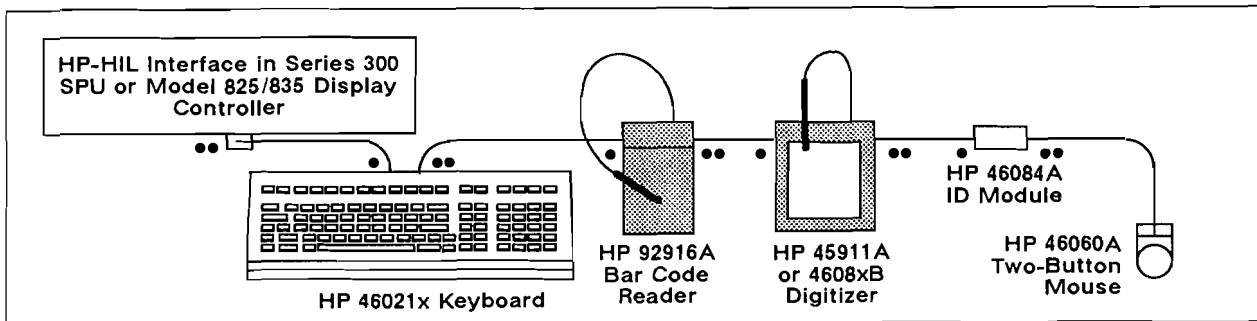


Figure 90. HP-HIL Connection Example

The following limitations apply to HP-HIL configurations:

- The total number of addressable devices must be seven (7) or less. Most devices use one address, except for extensions, which have no address, and the 46085A Control Dial Module, which has three addresses. See Table 16 for device addressing.
- The maximum cabling has “per-device” and “total length” limits. The first is 2.4m per device (other than 46082A/B remote extensions). The total length limit is 21m (48.6m if a 46082A/B remote extension is used). Multiple 46080A/46081A extensions or a *single* 46082A/B remote extension may be used.
- The total power used by all devices on the HP-HIL must be 12 watts or less (1000 mA at 12Vdc). The current used by the various HP-HIL devices is listed in Table 14 on the previous page. Series 300 mainframes have ample power for all configurations of up to three devices, and all configurations of up to seven devices that do not include the 46085A Control Dial Box.
- A device, such as a 46060A/B mouse, that has only one HP-HIL connection, must be the last device on the link. If both a M1309A Trackball and a mouse are required, specify the 46095A quadrature mouse and 46094A quadrature adapter, which has both HP-HIL connectors.
- It is possible to have more than one of the same device on the link. With respect to keyboards, the operating system establishes its single internal key-location-to-character code conversion table based on the language ID of the first keyboard-type device encountered. An application using a 92916A bar code reader, which emulates a keyboard, should have the reader configured “downstream” of the keyboard, as shown in Figure 90, above. An application, such as text translation, that uses two different keyboards must perform a secondary conversion on characters sent from the second keyboard.
- HP-HIL devices auto-configure their addresses based on their position on the link. When directly addressing an HP-HIL device in HP-UX, you must not remove any but the last device from the link, or the */dev* special files will no longer correctly designate the desired devices downstream from the removed device.

Bar Code Reader Input

The time and error potential in the entry of routine data can be minimized by using bar coded labels, tags, badges, or cards. Information as diverse as product part or stock numbers or patient identification numbers for hospital records can be imprinted in an appropriate bar code. Thereafter, the single sweep of a wand can scan and enter the encoded data in about one-third of the time required for keystroked entry by a skilled operator, and with monotonous accuracy.

HP 39800A and 39801A Bar code readers can be interfaced to Series 300 SPUs and Workstations and Model 825 or 835 Superworkstations as summarized in Table 17 and Figure 91, next page. However, it is important to realize that the user must develop programs to support data entry via 39800A or 39801A Bar Code Readers, since no device driver is provided for them in any Series 300 or Series 800 operating system.

The HP-HIL connected HP 92916A Bar Code Reader emulates the terminal keyboard in that the bar coded characters it reads are sent to the display and the computer as if they had been keystroked. If programmability is not required, the 92916A offers

the most economical bar code data entry solution. The 92916A Bar Code Reader connects via HP-HIL as shown in Figure 90 on the previous page.

Bar code printing is optional on the HP 2563B, 2564B, 2566B, and 2567B Line Printers and standard on the 2934A Printer. A font cartridge (92286WI) is also available for printing bar codes on HP 33440A/D LaserJet Series II printers.

Table 17. Bar Code Readers Supported by Series 300 SPUs and Workstations and Model 825 and 835 Superworkstations

BAR CODE READER	BAR CODES SUPPORTED	INTERFACING METHOD
39800A Programmable 39801A Non-programmable	3 of 9 and Interleaved 2 of 5 standard and Industrial 2 of 5, Codabar optional, and UPC/EAN/JAN optional	RS-232C (see Figure 91, below)
92916A	3 of 9, Interleaved 2 of 5, Codabar, and UPC/EAN/JAN	Connects to HP-HIL port on terminal keyboard using supplied cable (see Figure 90, page 134).

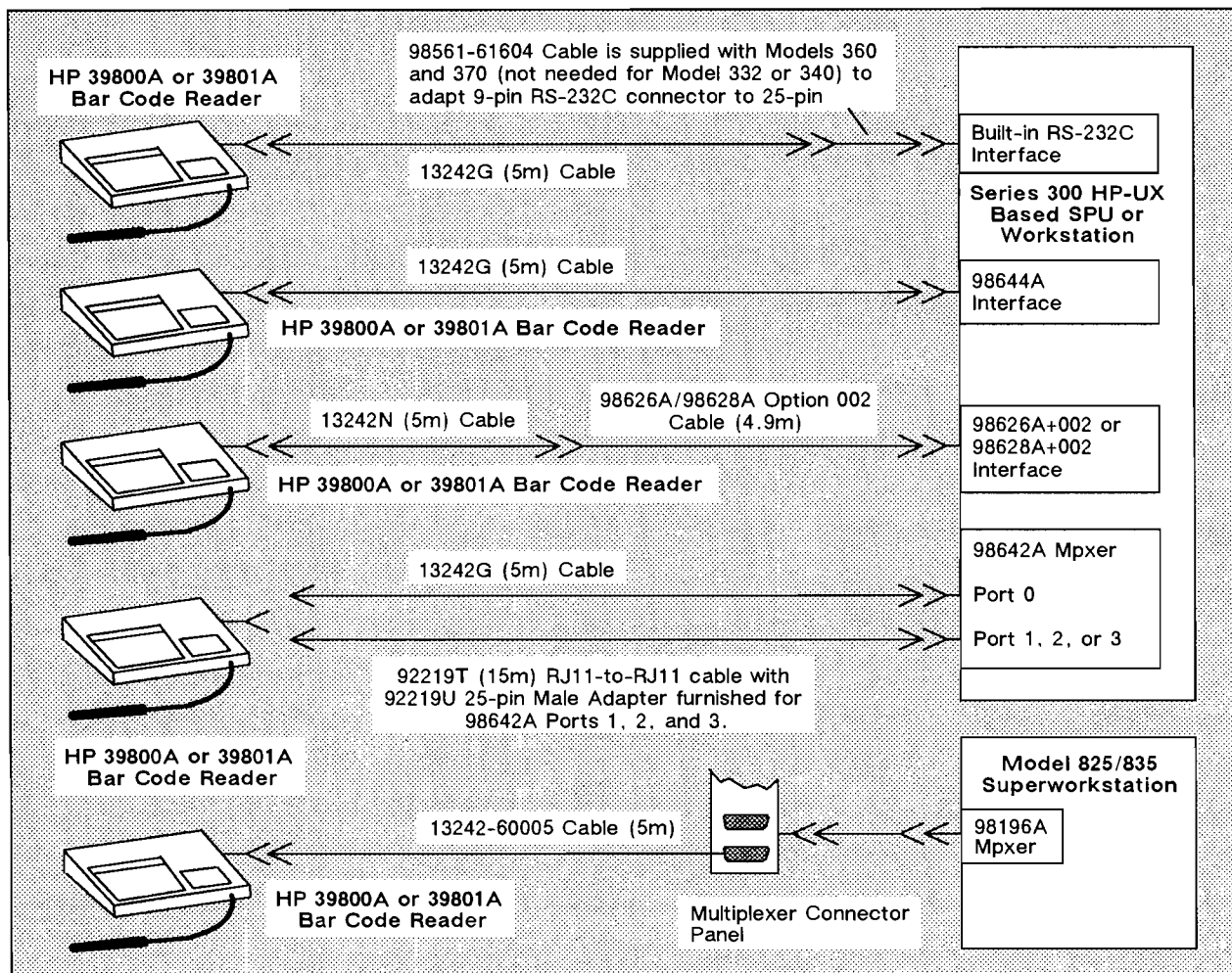


Figure 91. Connection of HP 39800A/39801A Bar Code Readers

Mass Storage

Mass Storage Functions

Disks (disk memories) provide high-capacity, non-volatile, fast-access mass storage for programs and data for the system. The key functions performed by disks are discussed below.

Support of System Boot-up

The most cost-effective way of supporting system bootup is from a mass storage device that is capable of fast transfers, such as a disk memory. If not supported from the disk in a networked host system, the bootup device is usually a locally-connected hard disk memory. When the bootup device is a local disk, it is called the system disk. For this function, fast transfer shortens the time required to boot-up the system. In Series 300, BASIC/WS and Pascal/WS systems can use a flexible disk as the system disk.

Fast-Access Storage and Retrieval

Applications in all but the harshest environments typically use a local disk for storing programs and data not currently in use, from which these are retrieved when and as needed. For this function, hard disks are preferred because of the greater capacity and faster storage and retrieval rates available with hard disks.

Virtual Memory

Under HP-UX, when the total size of executing processes and their data exceeds the capacity of installed RAM, process data is written to disk temporarily when needed to make room for other processes or data. It is also possible for individual programs and

data objects to exceed the capacity of installed RAM. The capability of shifting code and data from RAM to disk, which thus becomes "virtual" memory (VM), is managed by the virtual memory system.

Whenever a process is dispatched (run), a space equal to its virtual size is allocated on the VM disk(s). VM disk space must therefore at least equal the installed RAM. Optimally, the available VM disk space equals the total size of all the processes to be run in a maximum simultaneous mix.

The system may have up to 8 VM disks, on separate or shared buses. The VM limit for code and data is 4 GB. In practice, virtual memory is limited by available disk space.

Software Input and Limited Volume Backup

In HP-UX based systems, flexible disks may provide a good medium for installation and backup of individual application programs that can all fit on one flexible disk. However, a cartridge tape subsystem or a magnetic tape unit must be used for installation and should be used for backup (pages 141 and 142) of all but the smallest software systems or data bases.

Series 300 Disk Requirements and Performance

In HP-UX

HP-UX commands and utilities are usually read in from disk each time they are executed. Disk performance is, therefore, key to providing adequately fast response to user's requests. The performance figures given in Table 18, below, are minimum guidelines for a Series 300 software development environment. Specific applications may have significantly greater requirements.

In multi-user systems and in certain single-user applications, multiple system disks provide an aggregate performance which exceeds that of a single disk. The I/Os per second for two similar disks is generally 1.5 or more times that of one disk alone, provided that the system and user demands are well-distributed between the two disks.

A slight performance increase can be gained in a multi-disk system by connecting the disks via separate HP-IB and/or SCSI interfaces. However, before using a third interface to connect disks on a Series 300 system, both of two existing disk interfaces should each be supporting four disks. The reason for this is that, with two DMA channels available, the DMA contention initiated by

Table 18. Series 300 HP-UX System Disk Requirement Summary

		Number of Users		
		1 or 2	3 to 16	17 to 32
System load (boot)		HP-IB, SCSI	HP-IB, SCSI	HP-IB, SCSI
Boot image size		2.0 MB	2.0 MB	2.0 MB
Suggested Capacity	AXE	80 MB	n/a	n/a
	Prog. Env.	130 MB	152 MB	232 MB
Disk I/Os per Second	Single Disk	20	24	30
	Multiple Disks	18 each	22 each	24 each

adding a third disk interface may easily dissipate the performance gained by reducing contention for bus bandwidth. The Model 825 and 835 Superworkstations are not as limited with respect to the amount of DMA that can be performed. There can be 16 DMA subchannels per CIO bus.

In BASIC/WS or Pascal/WS

Standalone RAM-based HP BASIC/WS or Pascal/WS installation in a Series 300 system requires any supported 3.5-inch or 5.25-inch flexible disk. For most convenient use of the system, an external (hard) disk of any capacity or dual flexible disks with at least 788 KB each are recommended.

Maximum Number of Disks

In Series 300 Systems

The theoretical maximum number of disks supportable under HP-UX for the Series 300 is:

- 8 HP-IB Disk Drives with up to 16 total units and any number of volumes, plus
- 8 SCSI Disk Drives with no units limit.

There are only two DMA channels, so only two disk interface bus cards can use DMA at the same time. Additional simultaneous disk I/O requests are executed using "fast handshake" I/O, which is considerably slower than DMA.

A slight performance increase can be gained in a multi-disk system by connecting the disks via separate HP-IB and/or SCSI interfaces. However, before using a third interface to connect disks, both of two existing disk interfaces should each be supporting four discs. The reason for this is that, with two DMA channels available, the DMA contention initiated by adding a third disk interface may easily dissipate the performance gained by reducing contention for bus bandwidth.

In Model 825/835 Superworkstations

The maximum number of disks supportable under HP-UX for the Model 825/835 Superworkstations is:

- 12 HP-IB Disk Drives connected via three interfaces, or
- 16 HP-FL Disk Drives connected via two interfaces.

Disk Connections

Disks connect to Series 300 SPU's and workstations via HP-IB and/or SCSI interfaces, as shown in Figures 92, below, and 93, next page. Disks connect to Model 825/835 Superworkstations via an HP-IB or HP-FL interface, as shown in Figures 94 and 95, next page.

As shown in Figure 95, the fiber optic link connects from the system to one or a group of disks. A 30m fiber optic cable is included with the 27111A interface. The 30 meter cable can be replaced by a custom fiber optic cable, up to 500m long, which is ordered from Hewlett-Packard as HFBR-AWQnnn, where nnn is length in meters. The HP-FL disks in a group connect to each other via electrical PBus cables. Eight disks are supportable when ordered as the 19524FL disk product, which consists of eight 7937FL disks in a single tall 19514A cabinet. For other configurations, up to six HP-FL disks can be supported in 19511A cabinets, using HP 13367A Long PBus cables to connect drives in the adjacent cabinets.

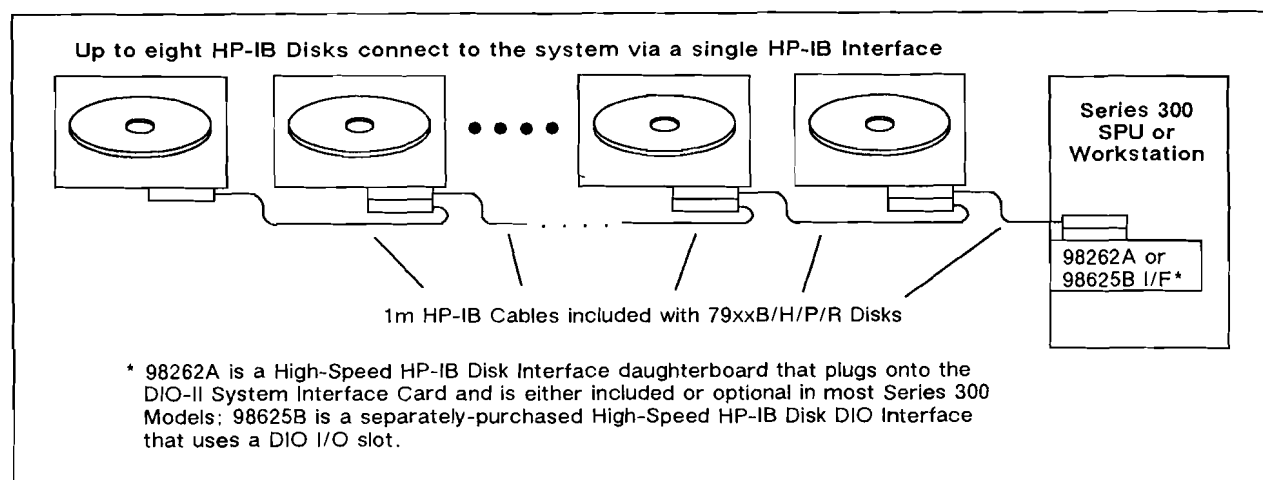


Figure 92. Connection of HP-IB Disks to Series 300 System via High-Speed HP-IB Interface

Disk Selection

Tables 19, 20, and 21 on the next two pages list the available HP-IB, SCSI, and HP-FL disks, respectively, giving capacity and basic disk hardware performance information for them.

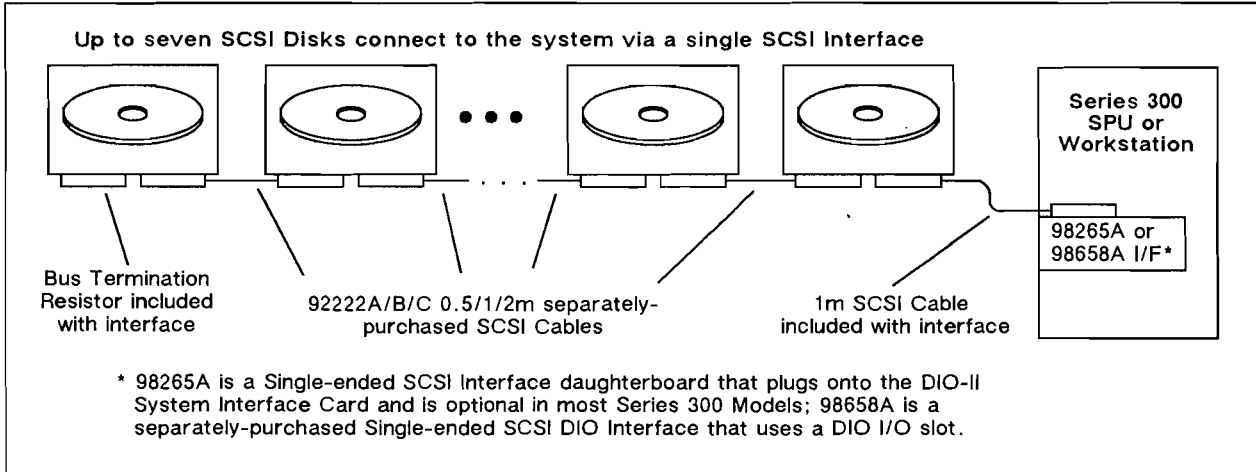


Figure 93. Connection of SCSI Disks to Series 300 System via SCSI Interface

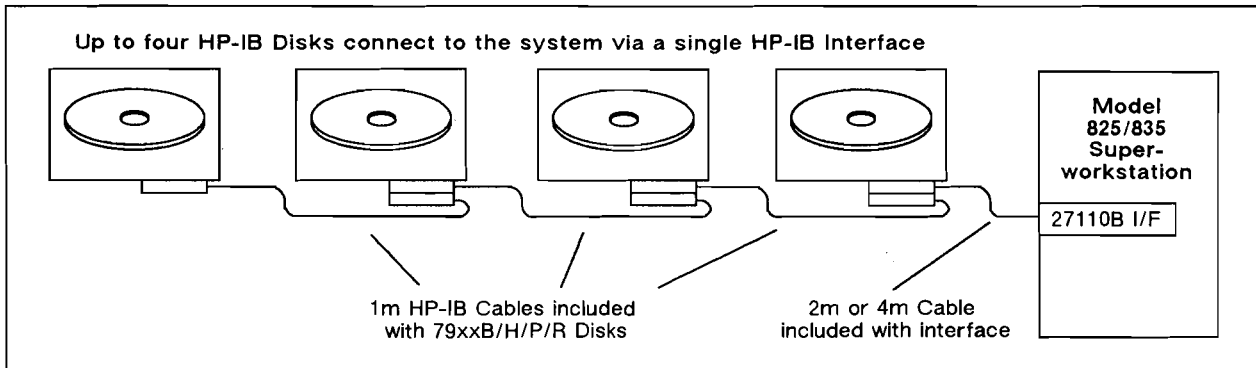


Figure 94. Connection of HP-IB Disks to Model 825/835 Superworkstations

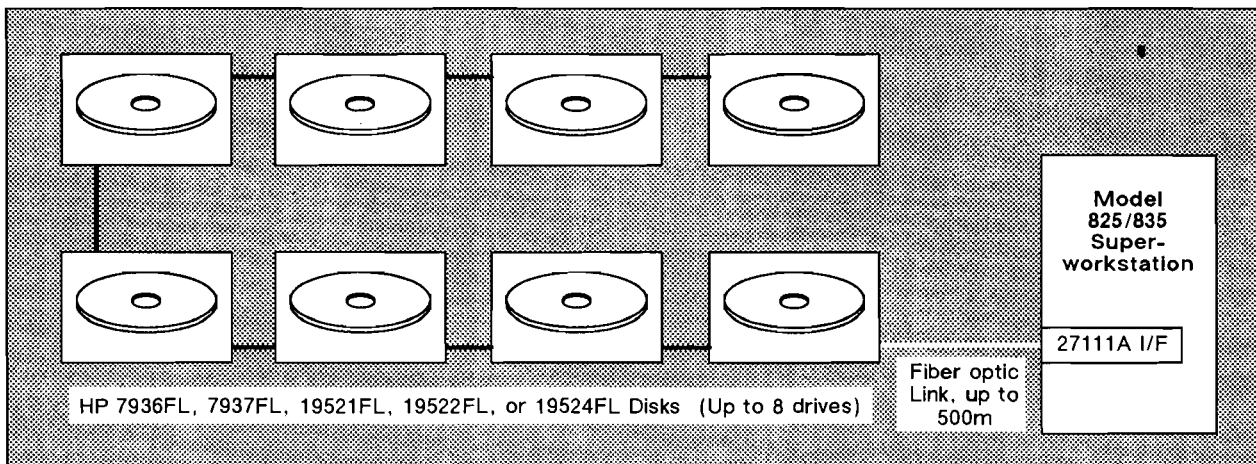


Figure 95. Connection of HP-FL Disks to Model 825/835 Superworkstations

**Table 19. HP-IB Disks Supported in Series 300 SPUs and Workstations
and Model 825/835 Superworkstations**

Product Number	Name/Description (Command Set)	Usable as System Disk?	Capacity (MB per Product)	Access Time (msec)	Average Transfer Rate (KB per sec)*
7907A	Fixed Disk/Removable Disk (CS/80)	In Series 300 BASIC/WS or Pascal/WS only	20.5/20.5	44.3	600
7914CT°	Fixed Disk with Cartridge Tape (CS/80)	Yes	132	44.3	600
7914P°/R°	Fixed Disk with Cartridge Tape (CS/80)	Yes	132	44.3	600
7914ST°	Fixed Disk (CS/80) with Magnetic Tape	Yes	132	44.3	600
7933H°	Fixed Disk (CS/80)	Yes	404	35.1	1,000
7935HR	Removable Disk (CS/80)	Yes	404	35.1	1,000
7936H	Fixed Disk (CS/80)	Yes	307	30.8	1,000
7937H	Fixed Disk (CS/80)	Yes	571	30.8	1,000
7957A°	Fixed Disk (CS/80)	In Series 300 only	81	41.5	853
7957B	Fixed Disk (CS/80)	In Series 300 only	81	28.4	875
7958A°	Fixed Disk (CS/80)	Yes	130	41.5	853
7958B	Fixed Disk (CS/80)	Yes	152	28.4	875
7959B	Fixed Disk (CS/80)	Yes	304	28.4	875
7962B	Fixed Disk (CS/80)	Yes	152	28.4	853
7963B	Fixed Disk (CS/80)	Yes	304	28.4	853
9122C Opt 001	Dual 3.5-inch Flexible Disks (SS/80) Delete one drive	In Series 300 BASIC/WS or Pascal/WS only	2 x 1.42 -1 x 1.42	185	35
9122D°	Dual 3.5-inch Flexible Disks (SS/80)	In Series 300 BASIC/WS or Pascal/WS only	2 x 0.63	175	63
9122S°	Single 3.5-inch Flexible Disk	In Series 300 BASIC/WS or Pascal/WS only	0.63	175	63
9127A	5.25-inch Flexible Disk (SS/80)	In Series 300 BASIC/WS or Pascal/WS only	0.5	93	250
9153C	Fixed Disk and 3.5-inch Flexible Disk (SS/80)	In Series 300 BASIC/WS or Pascal/WS only			
Opt 010	10 MB Fixed/3.5-inch Flexible		10/1.42	75/200	185/32
Opt 011	10 MB Fixed, no Flexible		10	75	185
Opt 020	20 MB Fixed/3.5-in. Flexible		20/1.42	75/200	185/32
Opt 021	20 MB Fixed, no Flexible		20	75	185
Opt 040	40 MB Fixed/3.5-in. Flexible		40/1.42	75/200	185/32
Opt 041	40 MB Fixed, no Flexible		40	75	185
9262B	Removable Winchester Disk Drive (CS/80)	Yes	152	28.4	853
9263B	Removable Winchester Disk Drive (CS/80)	Yes	304	28.4	853
19521H	Two 7937H Disks in 19511A Cabinet (CS/80)	Yes	1142	41.5	1,000
19522H	Four 7937H Disks in 19514A Cabinet (CS/80)	Yes	2284	41.5	1,000
19524H	Eight 7937H Disks in 19514A Cabinet (CS/80)	Yes	4568	41.5	1,000
97902B†	Add'l Removable Disk for 9262B or 9263B	Yes	152	28.4	875
97903B†	Add'l Removable Disk for 9262B or 9263B	Yes	304	28.4	875
97962B‡	Add'l Fixed Disk for 7962B or 7963B (CS/80)	Yes	152	28.4	875
97963B‡	Add'l Fixed Disk for 7962B or 7963B (CS/80)	Yes	304	28.4	875

* The average transfer rates listed here indicate the capability of the disk hardware; they are not system-achievable transfer rates.

° Discontinued product, listed here for reference.

† Maximum of one additional removable drive per 9262B or 9263B.

‡ Maximum of two additional fixed disks per 7962B or 7963B.

Table 20. SCSI Disks Supported in Series 300 SPUs and Workstations

Product Number	Name/Description	Usable as System Disk?	Capacity (MB per Product)	Access Time (msec)	Average Transfer Rate (KB per sec)
7957S	Fixed Disk	Yes	107	28.4	700*
7958S	Fixed Disk	Yes	161	28.4	700*
7959S	Fixed Disk	Yes	323	28.4	700*

* Up to 16 KB (one track) can be transferred at a burst rate of 1.5 MB per second, using built-in track buffer; this and the average transfer rate are capabilities of the disk hardware; they are not system-achievable transfer rates.

Table 21. HP-FL Disks Supported in Model 825 and 835 Superworkstations

Product Number	Name/Description	Usable as System Disk?	Capacity (MB per Product)	Access Time (msec)	Average Transfer Rate (KB per sec) *
7936FL	Fixed Disk	Yes	307	30.8	1,890
7937FL	Fixed Disk	Yes	571	30.8	1,890
19521FL	Two 7937FL Disks in 19511A Cabinet	Yes	1142	41.5	1,890
19522FL	Four 7937FL Disks in 19514A Cabinet	Yes	2284	41.5	1,890
19524FL	Eight 7937FL Disks in 19514A Cabinet	Yes	4568	41.5	1,890

* The average transfer rates listed here indicate the capability of the disk hardware; they are not system-achievable transfer rates.

Software Installation and Backup

Software Installation and Backup in Series 300 Systems

Software installation is currently supported in Series 300 Systems operating under HP-UX only via cartridge tape subsystems. The cartridge tape subsystem can also be used for backup of the system or data bases. See Table 22, below, for a summary of supported cartridge tape subsystems.

Software Installation and Backup in Models 825 and 835

In Model 825 and 835 Superworkstations, software installation and backup are supported via cartridge tape subsystems or 9-track, open reel 1/2-inch magnetic tape. Because of the greater capacity and high sequential transfer rate of magnetic tape, it should be used for back up of systems with 608 MB or more disk capacity. See Table 22, below, for a summary of supported cartridge tape subsystems and magnetic tape units.

Tape Device Support in Series 300 Systems

HP BASIC/WS, HP-UX, and Pascal/WS all support the 1/4-inch cartridge tape subsystems that are listed in Table 22, but only HP-UX offers software on 1/4-inch tape cartridges. Only HP-UX supports 1/2-inch open reel magnetic tape units, but Series 300 software is not offered on 1/2-inch magnetic tape media.

Cartridge Tape Subsystem on Same HP-IB Bus as Disk is NOT Recommended

Although the cartridge tape subsystems use the same CS/80 command set as most HP-IB disks, they have only a 12 KB FIFO buffer. Because of the small buffer, they can significantly degrade performance of a disk on the same bus. For that reason, a cartridge tape subsystem should be used on the same bus as a disk only if it will be used during system idle time, such as for late night backup.

Magnetic Tape Performance in Series 300 Systems

The 9-track magnetic tape units have a 256 KB buffer. They never consume more than 10% of the bus bandwidth and, for that reason, may safely be configured on the same bus with a disk.

Although the 9-track magnetic tape units have a hardware capability of 200 or 781 KB per second, the standard HP-UX backup utilities generate output at between 100 and 150 KB per second, including the time required to identify, locate, and read files within the file system. Rated transfer rates are generally achieved only by direct raw disk-to-tape transfers and user-written data-logging applications.

Connections

See Figure 96, next page.

Table 22. Cartridge Tape Subsystems and Magnetic Tape Units Supported in Series 300 Systems and Model 825 and 835 Superworkstations

Product Number	Name/Description	Recording Density	Operating Mode	Transfer Rate (KB/sec)	Reel/Cartridge Capacity
9144A	16-Track Cartridge Tape Subsystem	10,000 bpi	Streaming	35	67 MB per cartridge
9145A	32-Track Cartridge Tape Subsystem‡	10,000 bpi	Streaming	70	133 MB per cartridge
35401A	16-Track Autochanger Cartridge Tape Subsystem	10,000 bpi	Streaming	35	Magazine of eight 67 MB cartridges (536 MB total)
7979A	Autoloading Mag Tape Unit	1600 cpi, 800 cpi opt.	Streaming	200	40 MB in 2400 ft.
7980A	Autoloading Mag Tape Unit	6250/1600 cpi, 800 cpi optional	Streaming	781/200	140/40 MB in 2400 ft.
7980XC	Autoloading Mag Tape Unit with data compression	CPR†/6250/1600 cpi	Streaming	781/200	280-420/140/40 MB in 2400 ft.

‡ The 9145A 32-track Cartridge Tape Subsystem can read 16-track Cartridge Tapes for installation of software or exchange of programs and data recorded by 9144A or 35401A Cartridge Tape Subsystems.

† CPR (compression) gives 2 to 3 times tape data capacity of 6250 cpi recording density without compression.

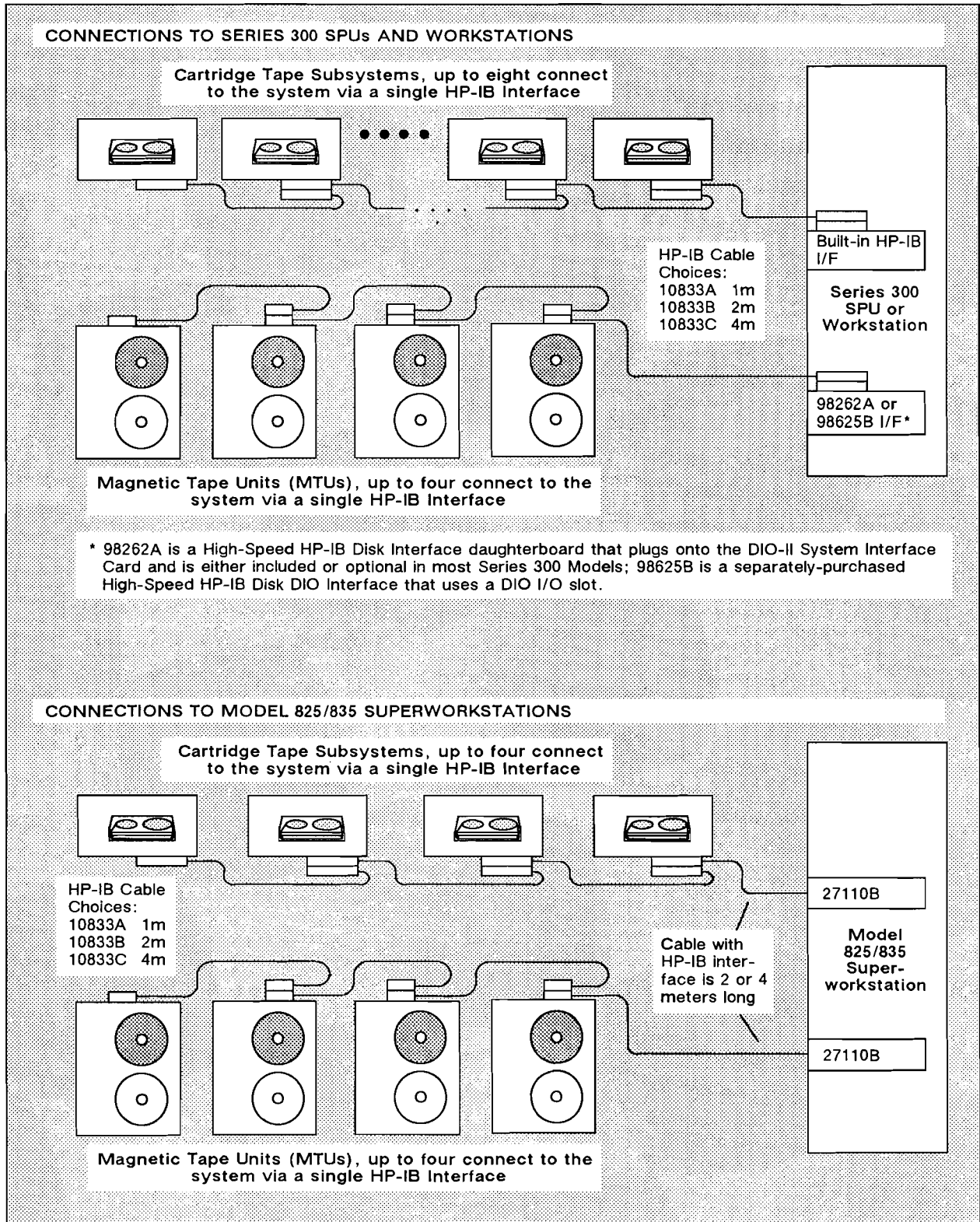


Figure 96. Connection of Cartridge Tape Subsystems and Magnetic Tape Units to Series 300 Systems and Model 825/835 Superworkstations

Printer Output

Printer Selection

The four types of printers supported on Series 300 Systems and Model 825/835 Superworkstations are compared in Table 23 at right with respect to relative cost, print speed, noise level, and estimated print quality. They are further compared in Table 24, below, with respect to paper type, text quality, and bar code printing capability.

Inkjet Printers

Inkjet (ThinkJet, QuietJet, DeskJet, and PaintJet) printers offer low price, reasonably fast print speed, and the quietest operation of all printers. Of these printers, the DeskJet offers Laser printer print quality. The Paint-

Table 23. Types of Printers Available for Series 300 Systems and Model 825/835 Superworkstations

Printer Type	Times ThinkJet Price	Print Speed	Noise Level (dBA)	Print Quality
Monochrome Inkjet	1.0-2.0	150-240 cps	50	C, B, A
Color Inkjet	2.8	167 cps	50	B
Dot-Matrix Impact Serial	3.8-6.1	40-480 cps	56-63	C, B+
Laser	5.4-40	8-20 ppm	50	A
Dot-Matrix Impact Line	11.9-58.9	300-1200 lpm	65	B

Jet has the added advantage of being able to make full-color overhead transparencies. This type of printer is useful mainly as a low-cost, light-workload, workstation printer. It should never be considered for use as the only printer in a system.

Dot-Matrix Serial Impact Printers

Dot-matrix serial impact printers combine versatility at reasonable cost with good print speed. Versatility can include graphics image and bar code printing and the ability to trade print speed for better print quality. Good

Table 24. Printers Supported in Series 300 Systems and Model 825/835 Superworkstations

Printer Product Number and Name	Support In	Maximum Print Rate	Paper Type	Print Quality	Bar Codes
2225A*/D <i>ThinkJet</i> Printer 2227A/B* <i>QuietJet Plus</i> Printer 2228A <i>QuietJet</i> Printer 2276A <i>DeskJet</i> Printer 3630A <i>PaintJet</i> Printer	Series 300 & 800	150 cps 160/192 cps 160/192 cps 120/240 cps 167 cps	Std fanfold/cut sheets Wide fanfold/cut sheets Std fanfold/cut sheets Std fanfold/cut sheets Std fanfold/cut sheets	Draft NLQ/Draft NLQ/Draft LQ/Draft NLQ	No No No No No
2235A/B/C/D <i>RuggedWriter</i> 2932A° <i>General-Purpose</i> Printer 2934A <i>Office</i> Printer 41063A <i>Asian Workstation</i> Printer	Series 300 & 800	240/480 cps 200 cps 40/67/200 cps 40/80 cps† 60/120 cps‡	Wide fanfold, 6-part forms Wide fanfold, 6-part forms Wide fanfold, 6-part forms Wide fanfold/cut sheets	LQ/Draft Draft LQ/Draft NLQ/Draft	No No Yes No
C1202A <i>Asian High Speed</i> Printer	Series 300 only	110/220 cps† 165/330 cps‡	Wide fanfold/cut sheets	NLQ/Draft	No
33440A <i>LaserJet II</i> Printer 33447A <i>LaserJet IID</i> Printer 2684A <i>LaserJet/2000</i> Printer	Series 300 & 800	8 pages/min. 8 pages/min. 20 pages/min.	Single sheets Single sheets & Duplex Single sheets	Letter Quality Letter Quality Letter Quality	Yes Yes Yes
2563B <i>Line</i> Printer 2564B <i>Line</i> Printer 2566B <i>Line</i> Printer C1200A <i>Asian Line</i> Printer	Series 300 & 800	300 lpm 600 lpm 900 lpm 270/330 lpm	Wide fanfold, 6-part forms Wide fanfold, 6-part forms Wide fanfold, 6-part forms Wide fanfold, 6-part forms	Draft Draft Draft NLQ/Draft	Opt Opt Opt No
2567B <i>Line</i> Printer	Series 800 only	1200 lpm	Wide fanfold, 6-part forms	Draft	Opt

Print Quality Legend: NLQ = Near Letter Quality LQ = Letter Quality

* Not supported in Series 800.

° Discontinued product, listed for reference.

† Rates when printing two-byte Asian characters. ‡ Rates when printing Roman8 and other one-byte characters.

Printer Output continued

print speed means that a dot-matrix serial impact printer can be used as the only printer on a system with modest-to-average printing requirements.

Laser Printers

Laser printers combine excellent print quality with print speed faster than the fastest dot-matrix serial printers at higher cost. Laser printers are recommended for systems with average printing workload in which high print

quality and quiet operation are important and the lack of multi-part forms print capability is irrelevant.

Dot-Matrix Impact Line Printers

Dot-matrix impact line printers offer versatility similar to dot-matrix serial impact printers at faster print speeds and higher prices. A dot-matrix impact line printer should be selected for heavy printing workloads.

Printer Interfacing

For details, see Figures 97, below, and 98, next page, and Table 25 on the following page.

RS-232C Interfacing

Printers can be connected to an RS-232C interface as shown in Figure 97, below, for local or remote printing.

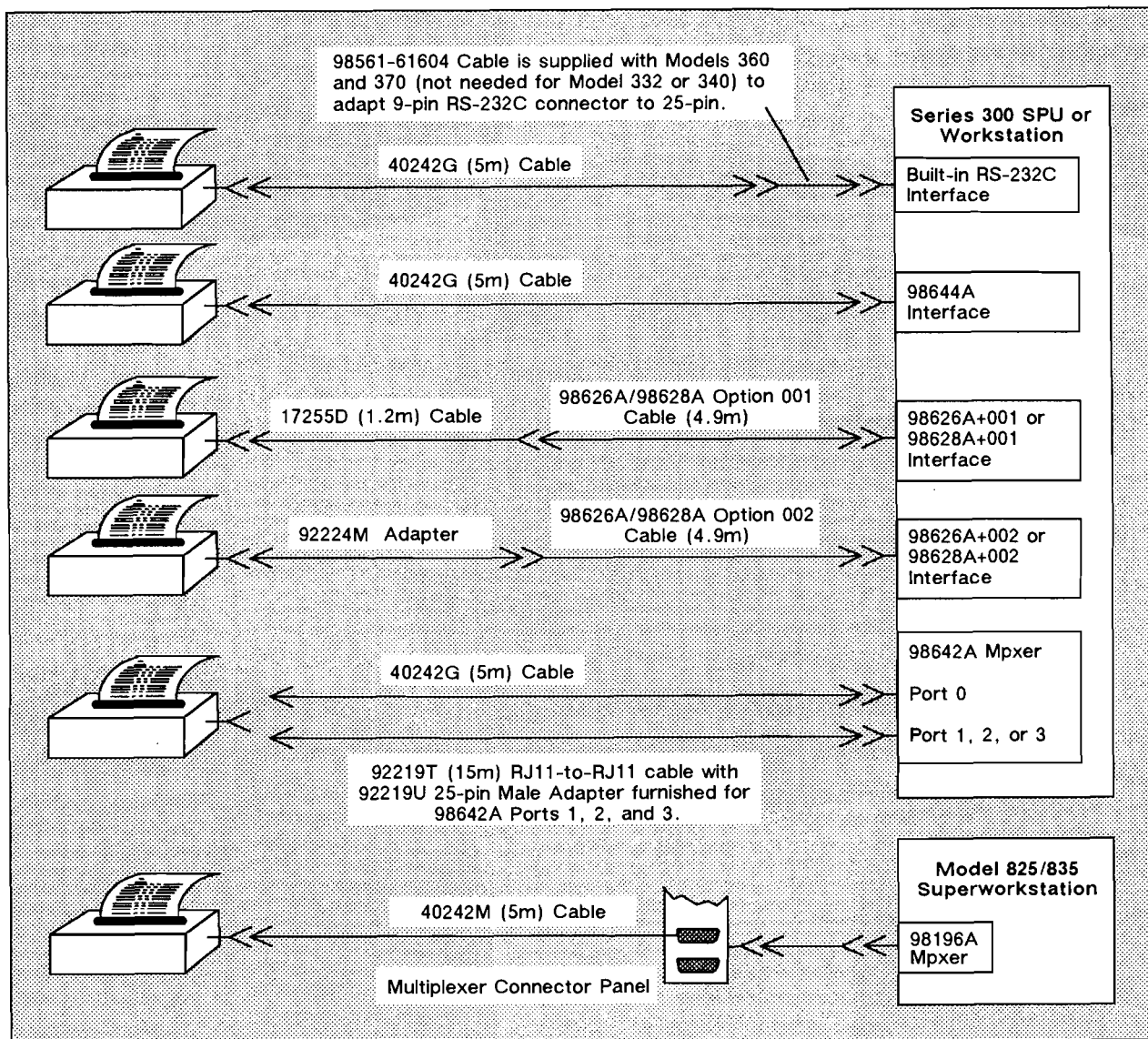


Figure 97. RS-232C Connection of Printers to Series 300 Systems and Model 825/835 Superworkstations

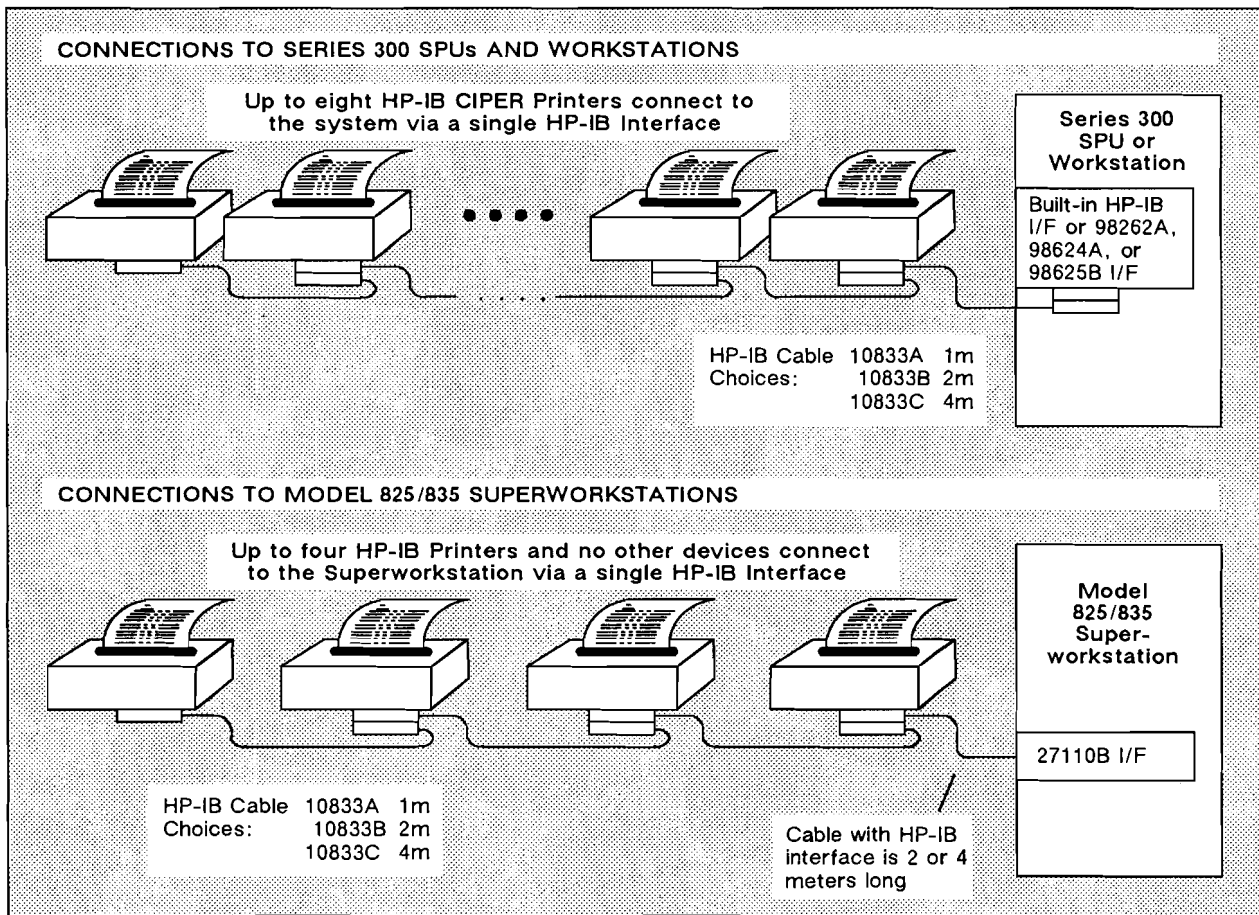


Figure 98. HP-IB Connection of Printers to Series 300 Systems and Model 825/835 Superworkstations

HP-IB Interfacing

Printers can be connected to an HP-IB interface as shown in Figure 98, above.

In Series 300. The HP-IB CIPER interface available for 256xB Printers as Option 290 has extra intelligence that enables the printer to share an HP-IB interface with other devices more efficiently than a simple HP-IB interface. For that reason, HP-IB CIPER printers can be used on the same HP-IB interface as a disk in Series 300 systems operating under HP-UX, but printers with a simple HP-IB interface should not.

HP-UX can support up to eight HP-IB CIPER printers, which can use one HP-IB interface; the number of simple HP-IB printers that can be supported are limited only by the maximum number of HP-IB interfaces that can be supported, which is five (5).

In BASIC/WS systems, the number of printers is limited only by physical connections (select codes and addresses).

In Pascal/WS systems, the number of printers is limited by the number of permitted logical units, which is approximately 45.

In Model 825/835 Superworkstations, the only supported HP-IB interface for 256xB printers is the Option 290 HP-IB CIPER interface. Also, unlike the Series 300, the rules for Model 825/835 Superworkstations, based on the configurations tested, specify that each 27110B HP-IB interface can be used for up to four HP-IB printers. No other devices can be connected to an HP-IB interface that is serving printers.

Printer Output
continued

Table 25. Series 300 and Series 800 Workstations Printer Interfacing Summary

Product Number	Name or Description	Host Interface	HP-IB Cable	Cable Required for RS-232C Connection From:				
				Series 300				Ser 800
				Built-in, 98642A Port 0, 98644A	98626A/98628A Opt 001	98626A/98628A Opt 002	98642A Ports 1, 2, and 3	98196A Ports
C1200A C1202A	Asian Line Printer Asian High-Speed Serial Printer	RS-232C RS-232C	n/a n/a	40242G 40242G	17255D 17255D	92224M* 92224M*	Cbl. Incl. Cbl. Incl.	40242M† Not Sup.
2225A 2225D	ThinkJet Printer ThinkJet Printer	HP-IB‡ RS-232C	Any 10833x n/a	n/a 40242G	n/a 17255D	n/a 92224M*	n/a Cbl. Incl.	n/a 40242M†
2227A 2227B 2228A	QuietJet Plus Printer QuietJet Plus Printer QuietJet Printer	RS-232C HP-IB‡ RS-232C	n/a Any 10833x n/a	40242G n/a 40242G	17255D n/a 17255D	92224M* n/a 92224M*	Cbl. Incl. n/a Cbl. Incl.	40242M† n/a 40242M†
2235A-D 2235B/D	RuggedWriter Printer RuggedWriter Printer	RS-232C HP-IB	n/a Any 10833x	40242G n/a	17255D n/a	92224M* n/a	Cbl. Incl. n/a	40242M† n/a
2276A	DeskJet Printer	RS-232C	n/a	40242G	17255D	92224M*	Cbl. Incl.	40242M†
2563B 2564B 2566B Opt 049 Opt 200 Opt 290	300 LPM Line Printer 600 LPM Line Printer 900 LPM Line Printer Serial HP-IB (simple)‡ HP-IB (CIKER)	See Options See Options See Options RS-232C HP-IB simple HP-IB CIKER	----- ----- ----- n/a 4m included 4m included	----- ----- ----- 40242G n/a n/a	----- ----- ----- 17255D n/a n/a	----- ----- ----- 92224M* n/a n/a	----- ----- ----- Cbl. Incl. n/a n/a	----- ----- ----- 40242M† n/a n/a
2567B§ Opt 049 Opt 200 Opt 290	1200 LPM Line Printer Serial HP-IB (simple)‡ HP-IB (CIKER)	See Options RS-232C HP-IB simple HP-IB CIKER	----- n/a 4m included 4m included	----- Not Sup. n/a n/a	----- Not Sup. n/a n/a	----- Not Sup. n/a n/a	----- Not Sup. n/a n/a	----- 40242M† n/a n/a
2684A* w/26843A	LaserJet/2000 Printer Interface Kit	RS-232C	n/a	40242G	17255D	92224M*	Cbl. Incl.	40242M†
2932A° Opt 046	Gen'l Purpose Printer HP-IB Interface	RS-232C HP-IB	n/a Any 10833x	40242G n/a	17255D n/a	92224M* n/a	Cbl. Incl. n/a	40242M† n/a
2934A Opt 046	Office Printer HP-IB Interface	RS-232C HP-IB	n/a Any 10833x	40242G n/a	17255D n/a	92224M* n/a	Cbl. Incl. n/a	40242M† n/a
33440A 33447A	LaserJet Series II LaserJet Series IID	RS-232C	n/a	40242G	17255D	92224M*	Cbl. Incl.	40242M†
3630A Opt 001 Opt 002	PaintJet (Color) Serial HP-IB (simple)	See Options RS-232C HP-IB simple	n/a Any 10833x	40242G n/a	17255D n/a	92224M* n/a	Cbl. Incl. n/a	40242M† n/a
41063A	Asian Workstation	HP-IB‡ RS-232C	Any 10833x n/a	n/a 40242G	n/a 17255D	n/a 92224M*	n/a Cbl. Incl.	n/a 40242M†

* DTR-CTS hardware flow control is not possible with this cabling. Only Xon/Xoff is supported.

† Or 92218A Cable.

‡ HP-IB interface or HP-IB simple interface to this printer is not supported in Series 800.

° Discontinued product, listed here for reference.

§ The 2567B Line Printer is not supported in Series 300.

Graphics Input/Output

Software Support

Basic Requirement

Graphics I/O support of CGBDI calls under HP-UX requires *Starbase* graphics software, which includes device subroutines for the supported devices listed in this section. Series 300 workstations include a license to use *Starbase*. The 98594A Option 022 media for the HP-UX Series workstation bundles includes the *Starbase* software and documentation. The 92445A *Starbase* Graphics Library is included with Model 825/835 Superworkstations and thus does not have to be ordered separately.

Graphics Kernel System (GKS) Compatibility

Users desiring to write graphics applications to GKS standards can purchase the 98672L license to use the HP-GKS Graphics Library and the 98672B media and documentation for 98672L with media option 022, which provides software on 1/4-inch cartridge tape. For Model 825/835 Superworkstations, order the 92521A HP-GKS/HP-UX, which offers a choice of 1/4-inch cartridge tape (option AA0) or 1/2-inch magnetic tape (option AA1) media. GKS requires *Starbase*.

Interactive Graphics

Interactive graphics involves pointing and picking using a mouse or graphics tablet. It may also involve image control using a multi-axis control dial box, which is used interactively while observing a monochrome or color graphics display. Series 300 Workstations and Model 825/835 Superworkstations offer a choice

of high resolution graphics displays, as described in the respective Workstation and Superworkstation sections, pages 27 through 121 earlier in this guide. HP-HIL devices used for pointing, picking, and digitizing are described on pages 133 and 134.

Multiple Graphics Display Monitors

In Series 300

Series 300 computers can support multiple C+, CH, and MH graphics monitors to the extent that DIO system or DIO-II slots are available for their respective interfaces (98549A, 98550A, and 98548A). A 98568A or 98570A Expander will almost certainly be required to house the interface to a second monitor. Interactive graphics with more than one monitor requires additional programming to relate tablet or mouse input to the monitor whose display it is to interact with.

In Model 825/835 Superworkstation

Up to four CHX/SRX/TurboSRX display monitors can be connected to a Model 825/835 Superworkstation, each connected via its own A1017A display controller interface card.

Because each display controller has its own HP-HIL interface, up to four CHX displays can be interactive.

In a workstation with SRX or TurboSRX displays (with or without CHX displays as well), up to two of the four permitted displays can be interactive. The other two displays must function non-interactively as "soft plotters."

A1047A Animation Interfaces cannot be used in the same workstation as A1017A display controller interfaces. Up to two TurboSRX displays, each interfaced via its own A1047A Animation Interface can be interactive, or either can function as a "soft plotter."

RS-170 RGB and NTSC Outputs

Model 360 and 370 Workstations can be interfaced to color monitors that require RS-170 RGB or NTSC inputs via the Aurora/300 DIO-II boardset. Similar capability is available for Model 825 and 835 Superworkstations. For more information, contact Folsom Research, Inc., 526 East Bidwell Street, Folsom, CA 95630, telephone (916) 985-2481.

3D Controller Configurability

The 98720A SRX and 98730A TurboSRX Display Controllers are available separately as well as in bundled systems. A complete 3D subsystem consists of the monitor (98789A 16-inch or 98752A 19-inch) and a local graphics bus interface (98725A to 98720A SRX or 98726A to 98730A) in Series 300 systems. The TurboSRX subsystem also requires a 3 meter 98290A RGB cable, which is not included with either the 98730A Display Controller or the 98726A interface.

Graphics Input/Output, continued

The 98720A and 98730A Display Controllers are configurable external 325mm-wide devices. The following tables show slot assignments for the respective controllers.

SRX Slot Assignments

98720A SRX		
Component	Opt.	Upgrade
Aux. Power Supply	723	98723A
Main Power Supply	Std	-----
3D Transform Bd	721	98721A
3D Scan Converter	721	98721A
Frame Buffer Ctrlr.	Std	-----
Frame Buffer 3*	722	98722A
Frame Buffer 2*	722	98722A
Frame Buffer 1*	722	98722A
Frame Buffer 0	722	98722A
Color Map	Std	-----

* The auxiliary power supply is required if any of these frame buffer cards is installed.

The standard 98720A has four planes of frame buffer memory on the frame buffer controller. If planes are added, as multiple orders of option 722 or 98722A, the first four planes are used for overlay planes.

TurboSRX Slot Assignments

98730A TurboSRX		
Component	Opt.	Upgrade
Aux. Power Sup.	Std†	98723A
Main Power Sup.	Std	-----
Frame Buffer 2*	024	98722A
Frame Buffer 1*	016/024	98722A
Frame Buffer 0	Std	-----
Color Map	Std	-----
Fast Z-Buffer*	060	98732A
Frame Buffer Ctrlr.	Std	-----
Master Board*	060	98732A
Slave Board*	060	98732A

† Option 123, supported only on 98730s with single 8-plane frame buffer, deletes the auxiliary power supply.

* The auxiliary power supply is required if any of these slots are used.

The standard 98730A has eight planes of frame buffer memory (one 98722A) plus four overlay planes.

Graphics Hardcopy Output

Graphics Printing

Printers are supported as raster-to-raster hardcopy devices, primarily via the DUMP GRAPHICS facility in BASIC/WS and Pascal/WS, and by the *peltrans(1)* command in HP-UX. Graphics resolution is that supported by the printer (see Table 26). Without user programming, the bit size of an image is limited to the screen pixel size.

The only color hardcopy raster device supplied by HP is the 3630A PaintJet printer. For Series 300, the 98053A option 022 product supplies a GPIO cable and software for supporting a customer-supplied Versatec C2552, C2558, C2562, or C2568 color raster plotter. The 98622A GPIO card is ordered separately.

Graphics Plotting

Supported graphics plotters are compared in Table 27 with respect to speed, plot area, usable resolution, and special features.

Interfacing

Display Monitors

See Table 14 and Figure 86, on page 127 and Figure 87 on page 128.

Graphics Terminals

See Table 15 and Figure 88, on pages 130 and 131.

HP-HIL Mouse, Tablets, etc.

See Table 16 and Figure 90 and discussion, on pages 133 and 134.

Printers

See Figures 97 and 98 and Table 25, pages 144 through 146.

Plotters

HP-UX supports all plotters via HP-IB or RS-232C interface. Unless a dedicated HP-IB interface is available, use of RS-232C interfacing is recommended. HP BASIC/WS and Pascal/WS in Series 300 support only HP-IB interfacing to plotters. For details, see Figures 99 and 100 and Table 28 on pages 150 through 152.

Table 26. Graphics Printers Supported in Series 300 Systems and Model 825/835 Superworkstations

Device Product Number and Name	Data Rate or Plotting Speed	Print Area	Usable Resolution
C1200A Asian Line Printer	Not specified	345 x 241 mm	70.8 x 70.8 dots/cm.
C1202A Asian High Speed Serial Printer	Not specified	345 x 241 mm	70.8 x 70.8 dots/cm.
2225x <i>ThinkJet</i> Printer	Not specified	7.5 x 9.5 in. (190 x 241 mm)	96 x 96 dots/in. (37.7 x 37.7 dots/cm.)
2227x <i>QuietJet</i> Plus Printer	Not specified	13.2 x 9.5 in. (335 x 241 mm)	96 x 96 dots/in. (37.7 x 37.7 dots/cm.)
2228A <i>QuietJet</i> Printer	Not specified	7.5 x 9.5 in. (190 x 241 mm)	
2235x <i>RuggedWriter</i> Printer	Not specified	13.6 x 9.5 in. (345 x 241 mm)	90 x 90 dots/in. (35.4 x 35.4 dots/cm.)
2276A <i>DeskJet</i> Printer	Not specified	7.5 x 9.5 in. (190 x 241 mm)	Up to 300 x 300 dots/in. (118 x 118 dots/cm.)
2563B Line Printer	14.5 in./min. (36.8 cm/min.)	13.2 x 42.6 in. (335 x 1083 mm)	70 x 72 dots/in. (27.5 x 28.3 dots/cm.)
2564B Line Printer	29 in./min. (73 cm/min.)		
2566B/2567B Line Printer	50 in./min. (127 cm/min.)		
2684x <i>LaserJet/2000</i> Printer	Up to 20 ppm	8 x 10.6 in. (203 x 269 mm)	300 x 300 dots/in. (118 x 118 dots/cm.)
2932A° General-Purpose Printer 2934A Office Printer	8 in./min. (20.3 cm/min.)	11.3 x 42.6 in. (289 x 1083 mm)	90 x 90 dots/in. (35 x 35 dots/cm.)
33440A <i>LaserJet II</i> Printer 33447A <i>LaserJet IID</i> Printer	Up to 8 ppm	8 x 10.6 in. (203 x 269 mm)	300 x 300 dots/in. (118 x 118 dots/cm.)
3630A <i>PaintJet</i> Color Printer	4 min/color graphics page, 8 min/transparency	8 x 10.6 in. (203 x 269 mm)	180 x 180 dots/in. (70.8 x 70.8 dots/cm.)
41063A Asian Workstation Printer	Not specified	345 x 241 mm	70.8 x 70.8 dots/cm.

° Discontinued product, listed here for reference.



Table 27. Graphics Plotters Supported in Series 300 Systems and Model 825/835 Superworkstations

Device Product Number and Name	Plotting Speed	Plot Area	Usable Resolution	Graphics Features
C1600A 7600/240D Electrostatic Plotter	0.67 in./sec (1.6 cm/sec)	23.6 in. width (600 mm width)	406 dots/in. (160 dots/cm)	Prints across full width
C1601A 7600/240E Electrostatic Plotter	0.86 in./sec (2.2 cm/sec)	35.3 in. width (896 mm width)	406 dots/in. (160 dots/cm.)	Prints across full width
7440A ColorPro Plotter	15.7 in./sec (40 cm/sec)	7.5 x 10.7 in. (191 x 272 mm)	0.004 in. (0.1 mm)	8 pens
7475A Graphics Plotter	15 in./sec (38.1 cm/sec)	10.8 x 16.2 in. (275 x 414 mm)	0.004 in. (0.1 mm)	6 pens
7550A Graphics Plotter	31.5 in./sec (80 cm/sec)	10.7 x 16.1 in. (272 x 411 mm)	0.004 in. (0.1 mm)	8 pens, auto sheet feed
7570A DraftPro Plotter	15.7 in./sec (40 cm/sec)	25.2 x 39.4 in. (550 x 1000 mm)	0.004 in. (0.1 mm)	8 pens
7575A DraftPro DXL Plotter	32 in./sec (80 cm/sec)	24 x 37.2 in. (610 x 946 mm)	0.001 in. (0.0254 mm)	8 pens
7576A DraftPro EXL Plotter	32 in./sec (80 cm/sec)	36.4 x 46.2 in. (897 x 1176 mm)	0.001 in. (0.0254 mm)	8 pens
7595A DraftMaster I Plotter	24 in./sec (60 cm/sec)	36.4 x 44.6 in. (897 x 1232 mm)	0.004 in. (0.1 mm)	8 pens
7596A DraftMaster II Plotter	24 in./sec (60 cm/sec)	34.8 x 46.8 in. (884 x 1135 mm)	0.004 in. (0.1 mm)	8 pens, auto roll feed

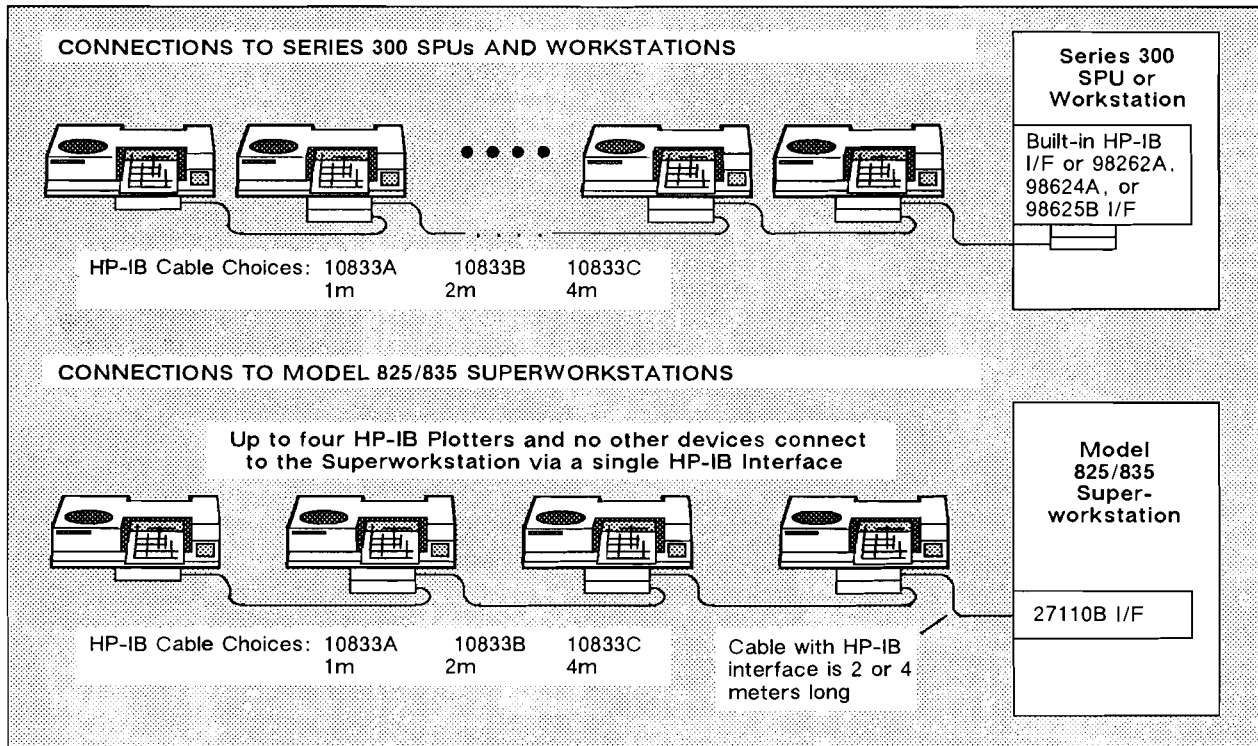


Figure 99. HP-IB Connection of Plotters to Series 300 Systems and Model 825/835 Superworkstations

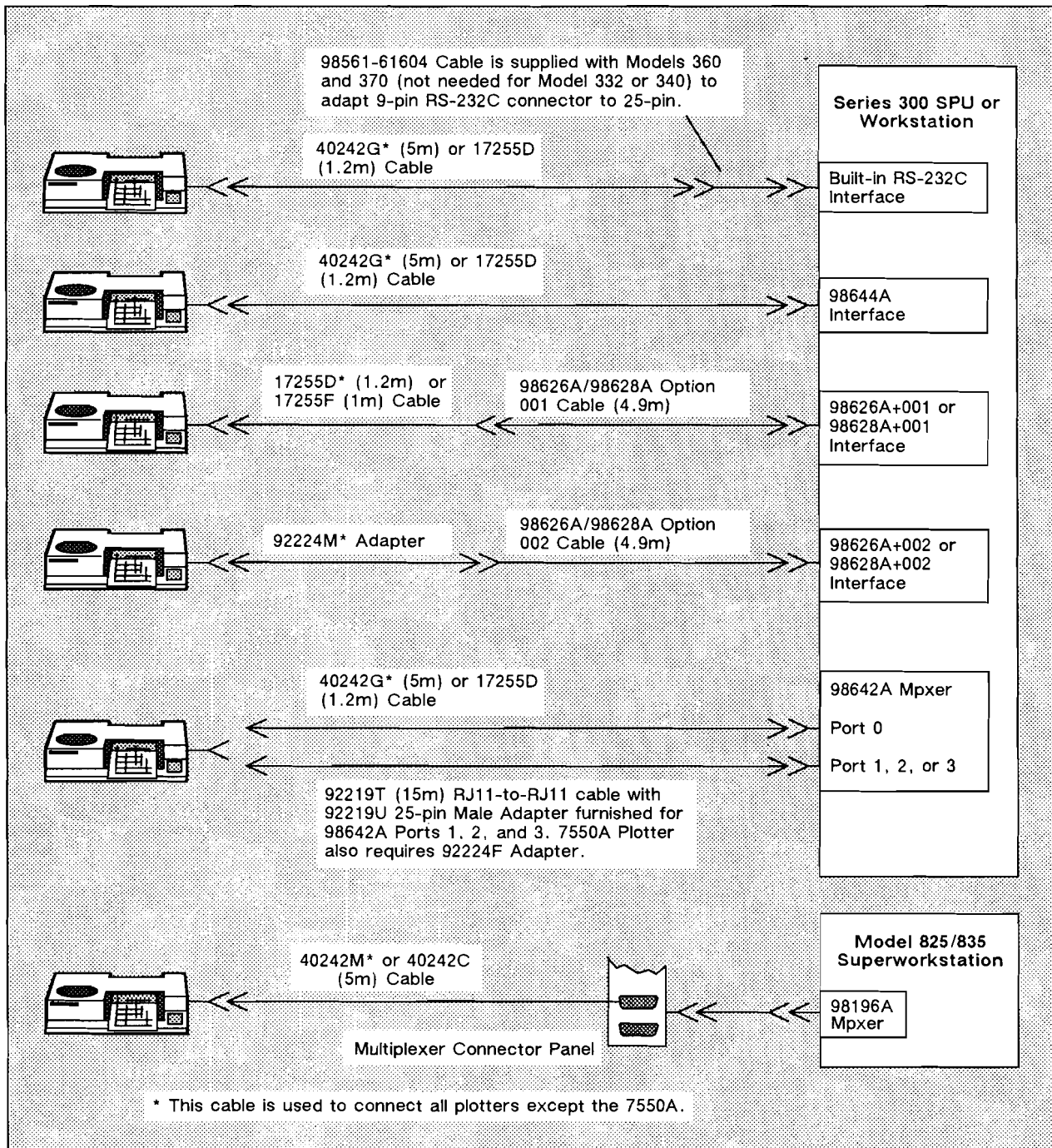


Figure 100. RS-232C Connection of Plotters to Series 300 Systems and Model 825/835 Superworkstations

Graphics Input/Output,
continued

Table 28. Series 300 and Series 800 Workstations Plotter Interfacing Summary

Product Number	Name or Description	Host Interface	HP-IB Cable	Cable Required for RS-232C Connection From:				
				Series 300				Ser 800
				Built-in, 98642A Port 0, 98644A	98626A/98628A Opt 001	98626A/98628A Opt 002	98642A Ports 1, 2, and 3	98196A Ports
C1600A	7600/240D Electrostatic Plotter	RS-232C HP-IB simple	n/a Any 10833x	40242G n/a	17255D n/a	92224M* n/a	Cbl. Incl. n/a	40242M† n/a
C1601A	7600/240E Electrostatic Plotter	RS-232C HP-IB simple	n/a Any 10833x	40242G n/a	17255D n/a	92224M* n/a	Cbl. Incl. n/a	40242M† n/a
7440A Opt 001 Opt 002	<i>ColorPro</i> Plotter Serial HP-IB (simple)	See Options RS-232C HP-IB simple	----- n/a Any 10833x	----- 40242G n/a	----- 17255D n/a	----- 92224M* n/a	----- Cbl. Incl. n/a	----- 40242M† n/a
7475A Opt 001 Opt 002	Graphics Plotter Serial HP-IB (simple)	See Options RS-232C HP-IB simple	----- n/a Any 10833x	----- 40242G n/a	----- 17255D n/a	----- 92224M* n/a	----- Cbl. Incl. n/a	----- 40242M† n/a
7550A	Graphics Plotter	RS-232C HP-IB simple	n/a Any 10833x	17255D n/a	17255F n/a	Cbl. Incl. n/a	92224F* n/a	40242C‡ n/a
7570A Std 17570A	<i>DraftPro</i> Plotter Serial HP-IB interface	See Options RS-232C HP-IB simple	----- n/a Any 10833x	----- 40242G n/a	----- 17255D n/a	----- 92224M* n/a	----- Cbl. Incl. n/a	----- 40242M† n/a
7575A Std 17570A	<i>DraftPro DXL</i> Plotter Serial HP-IB interface	See Options RS-232C HP-IB simple	----- n/a Any 10833x	----- 40242G n/a	----- 17255D n/a	----- 92224M* n/a	----- Cbl. Incl. n/a	----- 40242M† n/a
7576A Std 17570A	<i>DraftPro EXL</i> Plotter Serial HP-IB interface	See Options RS-232C HP-IB simple	----- n/a Any 10833x	----- 40242G n/a	----- 17255D n/a	----- 92224M* n/a	----- Cbl. Incl. n/a	----- 40242M† n/a
7595A	<i>DraftMaster I</i> Plotter	RS-232C HP-IB simple	n/a Any 10833x	40242G n/a	17255D n/a	92224M* n/a	Cbl. Incl. n/a	40242M† n/a
7596A	<i>DraftMaster II</i> Plotter	RS-232C HP-IB simple	n/a Any 10833x	40242G n/a	17255D n/a	92224M* n/a	Cbl. Incl. n/a	40242M† n/a

† Or 92218A (15m) Cable.

‡ Or 92215F (15m) Cable.

Local Area Network Communications

LAN Support

For Series 300

Interface. Models 340, 360, and 370 include a Local Area Network (LAN) interface for communication with other systems in a Local Area Network. The 98643A LAN/300 AUI interface can be used to also equip the Model 332 with the basic hardware needed for LAN communication. In all cases, the interfaces offer a choice of AUI connection or ThinLAN connection, which includes a built-in ThinMAU.

Software. Series 300 HP-UX bundles include ARPA/Berkeley, NFS, and HP Network Services software licenses. The network servers include the 98594A media and documentation for this software, which can be used to support diskless workstations. For standalone workstations, the 98594A media and documentation must be purchased separately to be available for installation of the licensed software. For capabilities of this software, see Table 29, next page.

For Model 825/835 Superworkstations

Interface. Model 825/835 Superworkstations include a 91786B LAN/9000 Series 825/835 Link, which incorporates the hardware interface and OSI software layers 2 through 6. ThinMAU and ThickMAU options are available.

Software. Model 825/835 Superworkstations include ARPA/BSD networking software, license to use, media, and documentation. For the capabilities of this software and other available LAN software, see Table 30, page 155.

LAN Connection Choices

Attachment Unit Interface (AUI) to Backbone LAN (ThickLAN connection)

Option 015 in Models 340, 360, and 370, the 98643A option 241 LAN/300 Link interface for Model 332, and Option 004 in Model 825/825 Superworkstations provide for AUI ThickLAN connection. In the Model 825/835, option 004 includes a 30241A Medium Attachment Unit (ThickMAU) and a 92254A 6 meter AUI cable). The AUI ThickLAN connection offers the greatest versatility because it can be used for connection to:

1. Backbone LAN (ThickLAN) cabling via a 92254A 6 meter or longer AUI cable and a 30241A Medium Attachment Unit (MAU), which must be separately purchased for Series 300 systems. This supports LAN cable length up to 500 meters and 100 nodes.
2. ThinLAN cabling via a separately purchased 28641A ThinMAU attachment unit or (from backbone LAN) a 4-connection 28645A ThinLAN Hub. ThinLAN cable length can be up to 185 meters and 30 nodes.
3. StarLAN twisted pair cabling via a separately purchased 28664A Twisted Pair Medium Attachment Unit to a 12-connection 28663A StarLAN 10 Hub. StarLAN 10 cable length can be up to 100 meters. See Figure 61, page 78.

ThinMAU Interface to ThinLAN

Option 017 in Models 340, 360, and 370, the standard 98643A LAN/300 Link interface for Model 332, and Option 003 in Model 825/825 Superworkstations provide for ThinMAU connection. This offers the greatest implementation simplicity, since all that the user needs to do is to connect ThinLAN cables to each arm of a BNC "T". See Figure 60, page 77.

Additional Information

For specifications on interfaces, MAUs, Hubs, and LAN software

See the "HP AdvanceNet Specification Guide," HP Literature Stock Number 5956-4144 or a later revision, available from HP Field Offices.

For a LAN Primer

Purchase "Making the LAN Connection," HP Part Number 5957-4624, from Hewlett-Packard's Direct Marketing Division, telephone 800-538-8787.

For LAN Installation Guidance

Purchase "LAN Cable and Accessories Installation Manual," HP Part Number 5955-7680, from Hewlett-Packard's Direct Marketing Division, telephone 800-538-8787.

Local Area Network
Communications, continued

Table 29. LAN-Based Communications Packages for Series 300 Systems

Communications Packages	For HP 9000 Model	Use Product Number	Capabilities	Supports Communication with
LAN/9000 Series 300 Link	332 SPU Other 300s with HP-UX	98643A Included	Interface supporting OSI level 1	All of the systems listed below when also supported by appropriate higher-level Communications Package.
Network Services/ARPA 300 (also requires LAN/9000 Series 300 Link, listed above)	3xx SPUs Other 300s with HP-UX	50952C/L Included*	Network File Transfer	HP 1000 A-Series System with Network Services/1000 software
			Remote File Access	HP 3000 System with Network Services/3000-V or 3000-XL software
			Resource Sharing with other HP-UX based systems	HP 9000 Series 800 System with Network Services/800 software
			Inter-process communications	HP 9000 Series 500 System with NS Services Series 500 software
			Base support for OSI levels 2 through 6.	DEC VAX/VMS System with HP 50950A Network Services for DEC VAX/VMS (ARPA Telenet and Network file transfer only)
			Link level access to data link layer	
			File Transfer Protocol (FTP) (ARPA)	HP 9000 Series 800 System with ARPA Services/800 software
			TELNET Virtual Terminal Capability (ARPA)	DEC VAX 7xx/BSD UNIX 4.2/4.3 System with BSD 4.2/4.2 networking
			Simple Mail Transfer (ARPA)	DEC VAX 7xx/VMS 4.0 System with Wollongong's WIN/VX Rel. 2.2 (ARPA services only)
			Remote Copy (BSD 4.2)	IBM PC-AT or HP Vectra with MS-DOS or PC-DOS 3.xx and ARPA Services/Vectra and ARPA ThinLAN Link/Vectra (Supports FTP and TELNET only)
			Remote Login (BSD 4.2)	
			Remote Who (BSD 4.2)	
			Remote Uptime (BSD 4.2)	SUN 68010 or 68020 computer with SUN Release 3.0 operating system and SUN ARPA
			Remote Shell (BSD 4.2)	
			Sendmail (BSD 4.2)	
			Berkeley Sockets (Inter-process Comm. (BSD 4.2)	
Network File System Services/300 (also requires LAN/9000 Series 300 Link, listed above)	3xx SPUs Other 300s with HP-UX	50969A/L Included*	Network File Sharing	HP 9000 Series 800 System with Network File System Services/800
			Remote Procedure Call	DEC VAX 7xx-8xxx/VMS 4.0 System with Wollongong's WIN/TCP 3.0 and WIN/NFS 1.1
			External Data Report (XDR)	IBM PC-AT or HP Vectra with MS-DOS or PC-DOS 3.xx and Sun Microsystems PC NFS 1.0 or 2.0
			Yellow Pages (YP)	SUN 2/xxx or 3/xxx system with SUN Release 3.x operating system and SUN NFS
			Virtual Home Environment (VHE)	

* HP-UX based Model 340, 360, and 370 workstations, instrument controllers, and network servers include a 98594L license to use HP-UX that also includes licenses to use Network Services/ARPA 300, and Network File System Services/300. Of these, workstations not supported by a Network Server will also require that the 98594A Media product, which delivers the licensed software on Option 022 1/4-inch cartridge tape media, be available for installation.

Table 30. LAN-Based Communications Packages for Model 825/835 Superworkstations

Communications Packages	For HP 9000 Model	Use Product Number	Capabilities	Supports Communication with
LAN/9000 Series 800 Link	825/835 Super-workstations	Included*	Interface, AUI or ThinMAU Assembly, and lower-level software collectively supporting OSI Model layers 1 - 5	All of the systems listed below when also supported by appropriate higher-level Communications Package.
Network Services/9000 Series 800 requires LAN/9000 Series 800 Link, listed above)	825/835 Super-workstations	91787A	Network File Transfer Remote File Access Resource Sharing with other HP-UX based systems Inter-process communications	HP 1000 A-Series System with Network Services/1000 software HP 3000 System with Network Services/3000-V or 3000-XL software HP 9000 Series 300 System with NS/ARPA Services Series 300 software HP 9000 Series 500 System with NS Services Series 500 software DEC VAX/VMS System with HP 50950A Network Services for DEC VAX/VMS (ARPA Telenet and Network file transfer only)
ARPA Services/800 (also requires LAN/9000 Series 800 Link, listed above)	825/835 Super-workstations	Included*	File Transfer Protocol (FTP) (ARPA) TELNET Virtual Terminal Capability (ARPA) Simple Mail Transfer (ARPA) Remote Copy (BSD 4.2) Remote Login (BSD 4.2) Remote Who (BSD 4.2) Remote Uptime (BSD 4.2) Remote Shell (BSD 4.2) Sendmail (BSD 4.2) Berkeley Sockets (Inter-process Comm. (BSD 4.2)	HP 9000 Series 300 System with HP-UX 5.1 or later and NS/ARPA Services Series 300 software DEC VAX 7xx/BSD UNIX 4.2/4.3 System with BSD 4.2/4.2 networking DEC VAX 7xx/VMS 4.0 System with Wollongong's WIN/VX Rel. 2.2 (ARPA services only) IBM PC-AT or HP Vectra with MS-DOS or PC-DOS 3.xx and ARPA Services/Vectra and ARPA ThinLAN Link/Vectra (Supports FTP and TELNET only) SUN 68010 or 68020 computer with SUN Release 3.0 operating system and SUN ARPA
Network File System Services/800 (also requires LAN/9000 Series 800 Link, listed above)	825/835 Super-workstations	50970A	Network File Sharing Remote Procedure Call External Data Report (XDR) Yellow Pages (YP) Virtual Home Environment (VHE)	HP 9000 Series 300 System with HP-UX 6.0 or later and Network File System Services/300 DEC VAX 7xx-8xxx/VMS 4.0 System with Wollongong's WIN/TCP 3.0 and WIN/NFS 1.1 IBM PC-AT or HP Vectra with MS-DOS or PC-DOS 3.xx and Sun Microsystems PC NFS 1.0 or 2.0 SUN 2/xxx or 3/xxx system with SUN Release 3.x operating system and SUN NFS

* Model 825/835 Superworkstations include the 91786B LAN/9000 Series 825 Link and 50981A ARPA/BSD Model 825 Networking Software, which does not have to be purchased separately.

X.25 Communication

Introduction

X.25 Communication for Series 300 systems and Model 825/835 Superworkstations is illustrated in Figure 101, below. Via the packet-switching network and the ARPA software, Series 300 systems or Model 825/835 Superworkstations can communicate with other systems using File Transfer Protocol (FTP), Telenet, and Simple Mail Transfer Protocol (SMTP). Communication to remote terminals connected via an HP 2334A Plus or 2335A X.25 Multiplexer is also supported.

Configuration Choices

Series 300 systems and Model 825/835 Superworkstations with X.25 Link can be configured as a DTE (Data Terminal Equipment) to transmit via a public or private X.25 network, as shown in Figure 101. Data rates up to 19.2 Kbps (Series 300) or 64 Kbps (Model 825/835 Superworkstations) are achievable. The X.25 Link can also be configured as a DCE (Data Circuit terminating Equipment) to run over direct, hard-wired lines. (A modem or modem eliminator is then required bet-

ween the two computers; no clock signals are available on the X.25 interface.)

Additional Information

For data sheets on the X.25 Links, ARPA software, and the 2334A Plus and 2335A X.25 Multiplexers, see the HP Advance-Net Specification Guide, HP Literature Stock Number 5956-4144 or a later revision, which is available from Hewlett-Packard Field Offices.

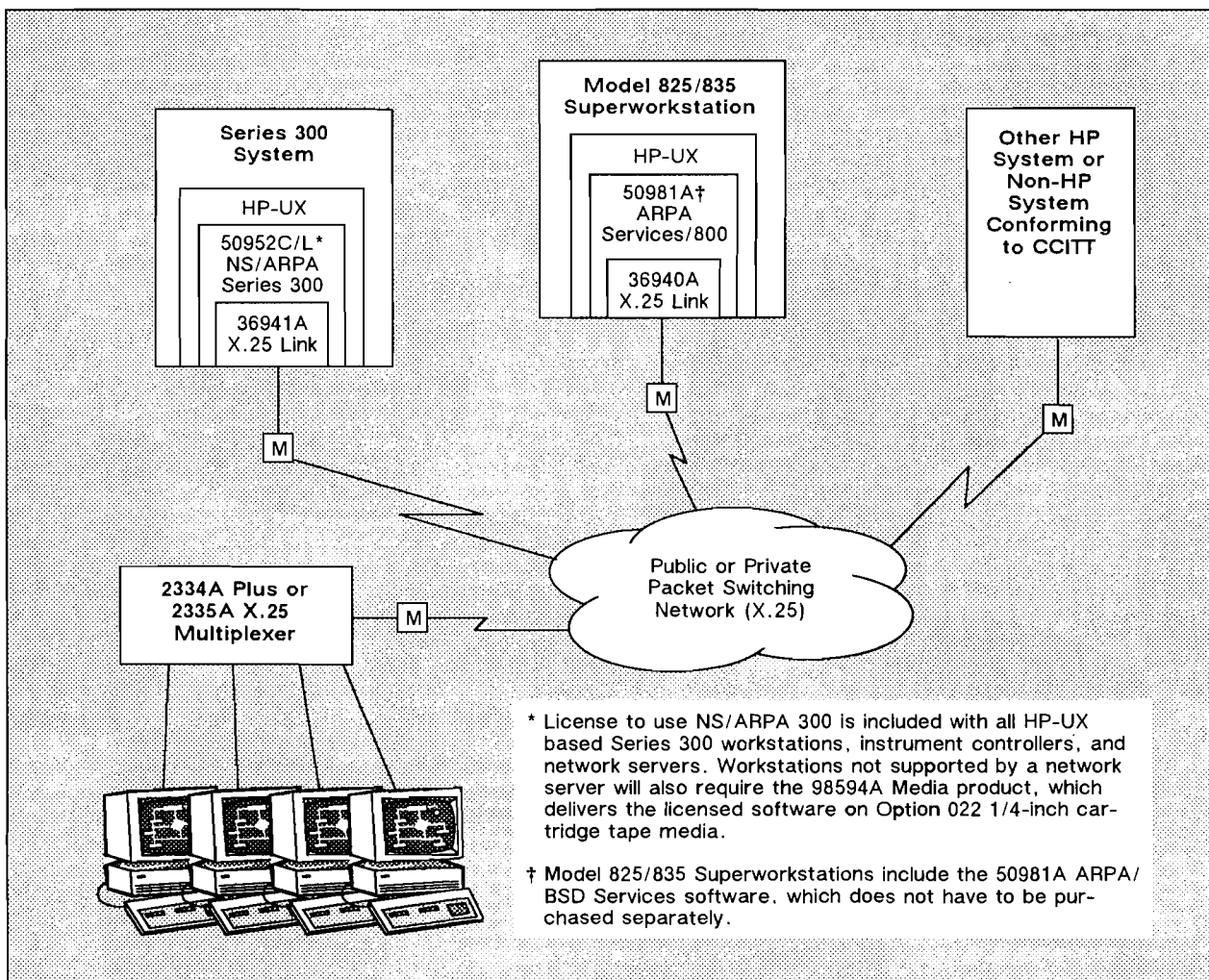


Figure 101. X.25 Communications for Series 300 Systems and Model 825/835 Superworkstations

Communication with IBM Systems

Introduction

IBM Communication capabilities available for Series 300 systems and Model 825/835 Superworkstations are summarized in Table 31, below. The relationships of the various IBM communications products are illustrated in Figure 102 on the next page.

SNA Standalone and Gateway Configurations

Series 300 systems and Model 825/835 Superworkstations may use SNA Communication with IBM systems either by direct modem connection (the standalone configuration) or via LAN connection to a gateway system. The

respective products used for standalone and gateway (GW) configurations are listed in separate sections in Table 31. The NS/9000 Network Services and LAN Link product that are required to complete gateway communication between systems on the LAN and the host gateway are listed in the main GW section beneath a dashed line.

Table 31. IBM and Related Communications Products for Series 300 Systems and Model 825/835 Superworkstations

Communications Product	For HP 9000 Model	Use Product Number	Network Services Provided
SNA/3179G (requires SNALink)	All Series 300	B1001A† Opt AA1	Emulation of IBM 3179G Color Graphics Display Station.
SNA/3270 (requires SNALink)	All Series 300 825/835 Superworkstation	36590A 36915A	Emulation of IBM 3278 terminals and 3287 printers and PC3270 file transfer.
SNA/3770 (requires SNALink)	All Series 300 825/835 Superworkstation	98188A 98179A	Emulation of standard subset of IBM 3777 Model 1 RJE Communications Terminal capabilities, including batch job entry.
SNALink	All Series 300 825/835 Superworkstation	36592A 98191A	Emulation of major features of IBM 3274 Cluster Controller, using SNA protocols.
GW SNA/3179G (requires GW SNA Link)	All Series 300	B1001A† Opt AA2	Emulation of IBM 3179G Color Graphics Display Station.
GW SNA/3270 (requires GW SNA Link)	All Series 300 825/835 Superworkstation	36591A 36918A	Emulation of IBM 3278 terminals and 3287 printers and PC3270 file transfer.
GW SNA/3770 (requires GW SNA Link)	All Series 300 825/835 Superworkstation	98184A 98185A	Emulation of standard subset of IBM 3777 Model 1 RJE Communications Terminal capabilities, including batch job entry.
GW SNALink	All Series 300 825/835 Superworkstation	36593A 98193A	Emulation of major features of IBM 3274 Cluster Controller, using SNA protocols.
NS/9000 Network Services	All Series 300 825/835 Superworkstation	50952C* 50981A‡	Support of communication between client system and Gateway SNA host system.
LAN Link	All Series 300 825/835 Superworkstation	Built-in or 98643A 91786B‡	OSI Level 1 (Series 300) or OSI Levels 1 - 6 (Model 825/835 Superworkstation) for NS/9000 Network Services access to LAN.
DIO RJE Interface RJE Emulator	All Series 300 All Series 300	98641A 50967A	Emulation of IBM 2780 Data Transmission Terminal or 3780 Data Communications Terminal for access to files peripherals, and data bases of host system.

† B1001A requires X Windows, Version 11 (X11) software. License to use X11 software is included with HP-UX based Model 340, 360, and 370 workstations, instrument controllers, and network servers. Workstations not supported by a network server will require the 98594A Media product, which delivers the licensed software on Option 022 1/4-inch cartridge tape media, for installation of the software.

* License to use NS/ARPA 300 is included with all HP-UX based Series 300 workstations, instrument controllers, and network servers. Workstations not supported by a network server will also require the 98594A Media product, which delivers the licensed software on Option 022 1/4-inch cartridge tape media.

‡ 50981A ARPA/BSD Model 825/835 Networking Software and 91786B LAN/9000 Series 825/835 Link are included in Model 825 and 835 Superworkstations and do not have to be purchased separately.

Communication with IBM Systems, continued

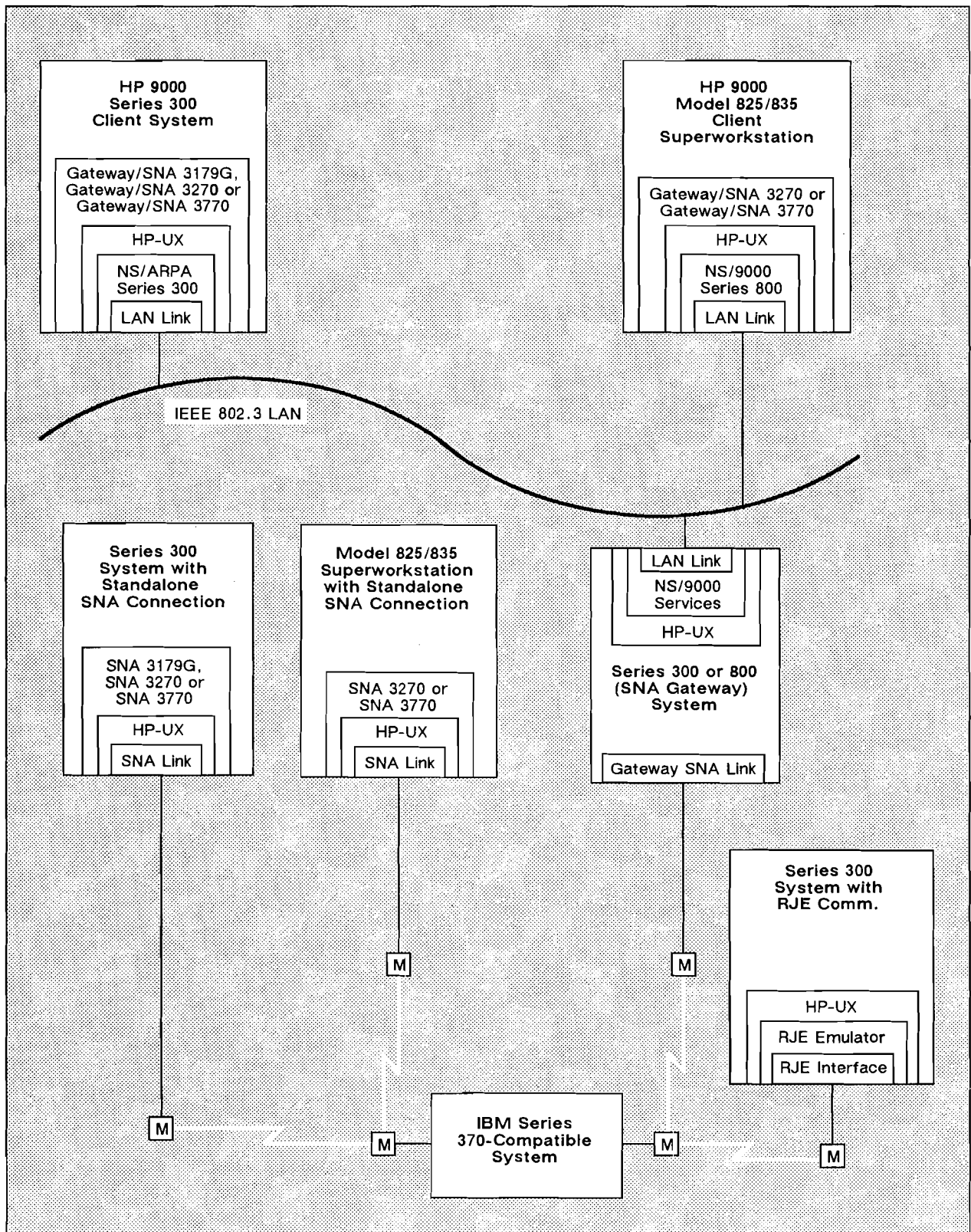


Figure 102. IBM Communications for Series 300 Systems and Model 825/835 Superworkstations

Database Management

A Choice of Two Database Management Systems

The HP Real-Time Database

For Computer Integrated Manufacturing and other uses requiring ultra-fast data capture and retrieval by factory floor cell controllers, Series 300 Systems and 825/835 Superworkstations can be provided with the HP Real-Time Database (Figure 103, below). The HP Real-Time Database is memory-based to provide fast,

deterministic response that avoids the extra delays inherent in disk-based data bases.

Relational Database

For applications that do not require the access speed of the HP Real-Time Database, Series 300 Systems can be provided with the disk-based SQL/300 Development Environment and Model 825/835 Superworkstations can be provided with ALLBASE/HP-UX (Figure 104, next page). SQL/300

and ALLBASE both support relational access databases. Interactive access for users is provided by HP Visor/300 in Series 300 systems and ALLBASE/QUERY in Model 825/835 Superworkstations. Because SQL/300 and ALLBASE/HP-UX are disk-based, they can provide considerably greater capacity than the HP Real-Time Database. Moreover, they also support ALLBASE/4GL (next section) for development and execution of transaction processing applications.

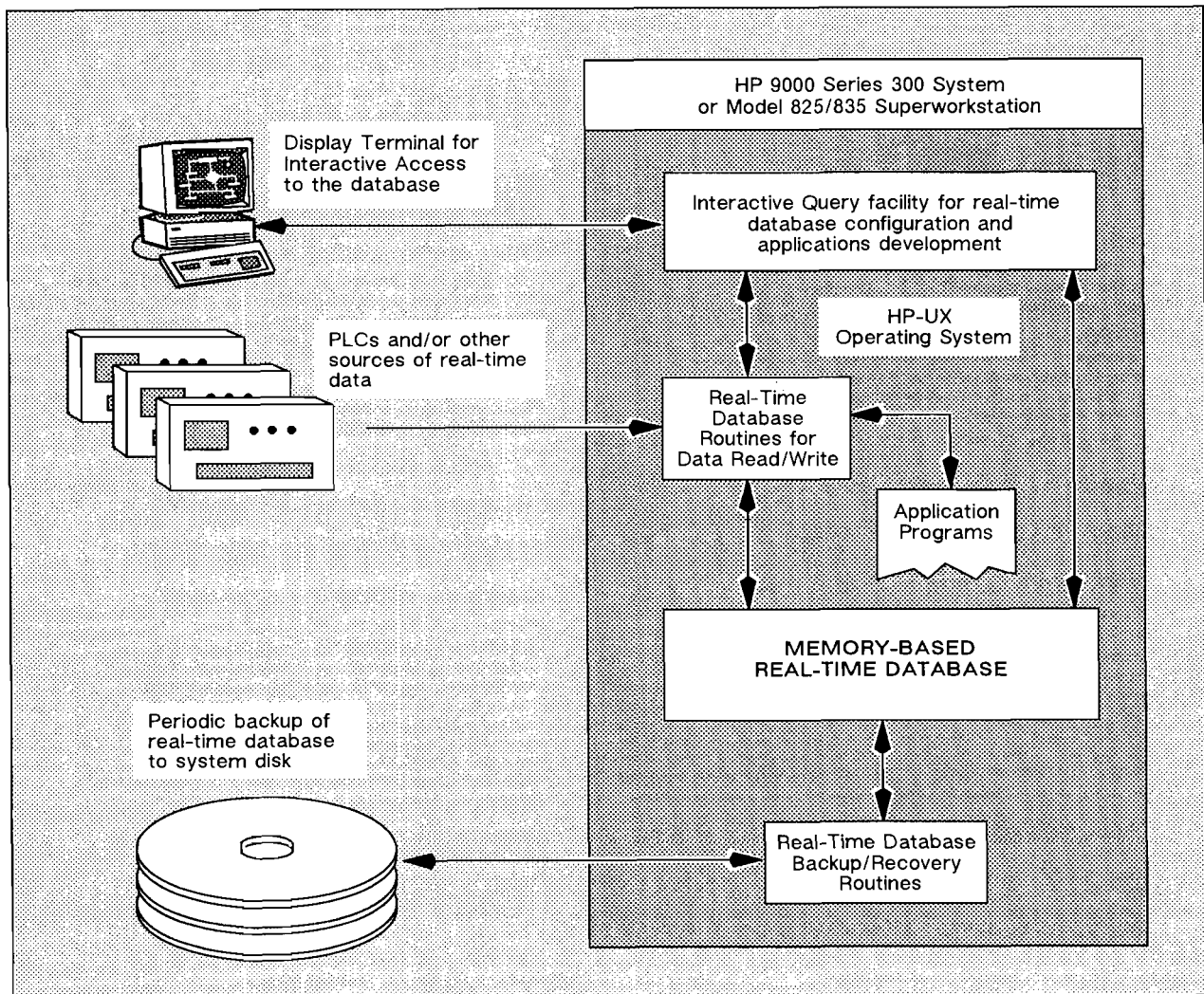


Figure 103. The HP Real-Time Database in Series 300 Systems and Model 825/835 Superworkstations

Relational Database Peripheral Require- ments

The peripheral devices required for relational data base support are shown in Figure 104, below. For guidance on interfacing and selecting terminals, disks, magnetic tape units and cartridge tape subsystems, and printers, respectively, see pages 130, 136, 141, and 143 in this guide.

The Database Management Products

Database Product	For HP 9000 Model	Use Product Number(s)
HP Real-Time Database	All Series 300	92572A/R/E Opt AEQ
	825/835 Superworkstations	92572A/RT/E Opt AEM
SQL/300	All Series 300	79725A & 79725L
HP Visor/300	All Series 300	79727B & 79727L
ALLBASE/HP-UX	825/835 Superworkstations	92460A
ALLBASE/QUERY	825/835 Superworkstations	92533A

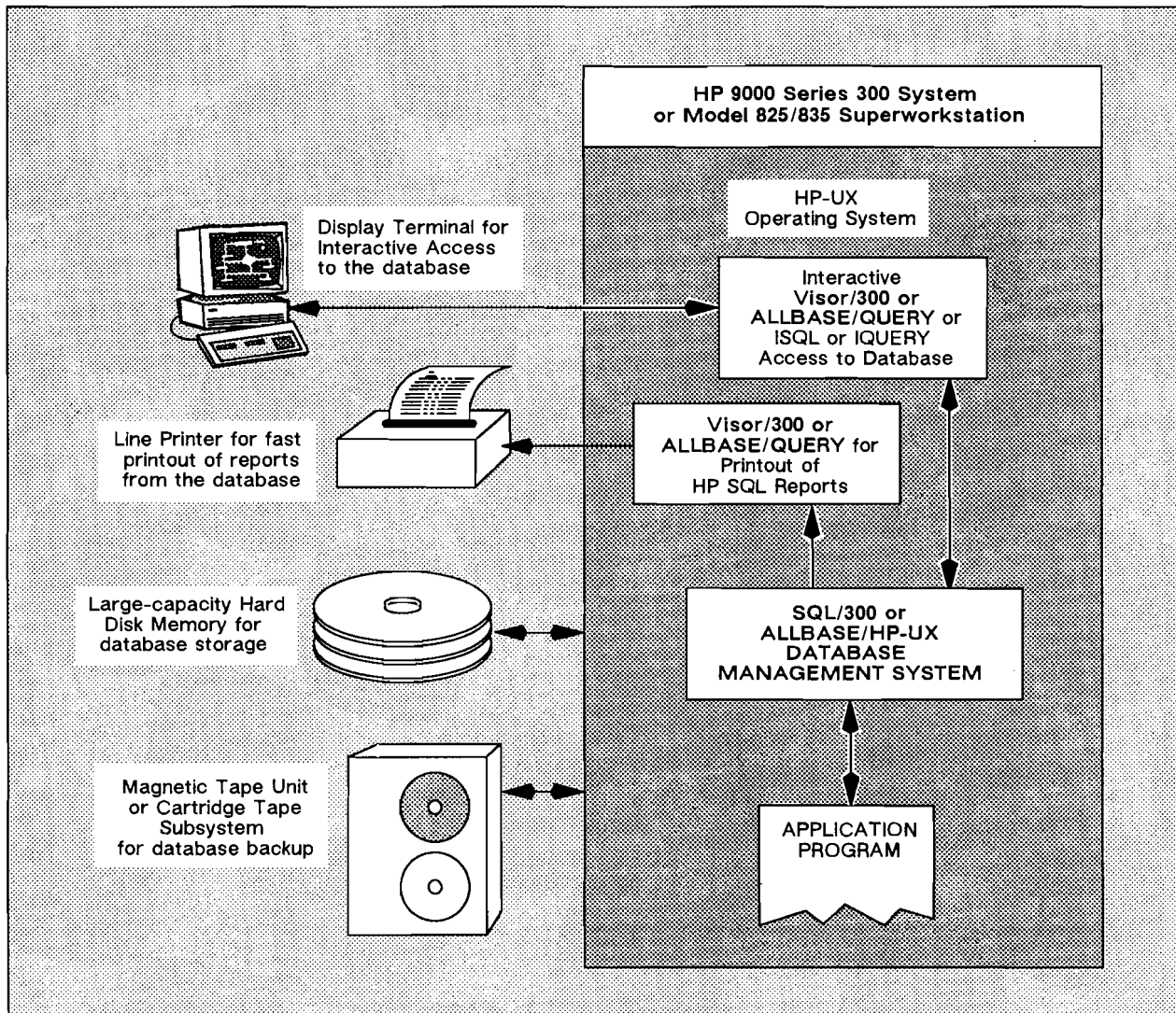


Figure 104. The Relational Database in Series 300 Systems and Model 825/835 Superworkstations

Application Development

Two Types of Application Development are Available

HP 9000 Series 300 Systems and Model 825/835 Superworkstations support two different types of application development, as follows:

- Fast interactive development of screen-based applications in HP-UX based systems using ALLBASE/4GL, a fourth-generation language.
- Conventional program development, using editor, compilers, debugger, etc.

Using ALLBASE/4GL

The ALLBASE/4GL Developer Pack provides a dictionary, screen painter, logic commands, and report layout facilities for interactive development of screen-based applications for transaction processing or data processing. (See Figure 105.) These applications typically interact with SQL/300, ALLBASE/HP-UX or other data bases. An external program interface, with full parameter passing, affords access to existing packages or computationally-

intensive code or other code written in conventional program languages. An ALLBASE/4GL runtime environment is available for execute-only support of completed ALLBASE/4GL applications on target systems.

Conventional Program Development

The basic requirements for conventional program development are illustrated in Figure 106, which also generally outlines the conventional program development process.

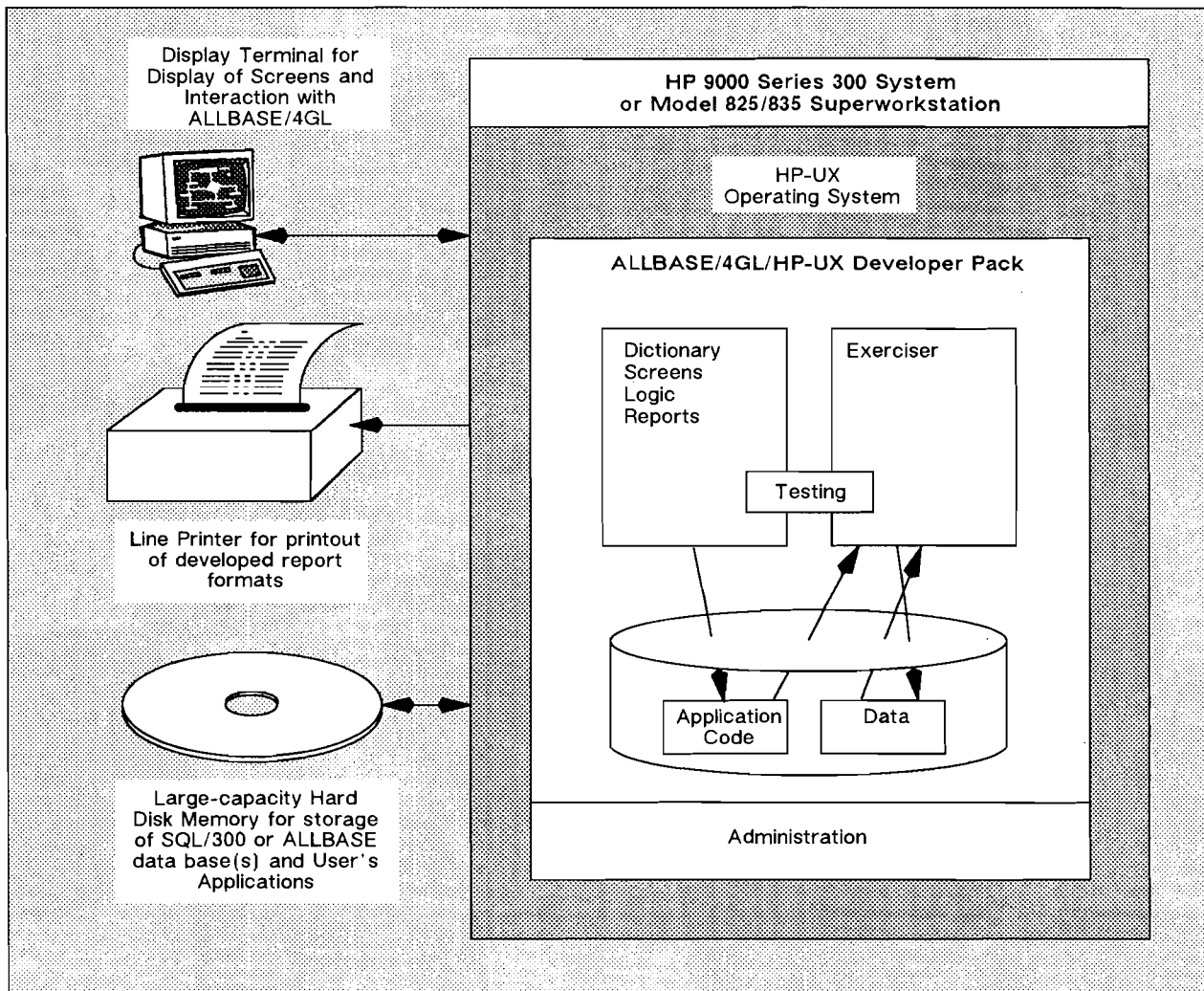


Figure 105. ALLBASE/4GL/HP-UX in Series 300 Systems and Model 825/835 Superworkstations

Application Development, continued

Step 1 - Entry of Program Code

A terminal is required by each concurrent user for calling up the appropriate program development software from the disk and for entry, or commanding the entry, of the source program, which may be accomplished via the vi Editor.

Step 2 - Compilation of the Program

Upon initial completion of the program, it must be compiled, assembled, or interpreted to provide an executable program in

object (machine) code form. The compilation process often involves printout of a hard copy program listing, which requires some type of system printer, preferably a fast line printer to conserve programmer's time.

Step 3 - Loading and Test Execution

The object program output of the compiler must be tested to confirm that it functions as intended by the programmer. If it does, the program development process can skip directly to step 5, routinely executing the program. However, if there are defects in the pro-

gram, or if the program takes too much time to execute, some of the other intermediate steps will also have to be taken.

Step 4 - Debugging the Program

Program defects need to be isolated and corrected, a process that is aided by the Symbolic Debugger/HP-UX, which is included with the HP-UX Programming Environment in Series 300, with the HP-UX operating system in Model 825/835 Superworkstations. Symbolic Debugger/HP-UX is window-oriented and can support multiple panes for viewing

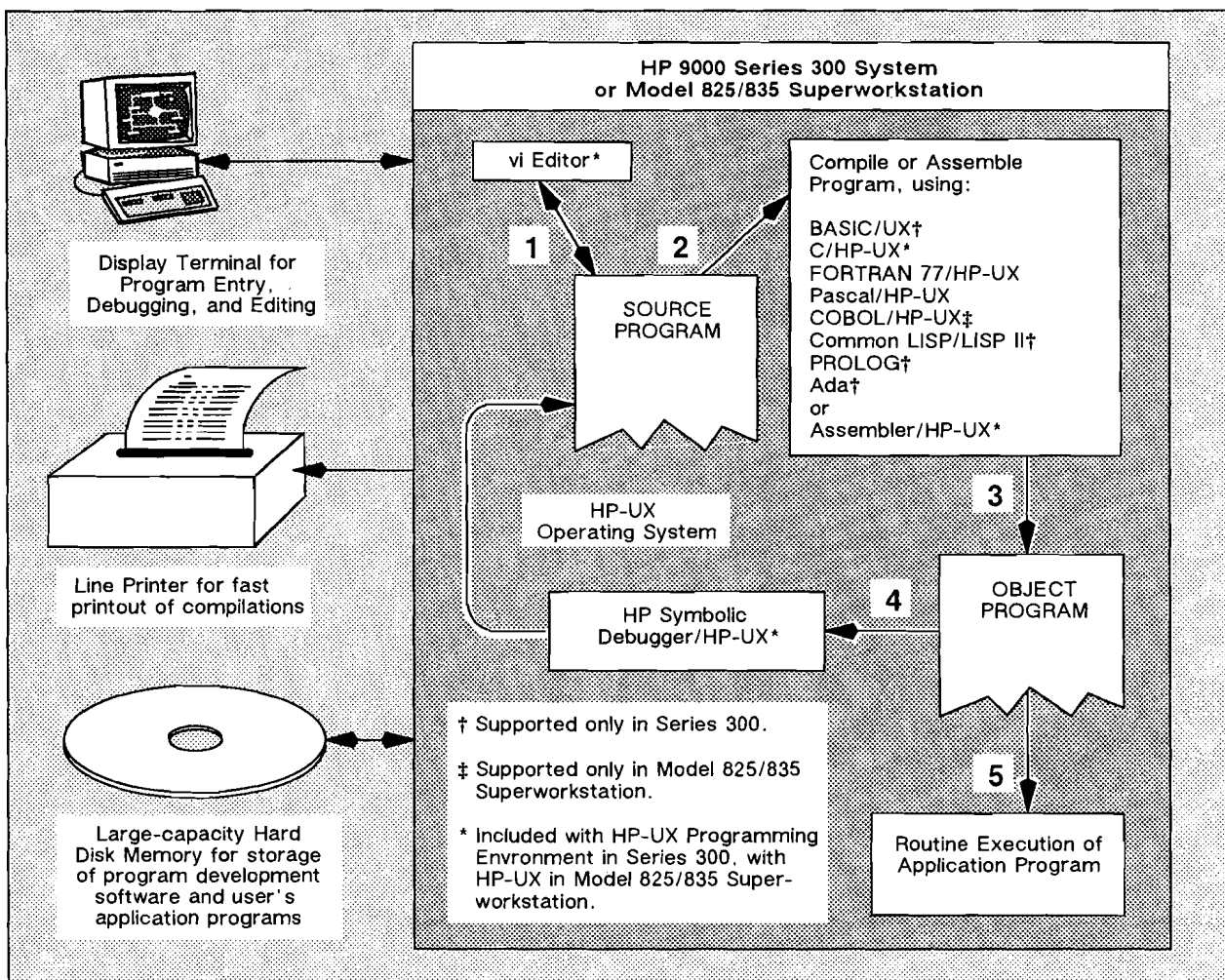


Figure 106. Conventional Program Development in Series 300 Systems and Model 825/835 Superworkstations

source statements and assembly instructions at the same time. It provides controlled execution that facilitates program fault isolation. With corrections made to the source code, it can be recompiled and retested. Symbolic Debugger/HP-UX provides complete support for programs written in C, FORTRAN, Pascal, and Assembly language.

Step 5 - Routine Execution

After debugging and compilation of an error-free program that runs as fast as it needs to, the program development process ends with routine execution of a successful application program.

BASIC/WS

The BASIC/WS system supports "Rocky Mountain" BASIC interpretive programming and execution in a relatively small, single-user system with keyboard and monitor that can use flexible disks to perform the functions of software installation and backup. It incorporates a hierarchical file system, an interactive editor, built-in debugging capabilities, and support for bit-mapped color displays, including high-resolution displays. However, it supports only BASIC language programming. A BASIC Compiler is supported and Compiled Subroutine utilities support calls to Pascal or Assembly language subroutines.

Pascal/WS

The Pascal/WS system is similar in scope and capability to the BASIC/WS system, but supports compiled program development in Pascal. No other high-level programming language is supported, although it does include a Motorola MC68xxx Assembler.

The Application Development Products

Application Development Product	For HP 9000 Model	Use Product Number
ALLBASE/4GL Developer Pack	310-340 350-370 825/835 Superworkstations	92471A 98112A 35305A
ALLBASE/4GL Developer Pack and ALLBASE/HP-UX	825S/835S/SE	92459A
ALLBASE/4GL Run-Time Environment	310-340 350-370 825/835 Superworkstations	92470A 98118A 35306A
FORTRAN 77/HP-UX	All Series 300 825/835 Superworkstations	98598B & 98598L 92443A
Pascal/HP-UX	All Series 300 825/835 Superworkstations	98599B & 98599L 92444A
COBOL/HP-UX Compiler	825/835 Superworkstations	35335A
COBOL/HP-UX Developer Pack	825/835 Superworkstations	35328A
COBOL/HP-UX Run-Time System Package	825/835 Superworkstations	35329A
HP-UX Programming Environment	All Series 300	98597C & 98597L
HP-UX Ada Development System	All Series 300	98860A & 98860L
BASIC/UX	All Series 300	98796A & 98796L
HP Common LISP Development Environment	All Series 300	98678B & 98678L
HP Common LISP II Development Environment	All Series 300	98688A & 98688L
HP Common LISP II Application Environment	All Series 300	98689A & 98689L
HP PROLOG Development Environment*	All Series 300	79232U
ROM-based BASIC/WS, Version 5.1 on DIO Accessory Card	All Series 300	98603B
RAM-based BASIC/WS, Version 5.1	All Series 300	98616A
BASIC 5.x Compiler	All Series 300	98618A
BASIC 5.x Compiled Subroutine Utilities	All Series 300	98616A-11x40
RAM-based Pascal/WS Version 3.21	All Series 300	98617A

* HP PROLOG Development Environment requires HP 98678B and 98678L HP Common LISP Development Environment.

MS-DOS Support Under HP-UX

Two Ways to Support MS-DOS Applications in HP 9000 Systems

It is now possible for users to support MS-DOS applications on both HP 9000 Series 300 and Series 800 systems operating under HP-UX. Series 300 systems support both a DOS Coprocessor (a DIO Accessory card with related DOS Coprocessor software) and SoftPC® Synthetic Hardware (MS-DOS system emulation software). Series 800 systems (Model 825 and 835 Superworkstations) support the SoftPC Synthetic Hardware. HP 9000 systems can thus provide single-user access to an MS-DOS environment that can run the thousands of applications that are available for the IBM PC family. Table 32, below, summarizes these two products.

Table 32. DOS Coprocessor - SoftPC Summary

	DOS Coprocessor	SoftPC
Supported In	Models 332, 340, 360, and 370 operating under HP-UX, revision 6.2 or later; Model 340 will require option 006; Model 360/370 will require a 98242A/B DIO backplane or a 98568A Option 132 DIO Expander.	Models 332, 340, 360, and 370 operating under HP-UX revision 6.2 or later and in Model 825 and 835 Superworkstations operating under Series 800 HP-UX revision 3.0 or later.
For Series 300, Order:	HP 98286A DOS Coprocessor Hardware and HP 98531A DOS Coprocessor Software on Option 022 1/4-inch Tape Cartridge or Option 045 3.5-inch Double-Sided Flexible Disk. Also available as HP 98286S/D bundles.	HP 98870L License to Use SoftPC and 98870A Media (1/4-inch Tape Cartridge) and Manuals.
For Model 825/835 Superworkstations, Order:	Not available	HP 98876A License to Use, Media, and Manuals; available on Option AA0 1/4-inch Tape Cartridge or Option AA1 1/2-inch 1600 cpi, 9-track magnetic tape.
Processors	Intel 80286 (7.16 MHz), Intel 80287 Numeric Coprocessor (4.66 MHz) is optional.	PC XT Intel 8086 (emulation)
Operating System	MS-DOS 3.3	MS-DOS 3.3
Memory	Conventional (640 KB, maximum) Extended (up to 4 MB) Expanded (Lotus/Intel®/MicroSoft® Expanded Memory Specification 4.0, up to 32 MB, limited by HP-UX kernel configuration)	Conventional (640 KB, maximum) Expanded (Lotus/Intel®/MicroSoft® Expanded Memory Specification 4.0, up to 8 MB)
Disk Storage	360 KB 5.25-inch flexible disk drive, 720 KB and 1.4 MB 3.5-inch flexible disk drives. Up to 32 MB hard disk emulated in HP-UX file system, Direct access to HP-UX file system space (size limited by HP-UX file system size).	360 KB 5.25-inch flexible disk drive, Two emulated hard disks (up to 32 MB each), Direct access to HP-UX file systems space (size limited by HP-UX file space).
Display System	IBM Color Graphics Adapter (CGA) and Hercules Graphics Controller (HGC) or IBM Enhanced Graphics Adapter (EGA)	IBM Color Graphics Adapter (CGA) and Hercules Graphics Controller (HGC) or IBM Monochrome Device Adaptor (MDA) for serial terminal emulation (text only)
Other I/O	Up to 4 emulated RS-232 ports with 19.2 Kbaud speed, Up to 3 emulated parallel printer ports, and Pipes to HP-UX processes.	Up to 4 emulated RS-232 ports with up to 9600 baud speed, Up to 3 emulated parallel printer ports, and Pipes to HP-UX processes.
Performance (if only DOS is executing)	Model 332/340: > 4.77 MHz PC XT Model 360/370: ~ 6 MHz PC AT	Model 332/340: > 4.77 MHz PC AT Model 360/825: ~ 6 MHz PC AT Model 370/835: >= 8 MHz PC AT
Partial List of Supported Applications	HP 68350F Charting Gallery, 68351F Drawing Gallery, 68331F Executive Card Manager, 68352F Gallery Collection (includes Charting Gallery and Drawing Gallery), 68340F Lotus® 1-2-3®, 45474D MS Word, 68339F Lotus Symphony, 45450D GW™ BASIC by MicroSoft, and 45448A COBOL by MicroSoft.	

Configuration Information

For configuration information, including configuration requirements, see Table 33, below.

Table 33. DOS Coprocessor – SoftPC Configuration Information

	DOS Coprocessor	SoftPC				
Slot Requirement	One DIO Accessory or DIO I/O Slot.	None				
Minimum RAM	4 MB without windowing software.	4 MB.				
Recommended RAM	8 MB with or without windowing software	8 MB.				
HP-UX Disk Space	5 MB required to install DOS Coprocessor.	5 MB required to install X Windows System 11 version of SoftPC; 4.5 MB to install terminal version; 7 MB to install both versions together.				
System Disk Size	80 MB, minimum; at least 130 MB recommended.	80 MB, minimum, in Series 300; at least 130 MB recommended in Series 300 and 800.				
Software Installation	HP 9144A or 35401A 1/4-inch cartridge tape subsystem can be used to install HP-UX and the DOS Coprocessor; HP 9122C 3.5-inch double-sided flexible disk can be used to install DOS Coprocessor software.	HP 9144A or 35401A 1/4-inch cartridge tape subsystem can be used to install HP-UX and SoftPC in Series 300 or Series 800; 1/2-inch HP 7979A, 7980A, or 7980XC 1/2-inch, 1600 cpi, 9-track magnetic tape unit can be used to install HP-UX and SoftPC in Model 825/835 Superworkstation				
Flexible Disk	HP 9122C 3.5-inch flexible disk can be used as 720 KB or 1.44 MB drive A or B; HP 9127A 5.25-inch flexible disk can be used as 360 KB drive A.	HP 9127A 5.25-inch flexible disk can be used as 360 KB drive A; Slave PC software, provided with SoftPC, supports file migration PCs to HP 9000s via RS-232 interface, eliminating a requirement for an HP 9127A for use in file transfer.				
Supported Video Interfaces	Model 332 built-in monochrome video interface, HP 98542A, 98543A, 98544A ^o /B, 98545A [§] , 98547A, 98548A, 98549A, 98550A, 98720A, and 98730A.	HP 98542A, 98543A, 98544A ^o /B, 98545A [§] , 98547A, 98548A, 98549A, 98550A, 98720A, 98730A, and A1020H.				
Supported Terminals	Not applicable	HP 2393A and C1007A/G/W have been tested and are supported; though not tested or supported, other HP terminals should also work.				
Supported Keyboards	HP PC emulation systems support all standard HP North American and European keyboards, including the USASCII keyboard. See page 13 for National versions of keyboards.					
Mouse Support	HP 46060A two-button mouse and 46060B three-button mouse can automatically emulate the MicroSoft mouse. An MS mouse driver is included with the DOS Coprocessor software and the SoftPC software.					
Suggested Printers	The HP PC emulation systems support many different printers. The following printers are suggested because they are supported by HP-UX and also widely supported by DOS applications: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">HP 2225D ThinkJet* (RS-232C)</td> <td style="width: 50%;">HP 2276A DeskJet* (RS-232C)</td> </tr> <tr> <td>HP 2227B QuietJet* (HP-IB)</td> <td>HP 33440A LaserJet Series II†</td> </tr> </table>		HP 2225D ThinkJet* (RS-232C)	HP 2276A DeskJet* (RS-232C)	HP 2227B QuietJet* (HP-IB)	HP 33440A LaserJet Series II†
HP 2225D ThinkJet* (RS-232C)	HP 2276A DeskJet* (RS-232C)					
HP 2227B QuietJet* (HP-IB)	HP 33440A LaserJet Series II†					
Suggested Plotters	An HP-GL plotter supported by HP-UX and the desired DOS applications connected via HP-IB or RS-232C, such as the HP 7440A ColorPro Plotter or the 7575A Graphics Plotter.					

^o Discontinued product, listed for reference.

[§] HP 98545A does not support EGA display emulation.

* This printer may be switched between HP PCL level 1 commands and IBM/Epson emulation mode (required by most DOS applications in order to have full printer support).

† Although the LaserJet family of printers supports only PCL level 3 or 4 commands, most DOS applications support HP PCL at those levels.

Network Access

Both the DOS Coprocessor and SoftPC are accessible remotely via the X-Window system and LAN connection.

DOS Coprocessor

Using the X Window System, a workstation on a LAN with a bit-mapped display can function as an X display server and access the DOS Coprocessor in another workstation on the LAN, which acts as an X client. The X display server runs the DOS emulation and application software on the X client and receives and displays the results locally. In this way, a workstation that does not have a DIO slot available for a DOS coprocessor can run DOS applications.

Only one X display server workstation on the LAN can access a DOS coprocessor system at a time. However, if multiple X client workstations have the DOS Coprocessor installed, the X display server workstation can access any or all of the coprocessors in the X clients concurrently.

SoftPC

Using the X Window System, workstations can access SoftPC without having the product installed locally, in much the same way as with the DOS Coprocessor. A workstation without SoftPC installed can act as an X display server and run DOS applications on an HP 9000 X client system which does have SoftPC installed. The X display server can run multiple SoftPC windows/applications on its display. These windows can be networked from one or multiple machines running SoftPC as X clients. Each machine will require a SoftPC license.

DOS Coprocessor Configuration Notes

Coprocessors Per System

Only one DOS Coprocessor can be used per Series 300 system.

Slot Requirement

The DOS Coprocessor uses one DIO Accessory slot or one DIO I/O slot. Use in a Model 340 workstation will require option 006. Use in a Model 360 or 370 workstation will require a 98242A or 98242B DIO backplane or a 98568A 8-slot direct-connect DIO Expander.

Use in HP 9888A Expander

The DOS Coprocessor board cannot be used in an HP 9888A Expander.

Rack Mounting Information

Introduction

Series 300 SPUs, most instrument controllers, and workstations, 825/835 Superworkstations, and most rackable expanders and peripherals for them are 325mm wide devices designed to be housed in HP *Design Plus* cabinets. These devices have removable front feet and rear pads and a top groove for interlocked stacking of units to a maximum supported height of 0.6m, or 24 *Design Plus* units. A *Design Plus* Unit is approximately 1 inch.

Devices of lesser depth should be stacked atop those of greater depth and, with depth the same, lighter devices should be stacked on heavier ones.

Table 34, at right, compares the cabinets that are available for housing HP 325mm *Design Plus* devices. Table 35, next page, lists the devices that can be housed in the cabinets.

92211M/L Taborets

The 92211M/L taborets are designed for under-table use. The taller 92211L is the maximum height that will fit under typical tables. The smaller 92211M is intended to accept a 19-inch wide HP System-II device, such as a 9888A DIO Bus Expander.

Both taborets have a flat floor with slots for the feet of the bottom device. The included rails and shelf are useful when the equipment does not fill the full vertical space and you want certain devices at the top.

Both taborets are shipped with four removable casters, with locking brakes on the front pair of casters. However, because the foot/groove interlock system relies on gravity for the security of housed devices, these cabinets are not intended for routine movement with devices in them.

Table 34. *Design Plus* Cabinets

Product Number	92211M	92211L	92211R
Common Name	Small Taboret	Large Taboret	Mobile Mini-rack
Usable Rack Height	13 units	20 units	22 units
Exterior Height	435mm	620mm	720mm
Interior Width Exterior Width	325mm 425mm	325mm 425mm	325mm 375mm
Interior Depth Exterior Depth	400mm 425mm	500mm 525mm	700mm 711mm
Equipment Rails	One pair included	One pair included	Order 92211S (four pairs)
Shelf	One included	One included	None
Front Filler Panels	None Available	None Available	Order 92211T (20 units)
Rear Door	None	None	Included
Power Strip	None	None	None

The taborets are open at front and rear. There are no cooling concerns so long as nothing more than I/O cables and power cables is placed behind any device housed in the taboret.

92211R Mini-Rack

The 92211R is designed for desk-side use, with an external height which matches that of other HP *Design Plus* furniture. It includes four casters, with locking brakes on the front pair of casters.

The 92211R does not have a flat floor and requires the use of at least one pair of 92211S rails for installing devices. The 92211S kit includes four rails. The rails do not have locking slots for device feet.

The 92211S kit also includes five pairs of module locks, each of which secures one device to the frame of the 92211R. At a minimum, one rail pair and one lock pair are required for the bottom device in a stack, so one 92211S kit can serve up to four 92211R cabinets.

If a rack is to be moved often, or is to be shipped, a pair of rails and locks should be used for each device in the cabinet. HP supports shipping of 92211R racks with equipment installed only for specific tested configurations in custom crating. Customers assume responsibility for all other shipped configurations.

A 92211T kit of 20 1-unit-high snap-in filler panels is available for cooling and cosmetic purposes. The 92211R has a removable rear door with ventilation slots. When the door is installed, any unoccupied vertical space at the front of the 92211R must be occupied by filler panels to prevent recirculation of heated air.

19511A Version of 92211R

The 92211R is also available in as the 19511A, a special version for two 7936/7937 disk drives. Modifications include anti-tip feet, safety interlock, extended-depth rear door, and two pairs of ball-bearing slide rails for mounting two disks. The 19511A also includes 11 filler panels.

Rack Mounting Information, continued

Where only a single 7936/7937 disk is installed (at the bottom), the upper rails can be removed and the available 11-unit space above the disk can be used for other devices. At least one pair of ordinary 92211S rails are required because the 7936/7937 does not have a flat, grooved top. Filler panels must be used to ensure adequate cooling of the device(s) in the top of the 19511A cabinet. In addition, if the second device is not a 35401A Autochanger Cartridge Tape Subsystem, the rear door must be removed.

For More Information on *Design Plus* Cabinets and Accessories

For more information on HP *Design Plus* cabinets and accessories, see the "Hewlett-Packard Computer Users Catalog," HP Literature Stock Number 5953-2450D or a later revision, available from Hewlett-Packard's Direct Marketing Division, telephone 800-538-8787.

19-inch EIA Rack-Mount Accessories

Table 36, next page, lists HP cabinets and accessories available for customers who want to rack-mount Model R/332 Instrument Controllers, Series 300 systems, or Model 825/835 Superworkstations in 19-inch EIA rack cabinets.

Table 35. *Design Plus* Device Sizes

Model or Product No.	Name/Description	Height (units)	Depth (mm)
310, 320, 332 318, 319, 340 360, 370	Computers Computer Computer	5 4 5	400 470 400
825/835	Superworkstation	9	500
A1013A	Expander for Superworkstation	9	500
2393/2397	Terminal Processor	4	350
35401A	Autochanger Cartridge Tape Subsystem	10	640
7907A	Fixed/Removable Disk	9	468
7936/7937*	Fixed Disk	11	735
7941A°/7945A° 7942A°/7946A°	Fixed Disks Fixed Disks with Cartridge Tape Drive	5 12	310 310
7957x-7959x 7962B/7963B	Winchester Disks Winchester Disks	5 5	310 570
9121°/9122 9125°/9127A	Flexible Disks Flexible Disks	3 4	310 310
9144A/9145A	Cartridge Tape Subsystems	5	310
9153	Disks	4	310
98568A 98570A 98577A	Expander Expander Expander	5 5 5	400 400 400
98720A 98730A	SRX Display Controller TurboSRX Display Controller	9 12	580 580

° Discontinued product, listed for reference.

* Requires 19511A version of 92211R rack or 19512A 19-inch EIA rack adapter.

Table 36. 19-inch EIA Rack Cabinets and Accessories

Product Number	Vertical Rack Space (Inches)	For Series	Name/Description
29402C	62.6	n/a	Cabinet
29431G	54.87	n/a	Cabinet divided equally into two compartments, ventilated upper and non-ventilated lower.
40101-6A	Various	n/a	1.75, 3.5, 5.25, 7, 8.25, and 10.5 inch blank, parchment white filler panels.
A1309A	7.5	300	Rack Mounting Flange Kit for Model R/332 Instrument Controller (also requires 1494-0059 or 1494-0063 rack slides or 12679B slide rails).
12131A	3.5	n/a	Keyboard racking kit; includes pivot for keyboards wider than 19 inches.
A1019A	3.5	800	Rack adapter for A1014A Battery Backup Unit for Model 825/835 Superworkstation.
19500B	5.25	300	Rack adapter for all 300mm to 400mm deep devices. Includes 1 and 2 unit filler panels for devices that are less than 5 units high.
19560B	7	n/a	Rack adapter for 7962B/7963B Disks.
98569A	7 & 5.25	300	Two-part rack adapter; the lower section supports the SPU chassis and the upper section provides cosmetic wings for a single 98568A/98570A/98577A Expander or other 5-unit high device that is shorter than 400mm.
19507A	7	n/a	Rack adapter for 7907A Disk.
44496A	8.75	n/a	Locking drawer for 2225x <i>ThinkJet</i> Printer.
35490A	12	n/a	Rack adapter for 35401A Autochanger Cartridge Tape Subsystem.
97099A	10.5	300/800	Rack adapter for 98720A SRX Display Controller.
19512A	12	n/a	Rack adapter for 7936/7937 Disk.
98567A	15.75	300	Rack adapter for 35731A Monochrome Monitor.
98567B	15.75	300	Rack adapter for 35741A Color Monitor.

n/a = not applicable to particular series.

Product Number Index

Product Number	Page	Product Number	Page	Product Number	Page
A1005A	110, 111	19507A	169	35305A	163
A1008A	107, 108			35306A	163
A1010A	108, 111, 114, 117, 120	19511A	82, 137, 140, 167	35325A	163
A1013A	108, 111, 125	19512A	169	35329A	163
A1014A	109, 111, 114, 117, 120, 169	19514A	137, 140	35335A,	63
A1015A	109, 111, 114, 117, 120	19521FL	140	35401A	81, 82, 141
A1017A	108, 111, 114, 117, 120, 122, 125, 127	19521H	139	35490A	169
A1019A	169	19522FL	140		
A1020A	108, 114	19522H	139	35723A	16, 19, 21, 35, 38, 40, 59, 133
A1020H	107, 108, 113, 114, 127	19524FL	126, 137, 140	35731A	16, 20, 39, 95, 127, 169
		19524H	139	35741A	16, 18, 37, 95, 127, 169
A1036A	109, 112	19560B	169		
A1037A	108, 111, 114, 117, 120	2225x	143, 146, 149	3630A	143, 146, 149
A1038A	109, 112	2227x	143, 146, 149		
A1039A	114, 115, 117, 118, 120, 121, 125	2228A	143, 146, 149	36590A	157
A1045A	116, 117			36591A	157
A1047A	120, 122, 147	2235x	143, 146, 149	36592A	96, 99, 157
A1050A	113, 114	2276A	143, 146, 149	36593A	96, 99, 157
A1055A	119, 120			36918A	157
A1082A	83	2334A Plus	156	36940A	122, 156
A1308A	23	2335A	156	36941A	96, 156
A1309A	23, 169			37201A	93, 124
B1001A	157	2342A	130, 132	37204A	93, 124
C1001x	128, 129, 130	2350A	132	39800A	134, 135
C1002x	130			39801A	134, 135
C1003x	130	2392A	129, 130		
C1004x	130	2393A	130, 133	40101-6A	169
C1006x	130	2397A	130, 133	40231A	132
C1007x	130			40242G	130, 131, 144, 146, 151, 152
C1200A	143, 146, 149	2563B	135, 143, 146, 149	40242M	130, 131, 144, 146, 151, 152
C1202A	143, 146, 149	2564B	135, 143, 146, 149	40242Y	130, 131
C1600A	150, 152	2566B	135, 143, 146, 149	41063A	143, 146, 149
C1601A	150, 152	2567B	135, 143, 146, 149		
10833A	92, 124, 142, 145, 150	2684x	143, 149	44496A	169
10833B	92, 124, 142, 145, 150	27110B	108, 111, 114, 117, 120, 122, 123, 124, 125, 126, 138, 142, 145, 150	45711E/F	130
10833C	92, 124, 142, 145, 150			45911A	109, 112, 115, 117, 121, 133, 134
10833D	92, 124	27111A	122, 123, 125, 137, 138		
10834A	92, 124	27114A	122	46021x	16, 18, 20, 24, 26, 28, 30, 32, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 61, 63, 65, 67, 69, 71, 73, 75, 79, 81, 107, 108, 110, 111, 113, 114, 116, 117, 119, 120, 127, 128, 133, 134
12131A	169	28641A	77, 108, 111, 114, 117, 120, 153		
13242G	135	28663A	78, 153	46060A	16, 19, 21, 25, 27, 29, 31, 33, 36, 38, 40, 41, 43, 45, 47, 50, 52, 53, 55, 59, 61, 63, 65, 67, 69, 71, 73, 75, 80, 82, 108, 111, 114, 117, 120, 133, 134
13242N	135	28664A	78, 153	46060B	133, 134
13279B	95	28667A	125		
13367A	137	28762A	122		
17255D	130, 131, 144, 146, 151, 152	28766A	122		
17255F	130, 131, 151	2932A	143, 146, 149		
17570A	152	2934A	135, 143, 146, 149		
19500B	109, 112, 115, 118, 121, 169	29402C	169		
		29431G	169		
		30241A	108, 111, 114, 117, 153		
		30421A	120		
		33440A	143, 146, 149		

Product Number	Page	Product Number	Page	Product Number	Page
46080A	23, 133, 134	7957A	139	92521A	147
46081A	16, 19, 21, 36, 38, 40, 41, 43, 46, 48, 50, 52, 53, 55, 59, 61, 63, 65, 67, 69, 71, 73, 76, 108, 111, 114, 117, 120, 133, 134	7957B	139	92524A	108, 111, 114, 117, 120
46082A/B	133, 134	7957S	140	92533A	160
46083A	133	7958A	139	92572A/E	160
46084A	16, 19, 21, 25, 27, 29, 31, 33, 36, 38, 40, 41, 43, 46, 48, 50, 52, 53, 56, 59, 61, 63, 65, 67, 69, 71, 74, 76, 80, 82, 108, 111, 114, 117, 120, 133, 134	7958B	42, 44, 139	9262B	139
46085A	112, 117, 121, 133	7958S	140	9263B	139
46086A	133	7959B	79, 80, 139	92916A	133, 134, 135
46087B	109, 112, 115, 117, 121, 133	7959S	140	9666A	130
46088B	109, 112, 115, 118, 121, 133	7962B	139	97099A	109, 112, 115, 118, 121, 169
46094A	133, 134	7963B	139	97902B	139
46095A	133, 134	79725A/L	160	97903B	139
50950A	154, 155	79727B/L	160	97962B	139
50952C	154, 156, 157	7979A	91, 141	97963B	139
50952L	10, 154, 156	7980A	91, 141	98013A	25, 27, 29, 31
50955A	96	7980XC	91, 141	98053A	97
50962A	96, 99	82977A/B	92, 124	98112A	163
50967A	157	9122C	139	98118A	163
50969A	154	9122D	139	98179A	157
50969L	10, 154	9122S	139	98184A	157
50970A	155	9127A	139	98185A	157
50981A	108, 111, 114, 117, 120, 155, 156, 157	9144A	79, 80, 141	98188A	157
7440A	150, 152	9145A	141	98191A	122, 157
7475A	150, 152	9153C	139	98193A	122, 157
7550A	150, 151, 152	91786B	108, 111, 114, 117, 120, 122, 153, 155, 157	98196A	122, 123, 125, 126, 129, 130, 131, 135, 144, 146, 151, 152
7570A	150, 152	91787A	155	98203C	16, 19, 21, 38, 40
7575A	150, 152	92211L/M	167	98222x	138
7576A	150, 152	92211R	80, 82, 109, 112, 115, 118, 121, 167	98235A	25, 27, 29, 31, 33, 96
7595A	150, 152	92211S/T	109, 112, 115, 118, 121, 167	98237A	25, 27, 29, 31, 33, 96
7596A	150, 152	92219Q	131	98242A	46, 48, 50, 52, 54, 56, 85, 102
7907A	139	92219T/U	131, 135, 144, 151	98242B	35, 37, 39, 41, 43, 85, 88, 102, 103
7914CT	139	92220R	92, 124	98248B	35, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 62, 64, 66, 68, 70, 72, 74, 76, 82, 83, 98
7914P/R	139	92221M/P	130, 131	98253A	98
7914ST	139	92222x	92	98255A	90, 98, 99
79232U	163	92224F	130, 131, 152	98256A	99
7933H	139	92224M	130, 131, 144, 146, 151, 152	98257A	99
7935HR	139	92227A-P	77	98258x	58, 59, 62, 64, 66, 68, 70, 72, 74, 76, 98
7936FL	140	92268A-D	78	98259A	98, 99
7936H	139	92443A	163	98262A	37, 39, 41, 43, 55, 91, 137, 142, 145, 150
7937FL	137, 140	92444A	163		
7937H	81, 82, 139	92445A	108, 111, 114, 117, 120, 147		
		92452A	108, 111, 114, 117, 120		
		92459A	163		
		92460A	160		
		92470A	163		
		92471A	163		

Product Number Index, continued

Product Number	Page	Product Number	Page	Product Number	Page
98264x	58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 97, 98	98581C	18	98643A	15, 96, 99, 153, 154, 157
98265A	91, 138	98581W	37	98644A	91, 94, 99, 128, 130, 131, 135, 144, 146, 151, 152
98267x	35, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 98	98581WX	41		
98268A	25, 27, 29, 31, 33, 80, 98	98583G	65, 83	98645A	97
98269A/B	16, 19, 21	98583W	45, 47, 49, 83	98646A	88, 90, 97, 99
98284A	16, 19, 21	98587G	73, 83	98647A	99
98285A	16	98587H	75, 83	98649A	96, 99
98286A	99, 164	98587T	55, 83		
98286S	99	98587W	53	98658A	25, 27, 29, 31, 33, 91, 99, 100, 101, 102, 103, 106, 138
98287A	95, 99	98588G	61, 67, 69, 83		
98290A	55, 73, 75, 111, 117	98588W	83	98672B/L	147
98515B	12	98589G	63, 71, 83	98678B/L	163
98515L	10	98589W	51, 83	98688A/L	62, 64, 163
98531A	164	98594A	10, 42, 44, 62, 64, 80, 82, 153, 154, 156, 157	98689A/L	163
98542A	39, 95, 127	98594L	10, 25, 27, 29, 31, 33, 41, 43, 46, 48, 50, 52, 54, 56, 61, 63, 65, 67, 69, 71, 73, 75, 80, 82, 154	98691A	96, 99
98543A	16, 18, 37, 95, 127	98595B/L	12	98700H	95, 133
98544B	16, 35, 43, 59, 95, 127	98596B/L	12	98720A	32, 33, 53, 73, 95, 110, 111, 112, 116, 117, 127, 133, 147
98546A	16, 19, 21, 95, 99, 127, 128	98597C	163	98721A	111, 117, 148
98547A	16, 35, 36, 59, 95, 127	98597L	10, 163	98722A	33, 111, 112, 117, 118, 121, 148
98548A	51, 63, 71, 95, 127	98598B/L	163	98723A	33, 112, 118, 121, 148
98549A	45, 65, 95, 97, 127	98599B/L	163	98724A	95, 99
98550A	41, 47, 49, 61, 67, 69, 95, 97, 108, 114, 127	98603A	99	98725A	53, 73, 95, 127, 147
98556A	25, 29, 46, 48, 49, 95, 97, 108, 114	98603B	98, 99, 163	98726A	55, 75, 95, 127, 147
98563E	26	98616A	10, 18, 20, 23, 37, 39, 163	98730A	55, 75, 95, 119, 120, 127, 133, 147
98563G	30, 83	98617A	12, 163	98732A	121, 148
98564C	24, 83	98617E	12	98751A	25, 29, 33, 46, 65, 66, 95, 127
98564F	79	98617M	12	98752A	48, 50, 55, 61, 67, 69, 73, 75, 80, 82, 95, 107, 108, 110, 111, 113, 114, 116, 117, 119, 120, 127, 147
98564G	28, 83	98617R	12	98785A	24, 25, 45, 80, 82, 95, 127
98566F	81, 82	98618A	10, 163	98786A	26, 27, 43, 95, 127
98567A/B	169	98620B	99	98788A	30, 31, 51, 63, 71, 80, 82, 95, 127
98568A	15, 16, 19, 21, 34, 35, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 57, 58, 62, 64, 66, 68, 70, 72, 74, 76, 83, 86, 100, 104	98622A	97, 99	98789A	28, 29, 32, 33, 41, 47, 49, 53, 62, 68, 70, 114, 127, 147
98569A	169	98623A	97, 99	98794A	10, 62, 64, 80, 82
98570A	34, 35, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 57, 58, 62, 64, 66, 68, 70, 72, 74, 76, 81, 83, 87, 88, 97, 104	98624A	91, 99, 100, 101, 102, 103, 106, 145, 150	98796A/L	42, 43, 44
98572A	15, 16, 18, 20	98625B	25, 27, 29, 31, 33, 79, 80, 91, 99, 100, 101, 102, 103, 106, 137, 142, 145, 150	98860A/L	163
98573C	32	98626A	91, 94, 99, 128, 130, 131, 135, 144, 146, 151, 152	98870A/L	164
98577A	88	98627A	95, 99	98876A	164
98579A	34, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55	98628A	91, 99, 128, 130, 131, 135, 144, 146, 151, 152	9888A	15, 16, 19, 21, 22, 23, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 87, 88, 97, 99, 100, 101, 105
98579B	57, 58, 61, 63, 65, 67, 69, 71, 73, 75, 81, 82	98630A	97		
98580W	39	98633A	97, 99		
98580WX	43	98640A	97, 99		
		98641A	96, 157		
		98642A	91, 99, 100, 101, 102, 103, 106, 128, 130, 131, 135, 144, 146, 151, 152		