

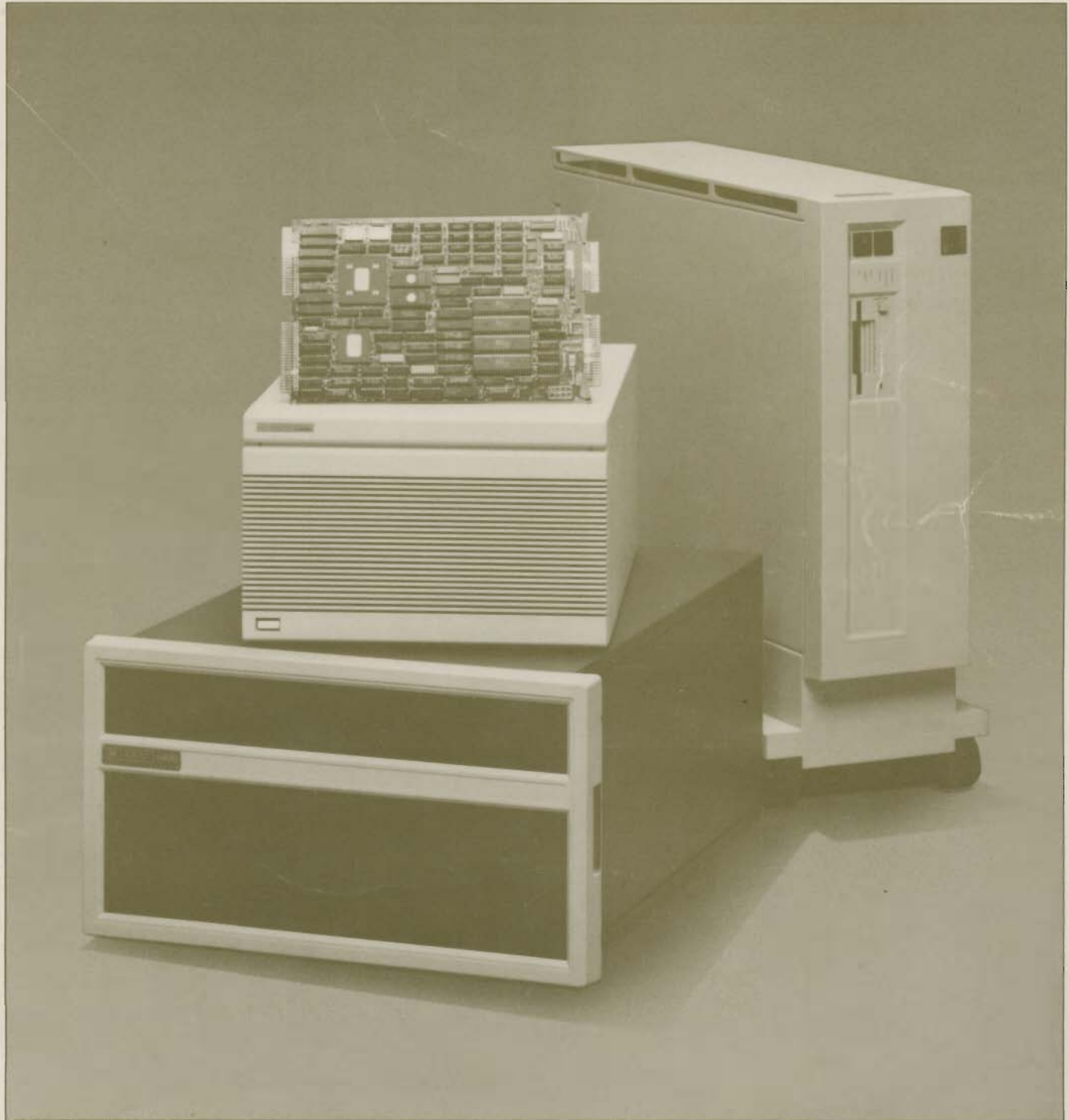
HP 1000 A-Series Computer Systems



Hardware, Software, Peripherals, and Support Configuration and Ordering Guide

Effective November 1, 1987

Note: Use with HP 1000 A-Series Ordering Information



Product Number Index

700 Product Numbers	Page	3000 Product Numbers	Page	12000 Product Numbers	Page
700/92 (C1001A/G/W)	32, 37	3081A	13, 38	12005B	10, 26, 32, 33 34, 35, 39
700/41 (C1003A/G)	32, 33, 37, 58	3600 Product Numbers		12006A	26
2100 Product Numbers		3630A	46, 47	12007B	14, 16, 19, 22, 26, 52
2106CK/DK	16, 17	7400 Product Numbers		12008A	14, 16, 19, 22
2134A	14, 31	7440A	48, 49	12009A	9, 10, 14, 16, 19, 22, 26, 27, 30, 41, 42, 44, 45, 47, 49, 50, 54
2137B	19, 20, 21, 31	7470A	49	12010A	26
2139B	22, 23, 24, 31	7475A	48, 49	12038A-D	15, 18, 21, 61
2156C/D	9, 16, 18, 31	7500 Product Numbers		12040D	10, 26, 27, 30, 32, 33, 34, 35, 38, 39, 46, 47, 49, 50, 54
2196G/H	16, 18, 31	7510A	49	12041B	26, 54
2197E	19, 20, 21, 31	7550A	48, 49	12042B	26
2199E	22, 23, 24, 31	7570A	48, 49	12043A	26, 53
2200 Product Numbers		7580B	49	12044A	14, 16, 19, 22, 26, 52
2225C	37	7585B	49	12060B	9, 26, 31
2225D	37, 46	7586B	49	12061A	9, 26, 31
2227A	37, 46	7595A	48, 49	12062A	9, 26, 31
2228A	37, 46	7596A	48, 49	12063A	9, 26, 31
2235A	37	7900 Product Numbers		12064A	31
2235B	37, 46, 47	7907A	40, 43	12065A	26, 48, 50
2300 Product Numbers		7911P/R	42	12072A	26
2334A	36	7912P/R	42	12073A	26, 52
2382A	32, 58	7914CT	42	12075A	26, 33, 36, 52
2392A	32, 39	7914P/R	42	12076A	26, 52
2393A	32, 37, 39, 48, 49, 50	7914TD/ST	42	12082A	26, 52
2397A	32, 37, 39, 48, 49, 50	7920M/S	42	12092A	26, 60
2400 Product Numbers		7925M/S	42	12100 Product Numbers	
2424A	14, 31	7933H/XP	42	12100A	14, 15, 32, 33, 35, 46, 49
2426G/H	16, 31	7935H/XP	42	12103C/D/K/L/M	15, 17, 20, 21, 61
2434A	14, 31	7936H/XP	40, 43	12111A	61
2436G/H	16, 31	7937H/XP	40, 43	12111B/C	18, 20, 21, 61
2437B	19, 20, 31	7941A	42, 43	12122A	40, 41
2439B	22, 23, 31	7942A	40, 43	12159A	9, 31
2484B	14, 31	7945A	42, 43	12200 Product Numbers	
2486B/C	16, 31	7946A	40, 43	12205A	56
2487B	19, 20, 31	7957A	18, 21, 24, 40, 43	12221A	23
2489B	22, 23, 31	7958A	18, 21, 24, 40, 43	12221B	23, 61
2500 Product Numbers		7970ER	44	12222A-D	23, 61
2563B	46, 47, 48, 49	7971A/R	44	13200 Product Numbers	
2564B	46, 47, 48, 49	7974A	44	13222Y	32
2566B	46, 47, 48, 49	7978B	44	13242G	30, 47, 50
2600 Product Numbers		7979A	44	13242N	32, 47, 50
2608SR	49	7980A	44, 45	15500 Product Numbers	
2621B	32, 58	9100 Product Numbers		15561A	35
2622A	32	9111A	49	15564A	35
2623A	32	9122D	40	17300 Product Numbers	
2624B	32	9133H	42	17355D	50
2625A	32	9133L	40	24000 Product Numbers	
2626A	32	9134H	42	24398B	25
2627A	32	9134L	40	24540B	34
2628A	32	9144A	18, 21, 24, 41	24541B	34
2645A	32	9153B	40	24542D	37
2648A	32	9154B	40	24542G	37
2671A/G	37, 47	9600 Product Numbers		24542M	32, 34
2673A	37, 47	9666A	32, 48	24612A	25
2686A	47	10000 Product Numbers			
2900 Product Numbers		10833B/C	45, 47, 50		
2932A	37, 46, 47, 48, 49				
2934A	37, 46, 47, 48, 49				

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

29400 Product Numbers Page	
29429A	18, 21, 24, 44
29431G	18, 21, 24, 44
30000 Product Numbers	
30062B	34
35000 Product Numbers	
35401A	18, 21, 24, 41
35731A	34
35741A	34
35743A	44
37000 Product Numbers	
37204A	29, 30
37213A	35
37214A	35
37215A	35
37216A	35
39000 Product Numbers	
39301A	29, 30
39800A	39
39801A	39
40200 Product Numbers	
40242D	37
40242G	37
40242M	30, 32, 33, 34 36, 38, 39 50
40242X	38
40242Y	30, 32, 33, 34 36, 38, 39 50
45900 Product Numbers	
45951A	34
45981A	34
45983A	34
45984A	34
46000 Product Numbers	
46060A	48
46087A	48
46088A	48
68300 Product Numbers	
68333F	34
72400 Product Numbers	
72425A	32, 34, 39
72445A	32, 34, 39
82900 Product Numbers	
82906A	47
91100 Product Numbers	
91156A/B	56
91157A/B	56
91700 Product Numbers	
91750A/R	14, 16, 19, 22, 52
91751A/R	36, 51, 52
91781A/R	53
91782A/R	53
91784A/R	53
91790A/R	51, 52

92000 Product Numbers Page	
92049A	65
92050A	41, 42
92069A/R	57
92077A/R	14, 16, 19, 22, 25
92077A+H22/H44/H51	63, 64
92077A+N00/P00/Q00	63
92077A+S22/S44/S51	63
92077A+T22/T44/T51	63
92077A+V00/V22/V44/V51	63
92077A+W00/W22/W44/W51	63
92077E	14, 16, 19, 22
92078A/R	14, 16, 19, 22, 25
92078A+S00/W00	64
92081A/R	57, 59, 60
92081A+S00/W00	64
92083A	55, 56
92083A+S00/W00	64
92100 Product Numbers	
92125A	55
92131A/R	59, 60
92131A+Q00/S00/W00	64
92179H	38
92200 Product Numbers	
92205A/B/C	35
92219G	47, 50
92800 Product Numbers	
92833A	55, 56
92836A	55, 56
92836A+S00/W00	64
92857A	55, 56
92860A	55, 56
92860A+S00/W00	64
92861A	48, 49, 59, 60
92861A+S00/W00	64
92862A	49
92900 Product Numbers	
92915A	39
92916A	39
92922A	38
92923A	38
93500 Product Numbers	
93568P	14, 16, 19, 22
94200 Product Numbers	
94200B	54
94202A	54
94203A	54
94204A	54
94205A	54
94206A	54
94250B	58
99000 Product Numbers	
99081D+C00/V00	64
99082D+C00/V00	64
99083D+C00/V00	64
99102D+T00/V00	64

About this Guide

Two Parts Are Better Than One

The HP 1000 A-Series Configuration and Ordering Guide is actually a two part guide, as illustrated in Figure 1, below.

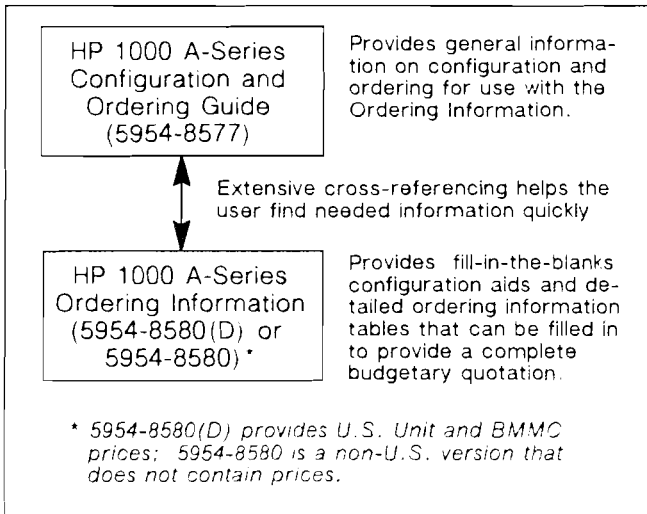


Figure 1. The Two-Part HP 1000 A-Series Configuration and Ordering Guide System

The Table of Contents on the next page lists the topics covered in these two items and the Product Number Index on pages 2 and 3 helps to locate information by product number. COG Pages in the Table of Contents give locations in this guide and OI Pages give locations in the Ordering Information packet.

This guide includes over 40 diagrams to help users understand product structures, connection of peripherals, and use of interfaces. More than 15 tables summarize interfacing of peripheral devices and relative capabilities of related configuration choices.

The Ordering Information packet is a consumable resource with illustrations and tables that give an overview of A-Series computer products and a checklist of system capabilities, help keep track of interface and card cage usage, and provide for entry and totalling of choices in ordering information tables for a budgetary quotation.

Capabilities-Oriented Organization

The HP 1000 A-Series Configuration and Ordering Guide is organized by capabilities. For example, Graphics software and peripheral devices are listed together in a Graphics I/O section, instead of in separate software and peripherals sections. Prerequisites for program development, data base management, and quality data management are described prominently and clearly, to facilitate the completion of a successful configuration.

Product Changes in This Guide

New and Newly-Bundled Items

HP 2134A Computer makes the A400 processor available in the 20-slot card cage.

Memory Array Cards based on 1M bit chips boost maximum memory to 32M bytes in all A-Series processors.

Low-Priced HP 700/92 and 700/41 Terminals are now supported in HP 1000 A-Series.

New HP 2235B and 3630A Printers are now supported in HP 1000 A-Series.

HP 7595A and 7596A Draftmaster I and II Plotters are now supported in HP 1000 A-Series.

HP 7979A and 7980A Autoloading Mag Tape Units are now supported in HP 1000 A-Series.

The A700 Floating Point Processor is now included with all A700 Computers and SPUs.

VC+ is are now included in all A-Series SPUs along with RTE-A.

Unbundled Items

A700 and A900 Base Memory – no more delete option 014 – simply order the desired memory array cards and the appropriate memory connector.

The Asynchronous Serial Interface Card – no more delete option 008 – simply order the 12005B or 12040D card as a line item with the appropriate connect cable(s).

Rack Cabinets in 219x SPUs – simply purchase the HP 29431G or 29429A cabinet as a line item, or rack the SPU yourself in a non-HP cabinet.

Discontinued Items

All A-Series memory array cards with less than 512 kB capacity and the 128 kB parity and 512 kB ECC memory controllers for the A600+.

HP 12120A and 12121A Integrated Discs for Micro 26, 27, and 29 Computers and SPUs – replaced by 12122A Integrated Discs.

HP 2686A LaserJet and LaserJet Plus – no new Laser Printer has been qualified on HP 1000 A-Series.

HP 7510A Color Film Recorder – no replacement.

HP 758xB Drafting Plotters – replaced by the 7570A DraftPro and the 7595A and 7596A Draftmaster I and II.

HP 791xP/R, 7933H/XP, 7935H/XP, 7941A, 7945A, 9133H, and 9134H Discs – replaced by the previously-introduced 7936H/XP, 7937H/XP, 7957A 7958A, 9153B, and 9154B Discs.

Table of Contents

	COG Pages	OI Pages
About This Guide	4	4
The A-Series Computer Products at a Glance	None	6
Configuration Rules	6	None
System Capabilities Checklist	10	97
Memory Requirements Estimator	12	8
How to Use the Ordering Sections	13	None
Ordering HP 1000 A400 Systems	14	12
Ordering HP 1000 A600+ Systems	16	15
Ordering HP 1000 A700 Systems	19	20
Ordering HP 1000 A900 Systems	22	24
Ordering RTE-A, VC+, and Diagnostics	25	27
Ordering Interfaces and Extenders	26	30
Ordering System Console and Terminals	32	40
Ordering Modems for Connecting Remote Terminals	35	45
Ordering X.25 Connection to Remote Terminals	36	46
Ordering Auxiliary Printers for Terminals	37	47
Ordering Industrial Workstation Terminals	38	48
Ordering Bar Code Readers	39	49
Ordering Discs, Disc Mirroring Software, and CTUs	40	50
Ordering Magnetic Tape Units	44	53
Ordering Printers	46	54
Ordering Graphics I/O	48	59
Ordering Communication with Other HP Systems	51	63
Ordering Communication with IBM Systems	53	65
Ordering Communication with PLCs	54	68
Ordering Program Development Software	55	71
Ordering Data Base Management Software	57	75
Ordering Forms Software	58	77
Ordering Quality Decision Management Software	59	78
Ordering Development Packs	None	79
Ordering Add-on Memory	61	81
Upgrades and Return Credit Products	62	82
Ordering Cabinets and Cabinet Accessories	None	85
Ordering Documentation Products	None	86
Ordering Consulting and Project Services	None	87
Ordering System Support	63	88

Configuration Rules

Base Requirements

HP 1000 A-Series Computer Systems, like most other computer systems, require:

1. Operating software.
2. System communications console.
3. A bootup device.

Operating Software

Computers are designed to execute programmed instructions (software), without which they are no more than inert assemblies of hardware parts. The operating software (or operating system) is the basic software used in a computer system. It manages input/output with peripheral devices, carries out user's program scheduling commands or program requests, manages main memory and disc memory files, and performs other operations that may be required to support the overall functioning of the computer system. The operating system for HP 1000 A-Series computers is the RTE-A Real-Time Executive system (see Figure 2). RTE-A is a time and event sched-

uled, modular, multi-user, multiprogramming system that can be configured for either memory-based or disc-based operation. For details, see the RTE Operating Systems, RTE-A, and VC+ data sheets in the A-Series Computer Handbook, 5954-8576 or a later revision.

HP 1000 A-Series System Processor Units all include an RTE-A primary system with VC+ on customer-specified media and all relocatable modules that are required for generation of other RTE-A system configurations, including memory-based configurations intended for execute-only use on board computers or box computers.

HP 1000 A400 and A600+ Box Computers include rights-to-execute configured RTE-A based systems, excluding the right to develop programs or generate other systems. Customers who want to develop programs or generate systems must purchase the RTE-A (software and manuals) product for their first computer and rights to copy that software to additional computers. Rights to execute RTE-A must be purchased separately for HP 1000 A700 and A900 box computers and A-Series Board Computers.

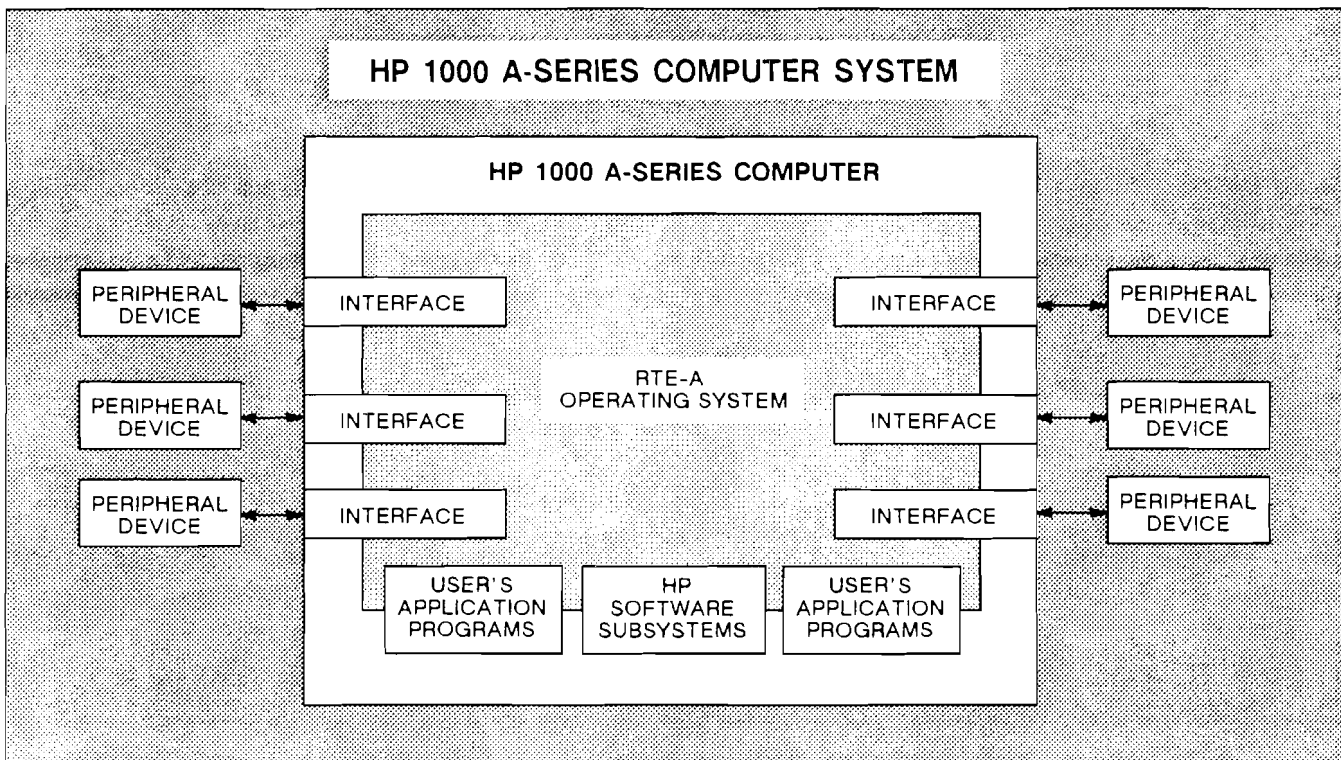


Figure 2. HP 1000 A-Series Computer System, Simplified Functional Diagram

A System Communications Console

HP 1000 A-Series Computer Systems have a ROM-based Virtual Control Panel (VCP) program. As its name suggests, the VCP enables an operator to perform control functions via a local or remote connected display terminal or a display terminal at an adjacent HP 1000 Computer System. The operator uses the VCP terminal to initiate self test, select a bootstrap loader, and initiate the boot-up of an RTE-A operating system. A display terminal functioning as a VCP terminal is thus a basic requirement for operation of an HP 1000 A-Series system. Figure 3 shows how system communications support can be provided for HP 1000 A-Series Computer Systems.

HP 1000 A-Series System Processor Units all require an interface to a local system console. Both the interface and the console are required for system operation. The A400 computers include an integral 4-port multiplexer, so separate purchase of a console interface is not needed with A400 System Processor Units.

HP 1000 A-Series Box Computers and Board Computers offer the customer maximum configuration flexibility. The customer can use a computer-to-computer communications interface for VCP communication via a terminal at a remote HP 1000 Computer System or a via local system console interface.

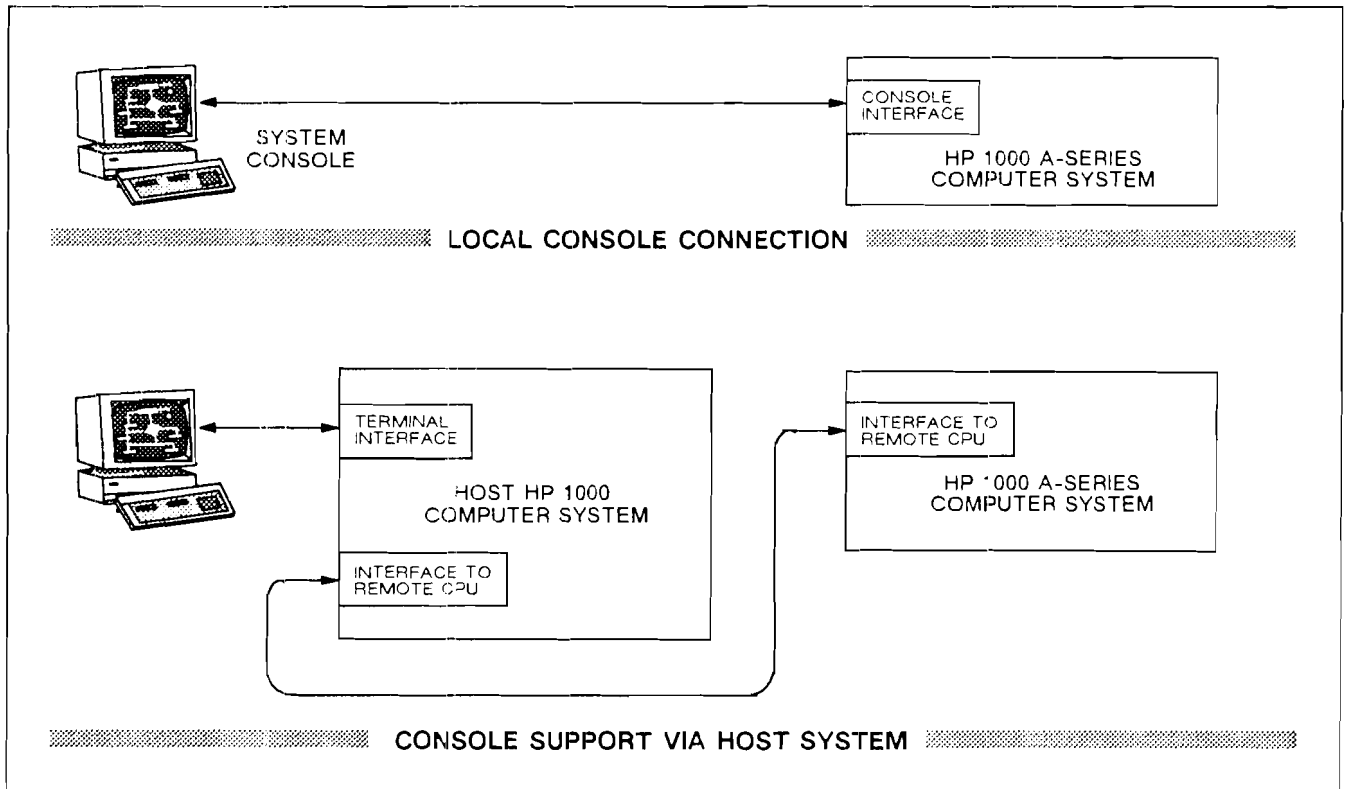


Figure 3. System Communications Support in HP 1000 A-Series Computer Systems

A Bootup Device

In addition to the system console that is used to command boot-up of the system, HP 1000 A-Series Computer Systems require a boot-up device. This device is usually the system disc, which also requires, and may incorporate, a flexible disc, cartridge tape, or magnetic tape drive for software installation. Figure 4 shows how system disc support can be provided for HP 1000 A-Series Computer Systems.

HP 1000 A-Series System Processor Units (SPUs) include an interface to a local system disc, which is thus the required boot-up device for system operation.

The system disc is required for program development and the generation of RTE-A system configurations other than the primary system which is supplied with HP 1000 A-Series SPUs. The cartridge tape, magnetic tape, or flexible disc drive associated with the system disc supports the installation and backup of the RTE-A operating system and other software.

The SPU provides the basis of an HP 1000 System that can be used to develop application programs and generate configurations for target systems. The target systems can be disc based, like the SPU, or memory based configurations assembled from box computers or board computers.

HP 1000 A-Series Box Computers and Board Computers do not include a system disc interface, leaving the customer maximum configuration flexibility. Since the RTE-A operating system can be configured for memory based operation, the boot-up device for box computers and board computers does **not** have to be a local system disc. Instead, systems based on box computers and board computers can also be booted up from any of the following other sources:

1. An adjacent HP 1000 System in a DS/1000-IV network via a point-to-point network interface.
2. A magnetic tape unit via an HP-IB (disc) interface.
3. A PROM Storage Module(s).

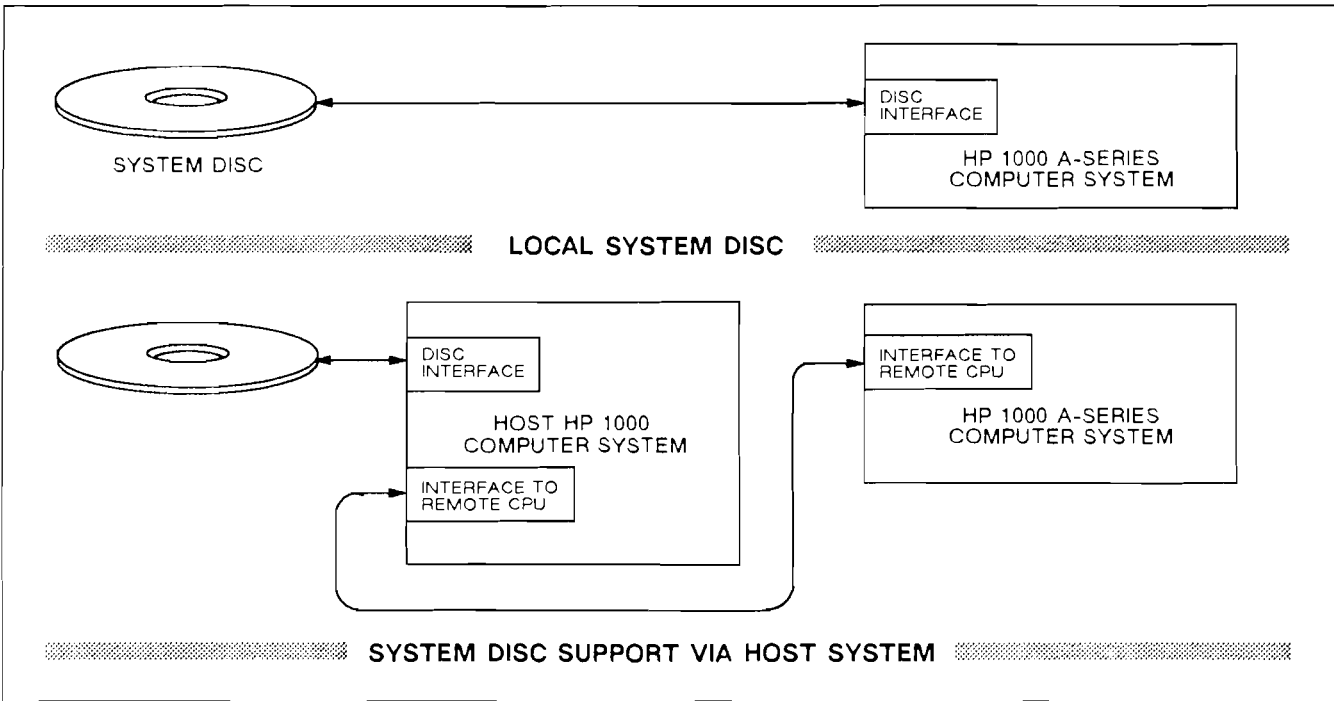


Figure 4. System Disc Support in HP 1000 A-Series Computer Systems



General Rules

Memory

Main and disc memory must be sufficient to satisfy the memory requirements of the operating system, all additional Hewlett-Packard software, and anticipated requirements for user-developed applications.

The system checklist in the next section incorporates a memory estimator that can be used to determine the minimum main and disc memory capacities that are required to support any configuration that can be outlined on the checklist.

Tested Peripheral Devices

Only the peripheral devices listed in this HP 1000 A-Series Configuration and Ordering Guide are supported by Hewlett-Packard for use with HP 1000 A-Series Systems. The devices in this guide have been tested for correct functioning when interfaced as indicated herein and have also been qualified for safety under UL, CSA, and IEC standards and have been checked to assure that they meet U.S. and German regulatory requirements for Electro-Magnetic Interference (EMI). Other devices, including new Hewlett-Packard terminals, printers, discs, etc., or older discontinued ones may be functionally compatible and usable, but until they have been tested and appear in this guide, along with appropriate interface and use recommendations, they are NOT supported for use on HP 1000 A-Series Systems. Such use and any adverse consequence arising from it is solely the customer's responsibility.

Maximum Number of Magnetic Tape Units per System

Two (2). No more than two magnetic tape units are supported per HP 1000 A-Series System because no more than two magnetic tape units have been tested on the system. This limitation does NOT apply to cartridge tape units.

HP-IB Capacity per 12009A Interface

Basic Capacity = eight (8) devices per bus since all devices in HP 1000 A-Series Systems are assumed to be functioning as high-speed devices. However, lesser capacities apply to use with certain devices, as described in the next paragraphs.

A Maximum of Four (4) Discs and/or Cartridge Tape Units per 12009A interface is supported because of the electrical loading of the HP-IB bus drivers by the discs. The discs and cartridge tape units have exclusive use of the interface.

A Maximum of Two (2) Magnetic Tape Units per 12009A interface is supported because of the electrical loading of the HP-IB bus drivers by the tape

units. No other device is supportable on the same HP-IB bus as a magnetic tape unit.

A Maximum of Two (2) HP 256xA/B Line Printers per 12009A interface is supported because of the electrical loading of the HP-IB bus drivers by the line printers. No other device is supportable on the same HP-IB bus as an HP 256xA/B Line Printer.

Card Cage Capacity

The computer must provide enough card cage slots to house the CPU card(s), all required memory cards, and all interfaces and any other plug-ins that use card cage slots, with the addition of an I/O Extender if necessary.

The system checklist in the next section incorporates an I/O interface and card cage slot requirements estimator that can be used to determine how many card cage slots are required for CPU, memory, and I/O cards used for any configuration that can be outlined on the checklist.

Disc Interface Location

All disc interfaces must be installed in the computer card cage. Interfacing of discs in the I/O Extender has NOT been tested and is NOT supported.

Processor/Interface Specific Rules

CPU, Memory, and Control Store Frontplane Connections

Frontplane connections require that the CPU, memory, and control store cards all be adjacent to each other in the card cage. In the Micro/1000 package, which has a maximum of seven adjacent card cage slots, this configuration rule limits the maximum number of memory array cards that can be used in a Micro 27 or Micro 29 computer or SPU, which require four slots for CPU and memory controller cards. Three memory array and control store cards can be used in a Micro 27. Two memory array cards and one control store card can be used in a Micro 29. (The two sections of the Micro/1000 card cage provide a total of 14 slots.)

25 kHz AC Supply for 1206xA/B Interfaces

The HP 12060B, 12061A, 12062A, and 12063A Analog and Digital I/O Interface cards all require 25 kHz AC from the computer power supply. Internally these interfaces convert the 25 kHz AC supply to isolated DC, which makes possible the isolation of inputs from outputs for maximum noise immunity. 25 kHz power ready for direct use by these interfaces is provided by the power supply in the HP 213xA/B and HP 2156C/D 20-slot Computers and the HP 219xG/H SPUs that incorporate those computers. An additional HP 12159A 25 kHz Sine Wave Card is required for filtering of 25 kHz power in HP 243xA/B/G/H and HP 248xA/B/G/H Micro/1000 Computers and SPUs. The HP 242xA/G/H 6-slot Computers do NOT have available 25 kHz ac power supply.

System Checklist

The System Capabilities Summary Checklist

HP 1000 A-Series Computer Systems can be equipped with a very diverse set of software and hardware capabilities. To help customers conceptualize and summarize the capabilities desired in their systems, the last page (97) of the HP 1000 Ordering Information packet is a System Capabilities Summary Checklist. This checklist is a foldout block diagram with lists of system elements and capabilities, such as processors, memory, software, and peripheral devices that are intended to be checked as part of an overall capabilities selection process. At this point you may want to locate the System Capabilities Summary in an Ordering Information packet to accompany your reading of this section.

Using the Summary Checklist

To Select System Capabilities

Figure 5 on the next page shows the basic layout of the Capabilities summary checklist at 45% of full size. The full-sized examples of some of the checklists with entries made in them illustrate use of the System Summary Checklist for specifying the capabilities that the customer wants included in his (or her) system.

To Determine Interface Requirements

After the system console, additional terminals, discs, other peripheral devices, and communications interfaces have been selected, the numbers entered into the lists in the System Capabilities Summary Checklist can be used to determine system interface requirements, as noted in Table 1.

To Determine Card Cage Slot Requirements

Card cage slots required are equal to the number of memory cards selected in the System Capabilities Summary Checklist plus the number of interfaces determined in Table 1. If this number exceeds the number of available card cage slots for the selected SPU or computer, one with more capacity should be selected, if available, or an I/O Extender will be required.

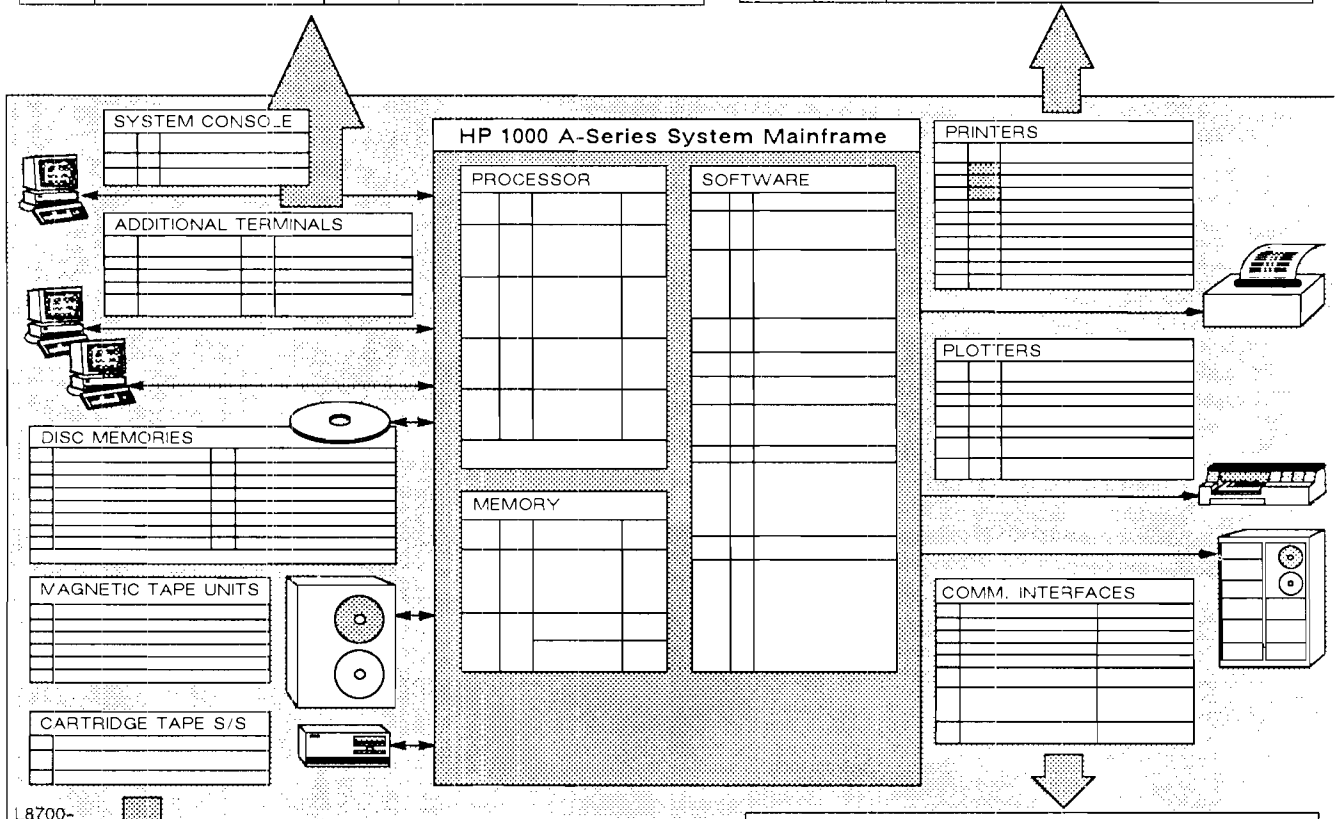
Table 1. Determining Interface Requirements

Interface	Requirements Determination Procedure	No. Req'd
12005B ASI	If checked in "OR ASI" column of System Console checklist, enter a 1	—
12009A HP-IB	For Discs and Cartridge Tape Subsystems, total the quantity and divide by 4, rounding up any fractional remainder (5 units would require 2 interfaces). For one or two Magnetic Tape Units, enter a 1 For "HP-IB Addr" 2563B, 2564B, and 2566B Printers, total the quantity and divide by 2, rounding up any fractional remainder (3 units would require 2 interfaces) For "HP-IB Addr" 2335A, 2932A, 2934A, 3630A and all "HP-IB Addr" Plotters, total the quantity and divide by 8, rounding up any fractional remainder (9 units would require 2 interfaces).	— — — —
12040D Multiplexer	For System Console, Additional Terminals, Printers, and Plotters, total the quantities entered in the "MPXER CH" columns, subtract 4 if the system will use an A400 SPU or Computer, and divide by 8, rounding up any fractional remainder (9 units would require 2 interfaces)	—
System-to-System	Total the quantities in the Comm. Interfaces to Other Systems checklist	—
Total Interfaces		—

SYSTEM CONSOLE		
MPXR CH	OR ASI	TERMINAL PRODUCT NUMBER AND NAME
2		HP 700/92 Display Terminal
		HP 2392A Display Terminal

PRINTERS		
MPXR CH	HP-IB ADDR	PRINTER PRODUCT NUMBER AND NAME
		HP 2225D ThinkJet Printer, 150 cps
2		HP 2227A QuietJet Plus Printer, 160 cps
		HP 2228A QuietJet Printer, 160 cps
		HP 2235B RuggedWriter, 480/240 cps
	2	HP 2563B Line Printer, 300 lpm
		HP 2564B Line Printer, 600 lpm
		HP 2566B Line Printer, 900 lpm
1		HP 2932A General-Purpose Printer, 200 cps
		HP 2934A Business Printer, 200/67/40 cps
		HP 3630A PaintJet Printer, 167 cps

ADDITIONAL TERMINALS			
MPXR CH	TERMINAL PRODUCT NUMBER AND TYPE	MPXR CH	TERMINAL PRODUCT NUMBER AND TYPE
2	HP 700/92 Display		HP 72425A Vectra Model 25 PC
	HP 2392A Display		HP 72445A Vectra Model 45 PC
3	HP 2393A Graphics		HP 9656A Operator Interface
2	HP 2397A Color Graphics		



L8700-

CARTRIDGE TAPE SUBSYSTEMS	
No.	PRODUCT NO. & NAME
1	HP 35401A CS/80 Autochanger Cartridge Tape Subsystem
	HP 9144A CS/80 Cartridge Tape Subsystem

COMM. INTERFACES TO OTHER SYSTEMS		
No.	PRODUCT NO. & NAME	REMOTE SYSTEM
	HP 12007B HDLC Modem I/F	HP 1000, pt-to-pt
1	HP 12044A HDLC Dir Conn I/F	HP 1000, pt-to-pt
	HP 12073A Bisync Modem I/F	HP 3000, pt-to-pt
	HP 12082A Bisync Dir Conn I/F	HP 3000, pt-to-pt
1	HP 12075A X.25 Modem Interface	HP 1000 or HP 3000 via X.25 Network
1	HP 12076A LAN/1000 Link Interface	HP 1000, HP 3000, HP 9000 Series 300/500/800, or DEC VAX via LAN
	HP 12043A Multi-Use Programmable Serial (Modem) Interface	IBM and Plug-compatible systems

Figure 5. System Capabilities Summary Checklist Entry Example

Memory Requirements Estimator

Memory Requirements

Software uses main memory capacity when it is loaded into the computer to execute and disc memory capacity when it is installed in disc files from which it can be loaded into the computer to execute. If a software item, such as a compiler is to be used by more than one person at a time, each additional user requires space for his (or her) use of the software in main memory, in addition to any on-line main memory space required by common control routines, libraries, etc.

Systematic Estimation of Minimum Memory Requirements

To facilitate estimation of main and disc memory requirements, pages 8 through 11 of the HP 1000 Ordering Information packet are a tabular Memory Requirements Estimator. The summation of basic and per-user main memory requirements and disc memory requirements uses simple arithmetic multiplications and additions based on the selections made in the Estimator table. Listed first are multiple-use software items which require the most memory per user, such as the Pascal compiler. This order is used because their requirements will also easily support those of software subsystems which require less main memory

space per user if the user changes from compiling programs in one language to compiling programs in another language.

Determining Total Main and Disc Memory Requirements

The total minimum main and disc memory requirements derived directly with the Estimator include **ONLY** the requirements for HP software products to be included in the system. As such they are **absolute minimums** and may not be sufficient even to support useful activity with all software loaded. A System's Engineer's estimate of the **Additional** main and disc memory needed for the user's applications must be added to the minimum figures. The main and disc memory requirements for the user application programs and data necessarily depend upon the size and nature of the application and its data storage requirements. Depending upon those factors, the additional main and disc memory requirement can easily be 2 to 10 times the minimum determined directly by the Estimator, though the increase for main memory may be less than for disc memory, or vice versa. Spaces are provided at the end of the table for adding the the Systems Engineer's estimate of application requirements to the minimums for the HP software.

How to Use the Ordering Sections

The Ordering Sections

The remainder of this Configuration and Ordering Guide is divided into separate Ordering Sections for systems, interfaces and extenders, peripheral devices, and software.

Each of the ordering sections in this guide provides background information supported by tabular summaries and diagrams (including integration diagrams), card cage layouts, and connection diagrams, as appropriate. This background information supports ordering information tables in the separate Ordering Information packet (5954-8580(D) in the U.S., 5954-8580 outside the U.S.). The Ordering Information tables have the form illustrated below. As can be seen from the example, the Ordering Information Tables provide not only a list of products (and their pricing in the U.S.), but a means of building a complete quotation of the system as well, using the Extended Price/BMMC column and subtotal spaces at the bottom of each Ordering Information page. After all pages containing desired products have been filled out, adding the Ordering Information table subtotals gives a total budgetary figure for system list and BMMC prices.

Each Ordering Information Section contains, or refers to, all the products needed to support the capabilities being ordered within the section, including **interfaces** (which are referenced, except in the interfaces section), **cables**, **accessories**, and **software**. There is much less need, as with previous HP 1000 Ordering

Guides, to flip from one set of pages to the other, except with interfaces. The Ordering Information pages are designed to be pulled out of the Ordering Information packet, so the Interfaces Ordering Information pages are easy to remove and use side-by-side with other sections.

Prices and BMMCs

Price Applicability

Product and service prices printed in Ordering Information packet 5954-8580(D) apply only in the United States (service prices are higher in Alaska), and are subject to change without notice. Quotations will be based on the HP Corporate Price List and HP Service Price Book that are current at the time of the quotation. Prices in the final quotation may differ from the prices listed in this guide.

BMMC Charges with Suffix Letters

In all but a few instances, the numbers given in the Unit Price/BMMC column are those for Basic Monthly Maintenance Charge. However, BMMC is not offered for certain terminals, PCs, and other devices. Where that is true, the BMMC number may be tagged with an "s" suffix, signifying that it is a Standard Monthly Maintenance Charge (SMMC) or a "w" suffix, signifying that it is a Workstation Monthly Maintenance Charge (WMMC).

Industrial Workstation Terminals, Interfaces, Adapters, and Cables Ordering Information **EXAMPLE**

PRODUCT AND OPT. NUMBERS	NAME OR DESCRIPTION	Qty	Unit Price/BMMC	Extended Price/BMMC
HP 3081A (6300)	INDUSTRIAL WORKSTATION TERMINAL with: - 32-character electroluminescent display - Membrane-type numeric keyboard with 10 function keys	<u>7</u>	\$ 905/\$ 7	\$ 6,335 / \$63
-014	Substitutes alphanumeric membrane keyboard for numeric keyboard.	<u>7</u>	117/ 0	819 /
-020	Adds mounting bracket.		97/ 0	/
-052	Adds 12 mil Office Bar Code Reader Wand, medium resolution (reads interleaved 2 out of 5 (USD1) and 3 of 9 (USD3) codes)		163/ 0	/
-053	Adds 12 mil Office Bar Code Reader Wand, medium resolution (reads interleaved 2 out of 5 (USD1) and 3 of 9 (USD3) codes)		163/ 0	/
-054	Adds 12 mil Office Bar Code Reader Wand, low resolution (reads interleaved 2 out of 5 (USD1) and 3 of 9 (USD3) codes)		163/ 0	/
-055	Adds 7 mil Industrial Bar Code Reader Wand, high resolution for harsh environments (reads interleaved 2 out of 5 (USD1) and 3 of 9 (USD3) codes)	<u>7</u>	295/ 0	2,065 /
SUBTOTALS				\$11,928 / \$75

Number in parenthesis identifies supplying division

Ordering HP 1000 A400 Systems

Available Platforms

HP 1000 A400 Computer Systems can be based on any of the following products (see Figure 6 for definition of integration levels):

1. The HP 12100A A400 Single Board Computer.
2. The HP 2134A Model 24 (20-slot) Box Computer.
3. The HP 2424A Micro 14 (6-slot) Box Computer.
4. The HP 2434A Micro 24 (14-slot) Box Computer.
5. The HP 2484B Micro 24 (14-slot) System Processor Unit (SPU).

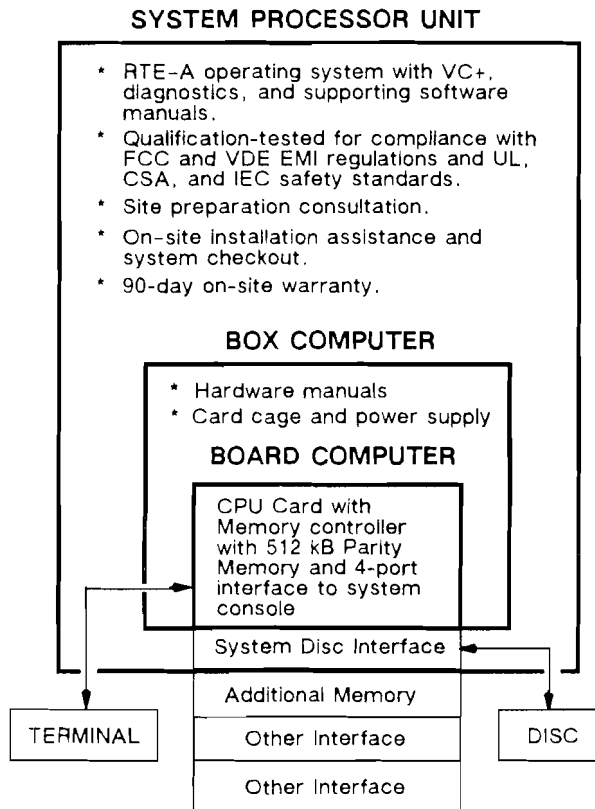


Figure 6. HP 1000 A400 Integration Levels

Operational Requirements

HP 2484B System Processor Unit

The HP 2484B System Processor Unit will require the following for operation:

1. A terminal to function as the system communications console, selected from those listed on page 32. (For more information on the console's function, see page 7.)

2. A system disc, selected from those listed on page 40. (For more information on the system disc's function, see page 8).
3. Additional software, memory, and peripheral devices as needed to support the application, which can be selected on the System Capabilities Summary Checklist on page 97 of the HP 1000 Ordering Information packet.

A400 Box Computers

The A400 box computers listed previously as items 2 through 4 in the Available Platforms section will require the following for operation:

1. Use of the RTE-A operating system. HP 92077E Right-to-Execute RTE-A is included with A400 box computers. Users who want to develop programs or generate systems must purchase 92077A RTE-A (software and manuals) for the first computer and 92077R Right-to-Copy RTE-A for each additional computer.
2. Either of the following system console communications choices:
 - a. A terminal to function as the system communications console, selected from those listed on page 32. (For more information on the console's function, see page 7.)
 - b. An HP 12007B or 12044A point-to-point HDLC interface to an adjacent HP 1000 system operating under 91790A NS/1000 or 91750A DS/1000-IV network software. 91790R or 91750R right to copy is also required for the local computer. See pages 51 and 52.
3. Any of the following bootup device choices:
 - a. An HP 12009A HP-IB interface to a local system disc, selected from those listed on page 40. (For more information on the system disc's function, see page 8).
 - b. An HP 12007B or 12044A point-to-point HDLC interface to an adjacent HP 1000 system operating under 91790A NS/1000 or 91750A DS/1000-IV network software. 91790R or 91750R right to copy is also required for the local computer. See pages 51 and 52.
 - c. An HP 12009A HP-IB interface to a cartridge tape subsystem or a magnetic tape unit, selected from those listed on page 44.
 - d. An HP 12008A or 93568P PROM Storage Module (Ordering Information page 14).
4. Additional software, memory, and peripheral devices as needed to support the application, which can be selected on the System Capabilities Summary Checklist on page 97 of the HP 1000 Ordering Information packet.

HP 12100A A400 Single Board Computer

The HP 12100A A400 Single Board Computer will require the following for operation:

1. User-fabricated card cage with backplane and power supply as required for support of use with other A-Series (I/O and/or memory) cards.
2. All of items 1 through 4 listed above for the A400 box computers.

A400 Card Cage Layouts

Figures 7 through 9 show the card cage layouts of the A400 box computers and SPU and provide spaces for entry of interface/memory card product numbers.

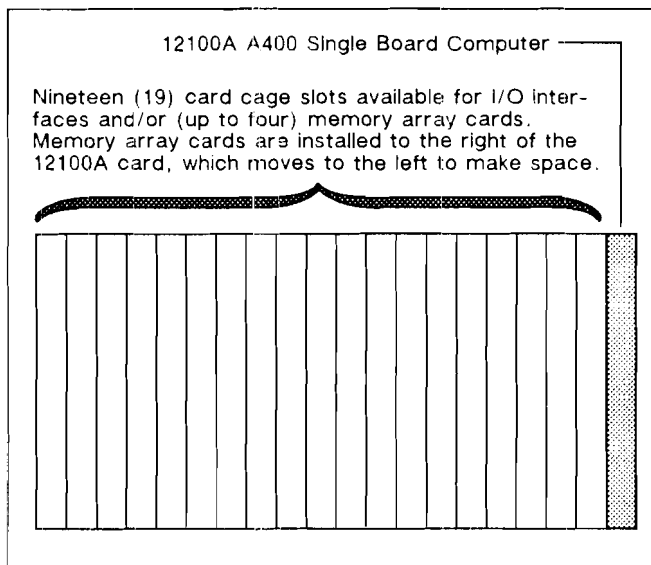


Figure 7. HP 2134A A400 (20-Slot) Box Computer Card Cage Layout, rear view

Memory for A400 Computer Systems

512k bytes of parity memory is included with the on-board memory controller on the 12100A A400 Single Board Computer (SBC). More memory can be provided by adding 12103C (0.5 MB), 12103D (1 MB), 12103K (2 MB), 12103L (4 MB), or 12103M (8 MB) Parity Memory Array Cards. The 12103K-M cards can be used independently of the base memory in the computer. Thus, a need for 8 megabytes of memory can be satisfied simply by ordering a 12103M 8 MB Parity Memory Array Card and the 12038A connector that is needed to connect it to the 12100A SBC. Up to 32 megabytes of memory (4 x 12103M cards) can be provided in an A400 system. See Figure 10 for the 12038x SBC-to-12103x array card connectors that should be used for the respective numbers of array cards that are to be connected.

A400 Ordering Information

Order A400 SPUs, Computers, Cabinets, Memory, and other plug-ins on pages 12 through 14 of the HP 1000 Ordering Information packet.

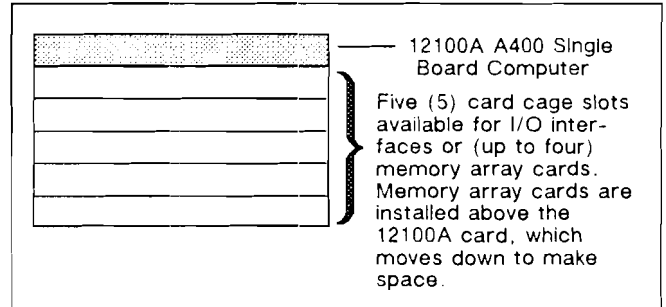


Figure 8. HP 2424A A400 (6-Slot) Box Computer Card Cage Layout

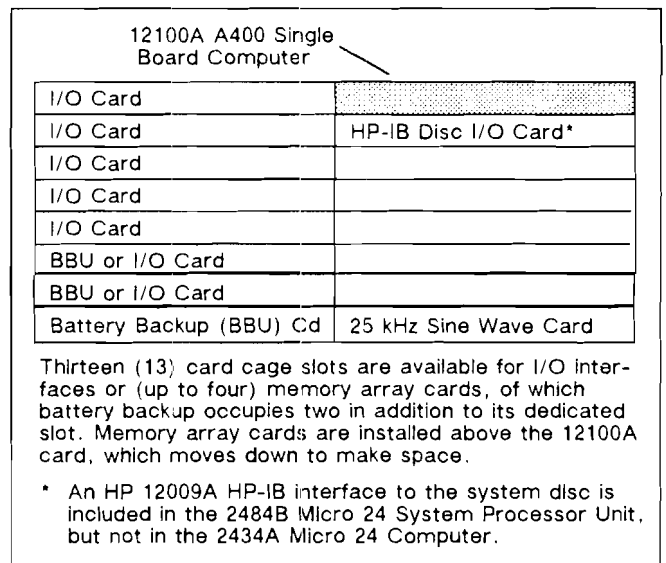


Figure 9. HP 2434A/2484B A400 (14-Slot) Micro 24 Box Computer/SPU Card Cage Layout, rear view

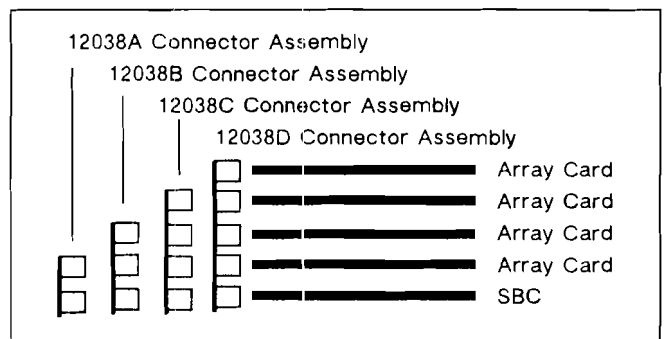


Figure 10. 12038x Connector Assembly Usage for Connection of Memory Array Cards to the SBC

Ordering HP 1000 A600+ Systems

Available Platforms

HP 1000 A600+ Computer Systems can be based on any of the following products (see Figure 11 for definition of integration levels):

1. The HP 2106CK/DK A600+ Board Computer.
2. The HP 2426G/H Micro 16 (6-slot) Box Computer.
3. The HP 2436G/H Micro 26 (14-slot) Box Computer.
4. The HP 2156C/D Model 26 (20-slot) Box Computer.
5. The HP 2486B/C Micro 26 (14-slot) System Processor Unit (SPU).
6. The HP 2196G/H Model 26 (20-slot) System Processor Unit (SPU).

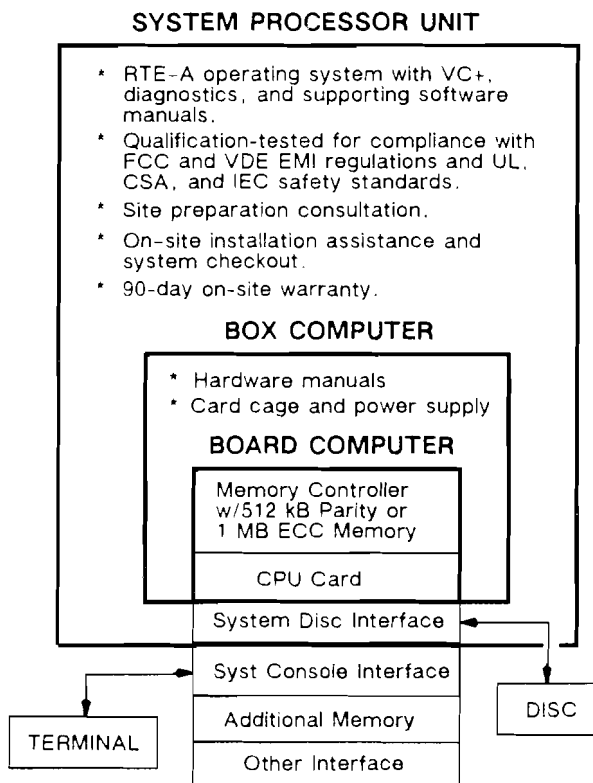


Figure 11. HP 1000 A600+ Integration Levels

Operational Requirements

HP 2486B/C or 2196G/H SPU

The HP 2486B/C or 2196G/H System Processor Unit will require the following for operation:

1. A separately-purchased console interface and a terminal to function as the system communications console, selected from those listed on page 32. (For more information on the console's function, see page 7.)

2. A system disc, selected from those listed on page 40. (For more information on the system disc's function, see page 8).
3. Additional software, memory, and peripheral devices as needed to support the application, which can be selected on the System Capabilities Summary Checklist on page 97 of the HP 1000 Ordering Information packet.

A600+ Box Computers

The A600+ box computers listed previously as items 2 through 4 in the Available Platforms section will require the following for operation:

1. Use of the RTE-A operating system. HP 92077E Right-to-Execute RTE-A is included with all A600+ box computers. Users who want to develop programs or generate systems must purchase 92077A RTE-A (software and manuals) for the first computer and 92077R Right-to-Copy RTE-A for each additional computer.
2. Either of the following system console communications choices:
 - a. A console interface and a terminal, selected from the list on page 32, to function as the system communications console. (For more information on the console's function, see page 7.)
 - b. An HP 12007B or 12044A point-to-point HDLC interface to an adjacent HP 1000 system operating under 91790A NS/1000 or 91750A DS/1000-IV network software. 91790R or 91750R right to copy is also required for the local computer. See pages 51 and 52.
3. Any of the following bootup device choices:
 - a. An HP 12009A HP-IB interface to a local system disc, selected from those listed on page 40. (For more information on the system disc's function, see page 8).
 - b. An HP 12007B or 12044A point-to-point HDLC interface to an adjacent HP 1000 system operating under 91790A NS/1000 or 91750A DS/1000-IV network software. 91790R or 91750R right to copy is also required for the local computer. See pages 51 and 52.
 - c. An HP 12009A HP-IB interface to a cartridge tape subsystem or a magnetic tape unit, selected from those listed on page 44.
 - d. An HP 12008A or 93568P PROM Storage Module (Ordering Information page 18).
4. Additional software, memory, and peripheral devices as needed to support the application, which can be selected on the System Capabilities Summary Checklist on page 97 of the HP 1000 Ordering Information packet.

HP 2106CK/DK A600+ Board Computer

The HP 2106CK/DK A600+ Board Computer will require the following for operation:

1. User-designed card cage with backplane and power supply as required for support of use with other A-Series (I/O and/or memory) cards.
2. All of items 1 through 4 listed above for the A600+ box computers.

A600+ Card Cage Layouts

Figures 12 through 14 show the card cage layouts of the A600+ box computers and SPUs and provide spaces for entry of interface/memory card product numbers.

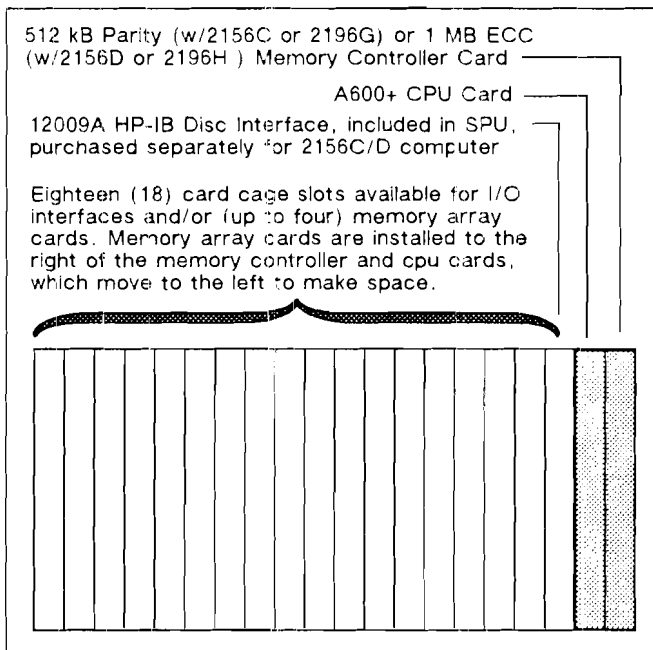


Figure 12. Card Cage Layout of HP 2196G/H SPU or HP 2156C/D (20-Slot) Box Computer, rear view

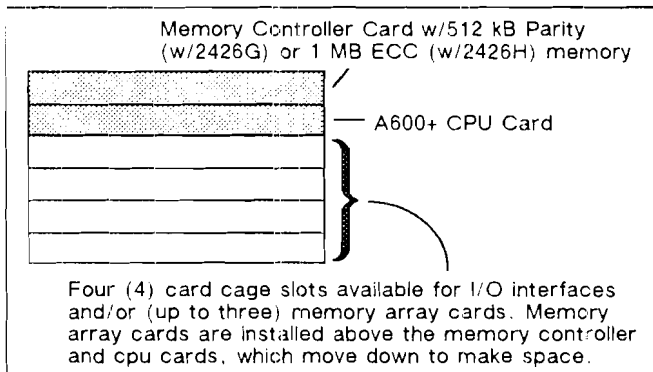


Figure 13. HP 2426G/H (6-Slot) Box Computer Card Cage Layout

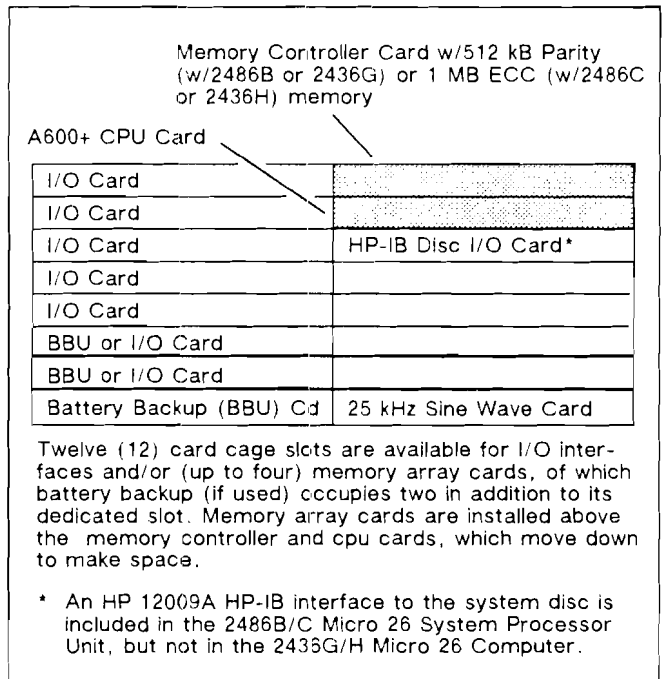


Figure 14. Card Cage Layout of HP 2486B/C SPU or HP 2436G/H (14-Slot) Micro 26 Box Computer, rear view

Memory for A600+ Computer Systems

Base Memory. A600+ Computer Systems are equipped with the customer's choice of a memory controller with 512k bytes of parity memory or 1M byte of ECC memory. The memory choices are determined by which of two different product numbers is ordered to obtain a particular SPU or computer. For example, to get a Model 26 SPU with 512k byte memory controller, you would order a 2196G. For a Model 26 SPU with 1M byte of ECC memory, order a 2196H.

Parity Memory. More memory can be provided with either controller by adding 12103C (0.5 MB), 12103D (1 MB), 12103K (2 MB), 12103L (4 MB), or 12103M (8 MB) Parity Memory Array Cards. The 12103K-M card can be added directly to either memory controller. This differs from 12103C and 12103D Parity Memory Array Cards, must be added in a certain progression for memory expansion (the system must have 1 MB of memory before 1 MB can be added). Thus, a need for 8 megabytes of memory can be satisfied simply by ordering a 12103M 8 MB Parity Memory Array Card and the 12038A connector that is needed to connect it to the 12100A SBC. Up to 32 megabytes of parity memory (4 x 12103M cards) can be provided in an A600+ system.

Ordering A600+ Systems, continued

ECC Memory. The A600+ with 1 MB ECC Memory Controller can also support expansion of ECC memory. In this case, a 12111B (1 MB) ECC memory array card is prerequisite to addition of 12111C (2 MB) memory array cards. Up to 8 megabytes of ECC memory can be supported.

Mixing of ECC and Parity Memory. Within the total limitation of four memory array cards, 12111B and C ECC memory array cards and 12103C, D, K, L, and M parity memory array cards can be used together in the same system. ECC memory can thus be used to assure maximum availability of the operating system and critical resident programs and data and lower priced parity memory can be used for programs and data that do not require the extra protection of ECC memory.

Use of Memory Connectors. See Figure 15 for the 12038x controller-to-array card connectors to use for the respective numbers of array cards that are to be connected.

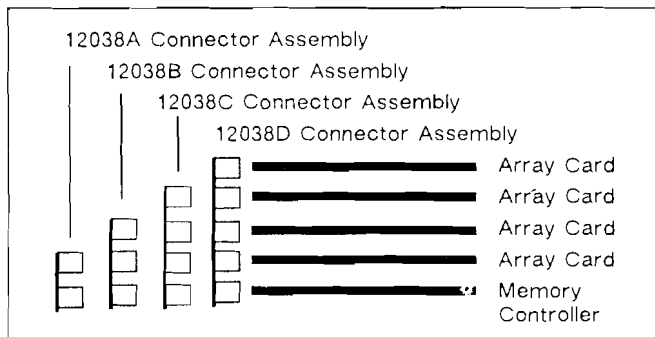


Figure 15. 12038x Connector Assembly Usage for Connection of Memory Array Cards to the A600+ Memory Controller

Rack Mounting of HP 2196G/H System Processor Units

HP 2196G/H System Processor Units must be installed in a 29429A Option 053 or 29431G Option 053 19-inch EIA rack mounting cabinet to assure compliance with EMI and safety regulations. The cabinet must be ordered separately, but on the same order as the HP 2196G/H SPU.

Layout of HP 2196G/H System Processor Unit in HP 29431G (tall) Cabinet

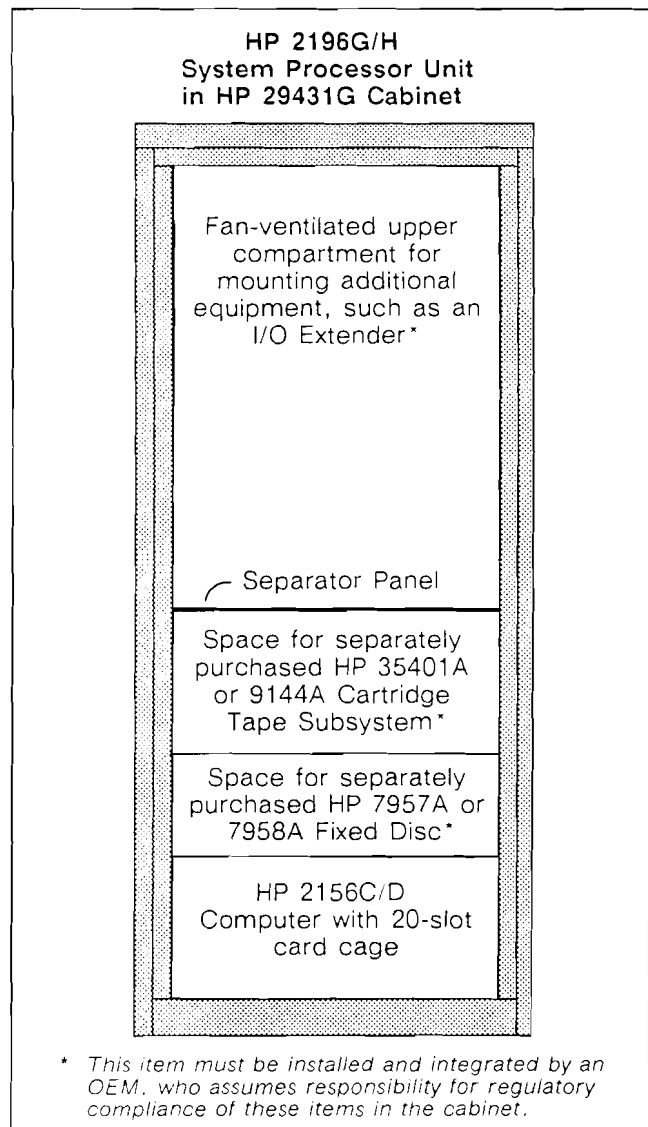
Figure 16 shows the layout of the HP 2196G/H System Processor Unit when rack mounted in the HP 29431G Option 053 Cabinet.

Layout of HP 2196G/H System Processor Unit in HP 29429A (short) Cabinet

Layout of the HP 2196G/H System Processor Unit in the HP 29429A Cabinet is the same as shown in Figure 16, except that there is no upper compartment providing extra space for additional equipment.

A600+ Ordering Information

Order A600+ SPUs, Computers, Cabinets, Memory, and other plug-ins on pages 15 through 19 of the HP 1000 Ordering Information packet.



* This item must be installed and integrated by an OEM, who assumes responsibility for regulatory compliance of these items in the cabinet.

Figure 16. Rack Layout of HP 2196G/H System Processor Unit in HP 29431G Cabinet

Ordering HP 1000 A700 Systems

Available Platforms

HP 1000 A700 Computer Systems can be based on any of the following products (see Figure 17 for definition of integration levels):

1. The HP 2437B Micro 27 (14-slot) Box Computer.
2. The HP 2137B Model 27 (20-slot) Box Computer.
3. The HP 2487B Micro 27 (14-slot) System Processor Unit (SPU).
4. The HP 2197E Model 27 (20-slot) System Processor Unit (SPU).

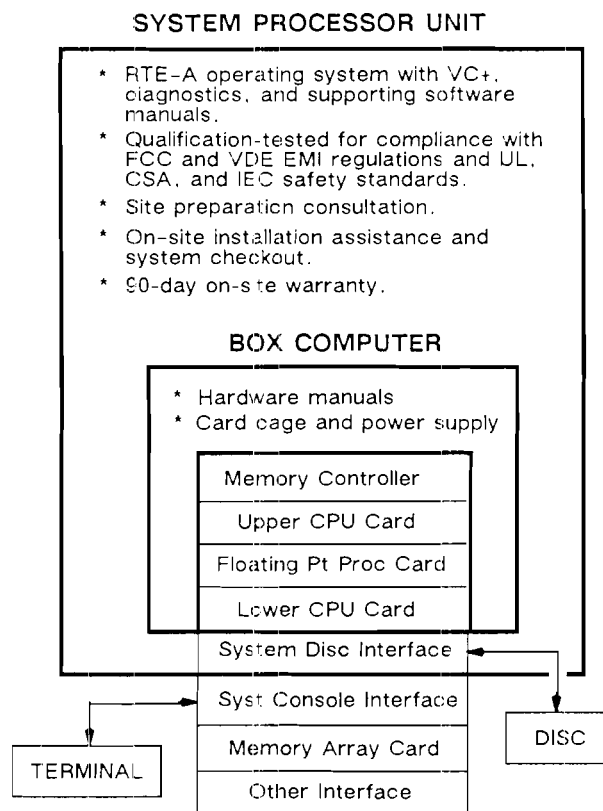


Figure 17. HP 1000 A700 Integration Levels

Operational Requirements

HP 2487B or 2197E SPU

The HP 2487B or 2197E System Processor Unit will require the following for operation:

1. A separately-purchased console interface and a terminal to function as the system communications console, selected from those listed on page 32. (For more information on the console's function, see page 7.)

2. A system disc, selected from those listed on page 40. (For more information on the system disc's function, see page 8).
3. A memory array card(s) and additional software and peripheral devices as needed to support the application, which can be selected on the System Capabilities Summary Checklist on page 97 of the HP 1000 Ordering Information packet.

HP 2437B or 2137B Box Computer

The HP 2437B and 2137B Computers will require the following for operation:

1. Use of the RTE-A operating system. Users who want to develop programs or generate systems must purchase the 92077A RTE-A (software and manuals) product for the first computer and the 92077R Right-to-Copy RTE-A product for each additional computer. HP 92077E purchases the right to execute developed applications under RTE-A on one target system, but without program development or generation of other systems on the target system.
2. Either of the following system console communications choices:
 - a. A console interface and a terminal, selected from the list on page 32, to function as the system communications console. (For more information on the console's function, see page 7.)
 - b. An HP 12007B or 12044A point-to-point HDLC interface to an adjacent HP 1000 system operating under 91790A NS/1000 or 91750A DS/1000-IV network software. 91790R or 91750R right to copy is also required for the local computer. See pages 51 and 52.
3. Any of the following bootup device choices:
 - a. An HP 12009A HP-IB interface to a local system disc, selected from those listed on page 40. (For more information on the system disc's function, see page 8).
 - b. An HP 12007B or 12044A point-to-point HDLC interface to an adjacent HP 1000 system operating under 91790A NS/1000 or 91750A DS/1000-IV network software. 91790R or 91750R right to copy is also required for the local computer. See pages 51 and 52.
 - c. An HP 12009A HP-IB interface to a cartridge tape subsystem or a magnetic tape unit, selected from those listed on page 44.
 - d. An HP 12008A or 93568P PROM Storage Module (Ordering Information page 22).
4. A memory array card(s) and additional software and peripheral devices as needed to support the application, which can be selected on the System Capabilities Summary Checklist on page 97 of the HP 1000 Ordering Information packet.

A700 Card Cage Layouts

Figures 18 and 19 show the card cage layouts of the A700 box computers and SPUs and provide spaces for entry of interface/memory card product numbers.

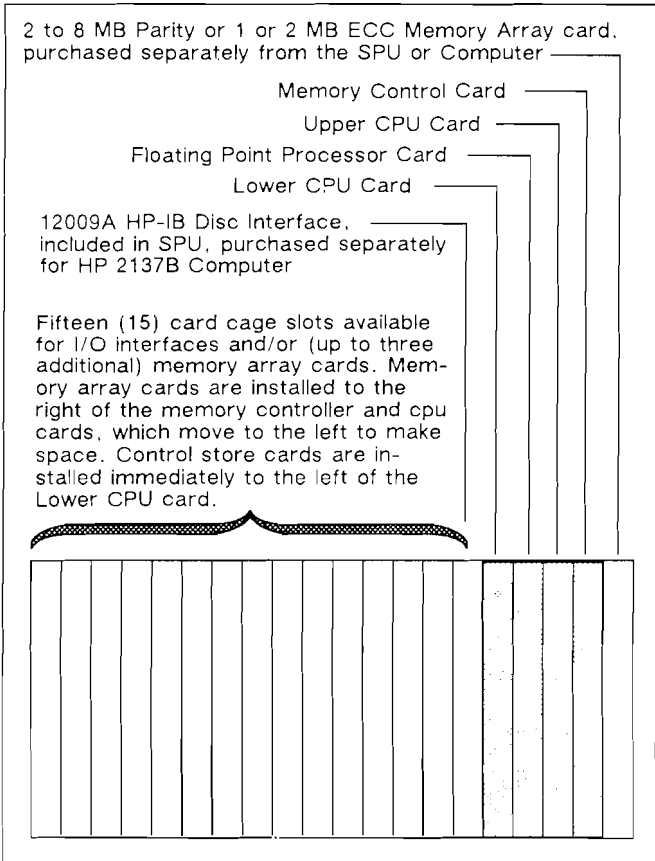


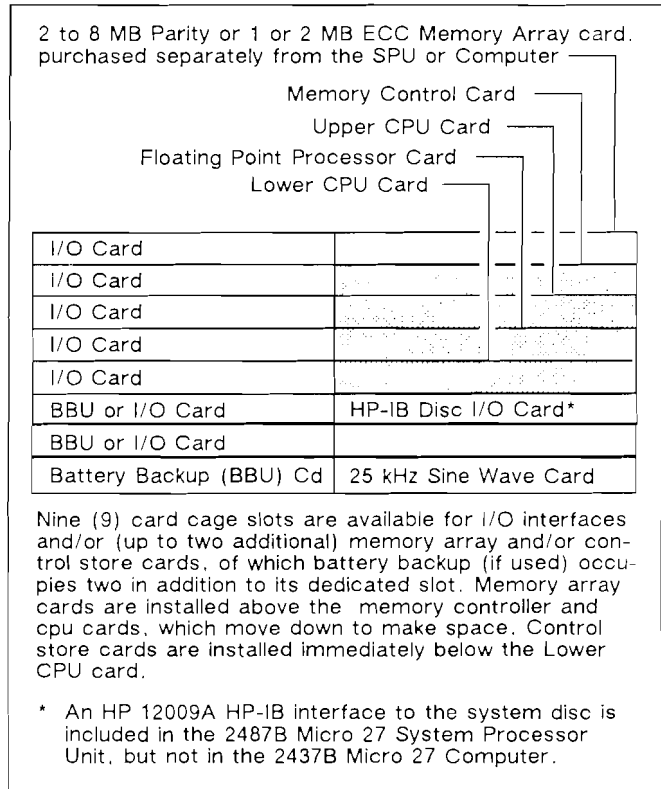
Figure 18. Card Cage Layout of HP 2197E SPU or HP 2137B(20-Slot) Box Computer, rear view

Memory for A700 Computer Systems

Base Memory. To simplify the ordering of desired memory array cards, A700 SPUs and Computers do not include any base memory. Customers simply specify the memory array cards that are needed for the application. The former memory delete option 014 is no longer needed.

Memory Capacity in 2487B and 2437B. Memory array cards, the memory controller, and the cpu, floating point processor, and control store cards are all connected together by a front plane as well as a backplane. Because of the frontplane connection, all

of these cards must be installed in adjacent slots. The Micro/1000 package used by the 2487B and the 2437B has a maximum of seven adjacent card cage slots. As shown in Figure 19, this leaves three slots available for memory array and control store cards. Two of these can instead be used for I/O interfaces if only one memory array card is needed to support the application.



Nine (9) card cage slots are available for I/O interfaces and/or (up to two additional) memory array and/or control store cards, of which battery backup (if used) occupies two in addition to its dedicated slot. Memory array cards are installed above the memory controller and cpu cards, which move down to make space. Control store cards are installed immediately below the Lower CPU card.

* An HP 12009A HP-IB interface to the system disc is included in the 2487B Micro 27 System Processor Unit, but not in the 2437B Micro 27 Computer.

Figure 19. Card Cage Layout of HP 2487B SPU or HP 2437B (14-Slot) Micro 27 Computer, rear view

Parity Memory. A700 systems can use the 12103C (0.5 MB), 12103D (1 MB), 12103K (2 MB), 12103L (4 MB), and 12103M (8 MB) Parity Memory Array Cards. Up to 32 megabytes of parity memory (4 x 12103M cards) can be provided in an A700 system based on the 2197E SPU or the 2137B Computer; up to 24 megabytes of parity memory (3 x 12103M cards) is supportable in a 2487B SPU or a 2437B Computer, provided that none of the usable memory slots are used for control store cards.

ECC Memory. The A700 systems can also use the 12111B (1 MB) and 12111C (2 MB) ECC memory array cards. Up to 8 megabytes of ECC memory can be supported in a 2197E SPU or 2137B Computer; 6 MB in a 2487B SPU or 2437B Computer.

Mixing of ECC and Parity Memory. Within the total limitation of four memory array cards in the 2197E and 2137B and three memory array cards in the 2487B and 2437B, 12111B and C ECC memory array cards and 12103C, D, K, L, and M parity memory array cards can be used together in the same system. ECC memory can thus be used to assure maximum availability of the operating system and critical resident programs and data and lower priced parity memory can be used for programs and data that do not require the extra protection of ECC memory.

Use of Memory Connectors. See Figure 20 for the 12038x controller-to-array card connectors that should be used for the respective numbers of array cards that are to be connected.

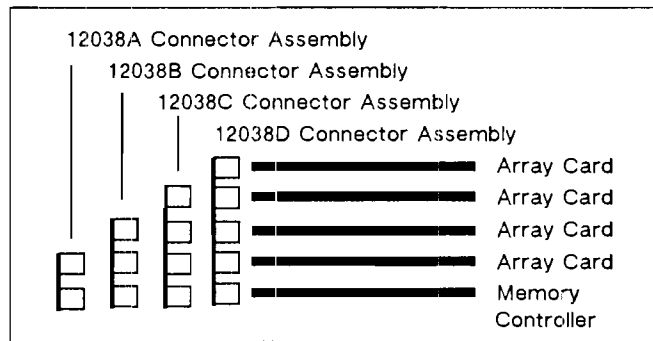


Figure 20. 12038x Connector Assembly Usage for Connection of Memory Array Cards to the A700 Memory Controller

Rack Mounting of HP 2197E System Processor Unit

HP 2197E System Processor Units must be installed in a 29429A Option 053 or 29431G Option 053 19-inch EIA rack mounting cabinet to assure compliance with EMI and safety regulations. The cabinet must be ordered separately, but on the same order as the HP 2197E SPU.

Layout of HP 2197E System Processor Unit in HP 29431G (tall) Cabinet

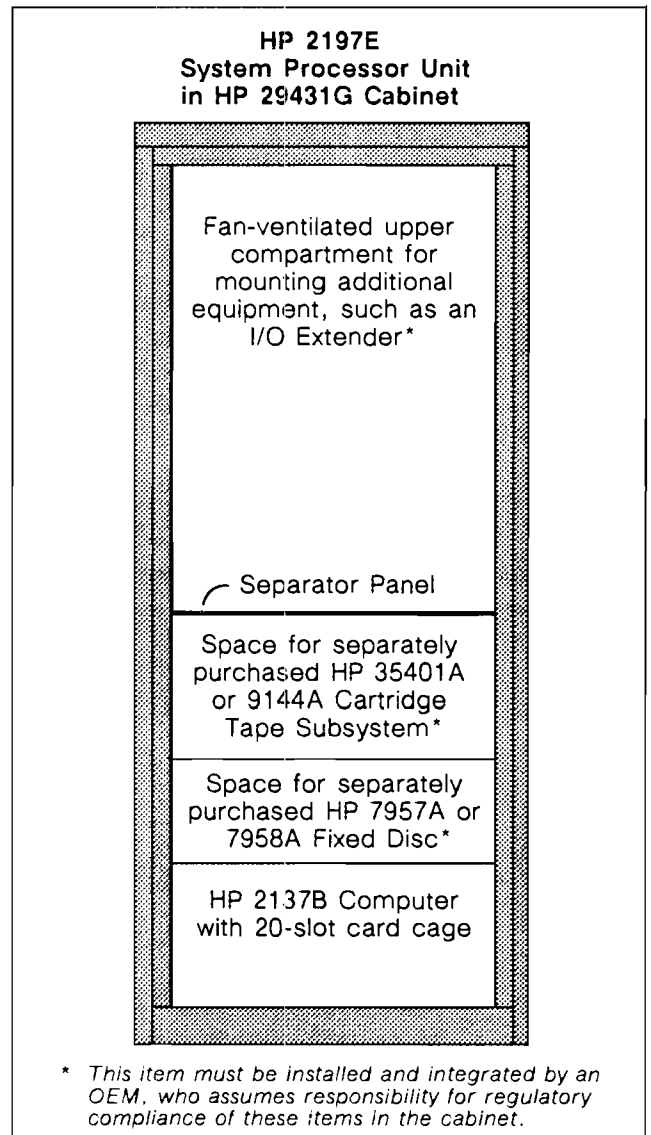
Figure 21 shows the layout of the HP 2197E System Processor Unit when rack mounted in the HP 29431G Option 053 Cabinet.

Layout of HP 2197E System Processor Unit in HP 29429A (short) Cabinet

Layout of the HP 2197E System Processor Unit in the HP 29429A Cabinet is the same as shown in Figure 21, except that there is no upper compartment providing extra space for additional equipment.

A700 Ordering Information

Order A700 SPUs, Computers, Cabinets, Memory, and other plug-ins on pages 20 through 23 of the HP 1000 Ordering Information packet.



* This item must be installed and integrated by an OEM, who assumes responsibility for regulatory compliance of these items in the cabinet.

Figure 21. Rack Layout of HP 2197E System Processor Unit in HP 29431G Cabinet

Ordering HP 1000 A900 Systems

Available Platforms

HP 1000 A900 Computer Systems can be based on any of the following products (see Figure 22 for definition of integration levels):

1. The HP 2439B Micro 29 (14-slot) Box Computer.
2. The HP 2139B Model 29 (20-slot) Box Computer.
3. The HP 2489B Micro 29 (14-slot) System Processor Unit (SPU).
4. The HP 2199E Model 29 (20-slot) System Processor Unit (SPU).

2. A system disc, selected from those listed on page 40. (For more information on the system disc's function, see page 8).
3. A memory array card(s) and additional software and peripheral devices as needed to support the application, which can be selected on the System Capabilities Summary Checklist on page 97 of the HP 1000 Ordering Information packet.

HP 2439B or 2139B Box Computer

The HP 2439B and 2139B Computers will require the following for operation:

1. Use of the RTE-A operating system. Users who want to develop programs or generate systems must purchase the 92077A RTE-A (software and manuals) product for the first computer and the 92077R Right-to-Copy RTE-A product for each additional computer. HP 92077E purchases the right to execute developed applications under RTE-A on one target system, but without program development or generation of other systems on the target system.
2. Either of the following system console communications choices:
 - a. A console interface and a terminal, selected from the list on page 32, to function as the system communications console. (For more information on the console's function, see page 7.)
 - b. An HP 12007B or 12044A point-to-point HDLC interface to an adjacent HP 1000 system operating under 91790A NS/1000 or 91750A DS/1000-IV network software. 91790R or 91750R right to copy is also required for the local computer. See pages 51 and 52.
3. Any of the following bootup device choices:
 - a. An HP 12009A HP-IB interface to a local system disc, selected from those listed on page 40. (For more information on the system disc's function, see page 8).
 - b. An HP 12007B or 12044A point-to-point HDLC interface to an adjacent HP 1000 system operating under 91790A NS/1000 or 91750A DS/1000-IV network software. 91790R or 91750R right to copy is also required for the local computer. See pages 51 and 52.
 - c. An HP 12009A HP-IB interface to a cartridge tape subsystem or a magnetic tape unit, selected from those listed on page 44.
 - d. An HP 12008A or 93568P PROM Storage Module (Ordering Information page 22).
4. A memory array card(s) and additional software and peripheral devices as needed to support the application, which can be selected on the System Capabilities Summary Checklist on page 97 of the HP 1000 Ordering Information packet.

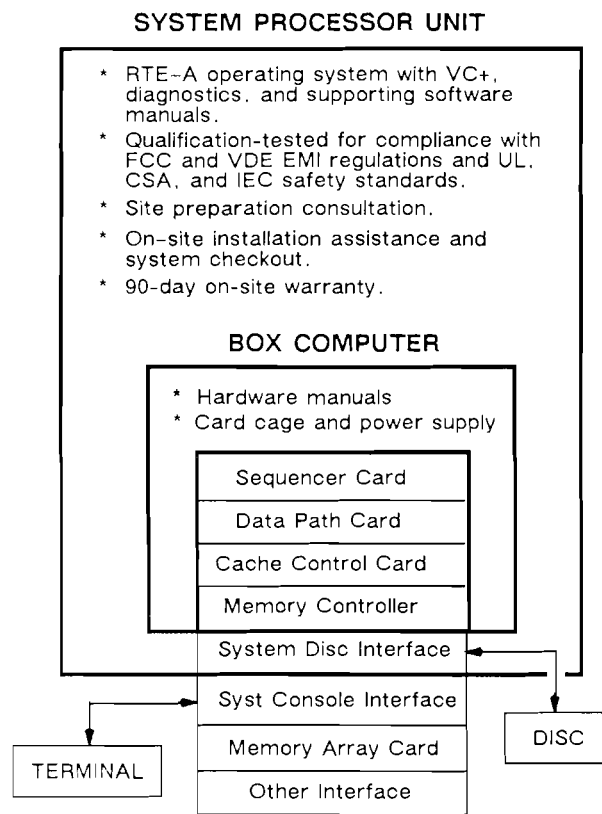


Figure 22. HP 1000 A900 Integration Levels

Operational Requirements

HP 2489B or 2199E SPU

The HP 2489B or 2199E System Processor Unit will require the following for operation:

1. A separately-purchased console interface and a terminal to function as the system communications console, selected from those listed on page 32. (For more information on the console's function, see page 7.)

A900 Card Cage Layouts

Figures 23 and 24 show the card cage layouts of the A900 box computers and SPUs and provide spaces for entry of interface/memory card product numbers.

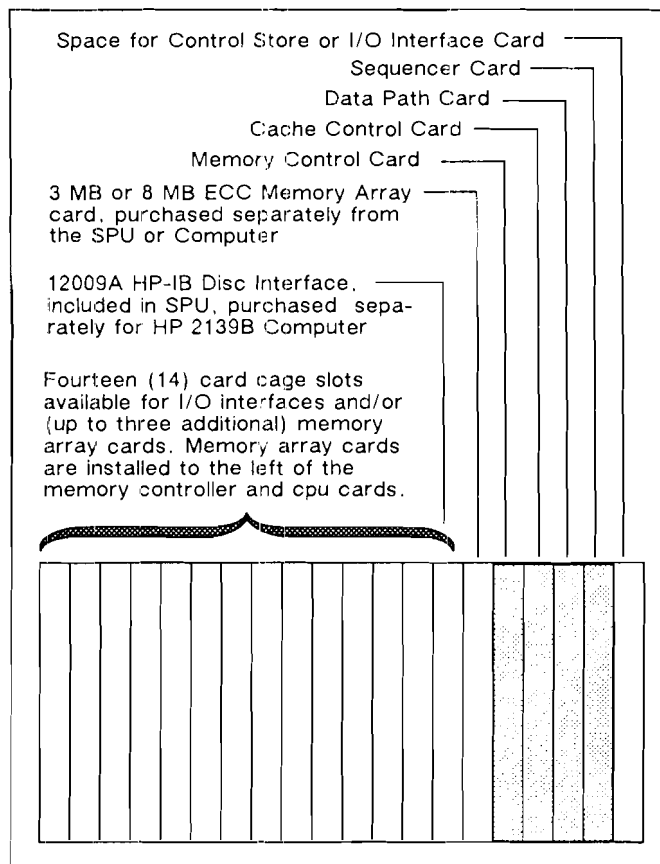


Figure 23. Card Cage Layout of HP 2199E SPU or HP 2139B(20-Slot) Box Computer, rear view

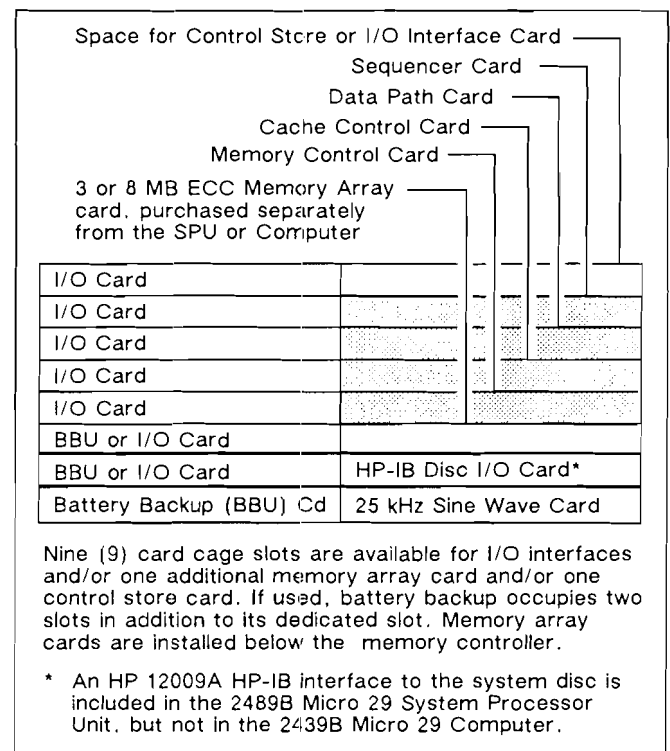
Memory for A900 Computer Systems

Base Memory. To simplify the ordering of desired memory array cards, A900 SPUs and Computers do not include any base memory. Customers simply specify the memory array cards that are needed for the application. The former memory delete option 014 is no longer needed.

Memory Capacity in 2489B and 2439B. Memory array cards, the memory controller card, the CPU cards, and the control store card must be installed in adjacent card cage slots. The Micro/1000 package used by the 2489B and the 2439B has a maximum of seven adjacent card cage slots. This leaves two slots available for memory array cards. As shown in Figure 24, one of the memory slots and the control store slot can instead be used for I/O interfaces if only one memory array card and no control store is needed to support the application.

ECC Memory. The A900 systems can both the 12221A (3 MB) and the 12221B (8 MB) memory array cards. Up to 32 megabytes of ECC memory (4 x 12221B) can be supported in a 2199E SPU or 2139B Computer; 16 MB (2 x 12221B) in a 2489B SPU or 2439B Computer.

Use of Memory Connectors. See Figure 25 (next page) for the 1222x controller-to-array card connectors that should be used for the respective numbers of array cards that are to be connected.



Nine (9) card cage slots are available for I/O interfaces and/or one additional memory array card and/or one control store card. If used, battery backup occupies two slots in addition to its dedicated slot. Memory array cards are installed below the memory controller.

* An HP 12009A HP-IB interface to the system disc is included in the 2489B Micro 29 System Processor Unit, but not in the 2439B Micro 29 Computer.

Figure 24. Card Cage Layout of HP 2489B SPU or HP 2439B(14-Slot) Micro 29 Box Computer, rear view

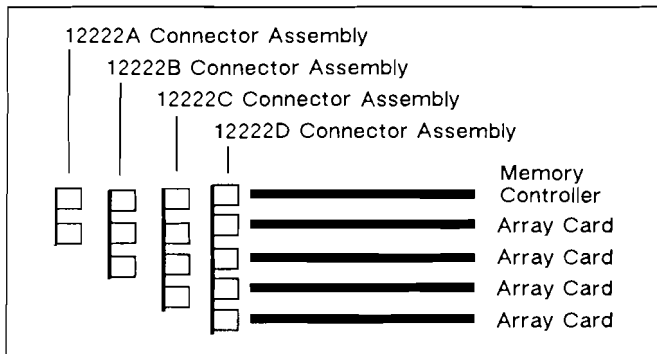


Figure 25. 12222x Connector Assembly Usage for Connection of Memory Array Cards to the A900 Memory Controller

Rack Mounting of HP 2199E System Processor Unit

HP 2197E System Processor Units must be installed in a 29429A Option 053 or 29431G Option 053 19-inch EIA rack mounting cabinet to assure compliance with EMI and safety regulations. The cabinet must be ordered separately, but on the same order as the HP 2197E SPU.

Layout of HP 2199E System Processor Unit in HP 29431G (tall) Cabinet

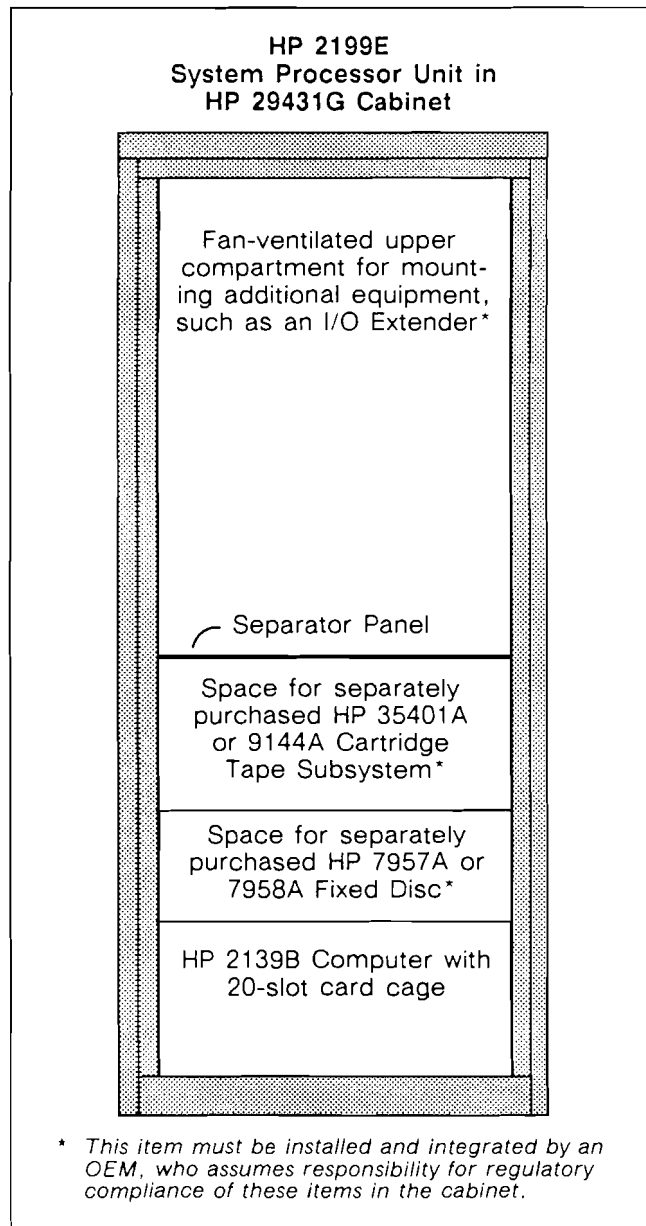
Figure 26 shows the layout of the HP 2199E System Processor Unit when rack mounted in the HP 29431G Option 053 Cabinet.

Layout of HP 2199E System Processor Unit in HP 29429A (short) Cabinet

Layout of the HP 2199E System Processor Unit in the HP 29429A Cabinet is the same as shown in Figure 26, except that there is no upper compartment providing extra space for additional equipment.

A900 Ordering Information

Order A900 SPUs, Computers, Cabinets, Memory, and other plug-ins on pages 24 through 26 of the HP 1000 Ordering Information packet.



* This item must be installed and integrated by an OEM, who assumes responsibility for regulatory compliance of these items in the cabinet.

Figure 26. Rack Layout of HP 2199E System Processor Unit in HP 29431G Cabinet

Ordering RTE-A, VC+, and Diagnostics

Purchase for New Systems

Systems Based On SPUs

RTE-A, VC+, and diagnostics are included with HP 219xE/G/H and HP 248xB/G/H System Processor Units (SPUs), with a full license to use RTE-A for program development and system generation. Thus, it is not necessary to purchase 92077A RTE-A, 92078A VC+, or 24398B and 24612A diagnostics separately for use on SPUs.

Systems Based On Computers

A license to execute RTE-A is included with HP 2134A, 2156C/D, 2424A, 2426G/H, 2434A, and 2436G/H Box Computers. This licenses execution of a particular system configuration on a target system, but excludes program development and generation of different system configurations. A license to develop programs and generate system configurations requires the purchase of 92077A RTE-A (and 92078A VC+ if desired) for the first computer and 92077R Rights to Copy RTE-A (and 92078R Rights to Copy VC+ if desired) for each additional computer.

Software Media Options. The 92077A, 92078A, and diagnostics software is available on different delivery media. The customer indicates (and MUST indicate) the media on which software is to be delivered by ordering the appropriate Software Media Option. Media Options range from 022 through 061.

Software Use Options. The prices for 92077A/R/E and 92078A/R/E are commensurate with the performance potential of the target system on which the software will be executed. Prices are linked to the processors on which they are to be used through the mechanism of Software Use Options 400 through 890.

Upgrade Purchases

Systems Without Support Services

Customers with RTE-A systems that are not receiving upgrades under a software support service product can purchase the latest revision of the RTE-A and VC+ software at a lower-than-first-purchase price, by ordering Software Use Option 601, 701, or 891.

To a More Powerful Processor

Customers with RTE-A systems on an A400, A600+, or A700 processor can move to the more powerful A900 processor at a price that gives full credit to the price paid for their original use option. This is done by ordering Software Upgrade Use Option 894, 896, or 897.

Operational Requirements

The RTE-A primary system and VC+ provided with HP 219xE/G/H and HP 248xB/G/H System Processor Units (SPUs) and most 92077A Media options requires a minimum of 512k bytes of memory, a system disc, and a local system console. The customer can generate other configurations, including memory-based configurations, that may have greater or lesser requirements.

RTE-A, VC+, and Diagnostics Ordering Information

Order RTE-A and VC+ "A", "R", and "E" products and diagnostics on pages 27 through 29 of the HP 1000 Ordering Information packet.

Ordering Interfaces and Extenders

A Wide Choice of Interfaces

Input/output interfaces are the crucial connecting link between the system and external peripheral devices

and other computer systems. Table 2, below, lists the HP 1000 A-Series interfaces by category, giving references to the Ordering Information packet pages on which they can be ordered.

Table 2. HP 1000 A-Series Input/Output Interfaces

Category	Product Number and Name	Use	Ordering Information Page Ref.
Multi-device	HP 12009A HP-IB Interface	Interfacing discs, cartridge tape subsystems, magnetic tape units, printers, plotters, and other HP-IB devices to the system.	32
	HP 12040D 8-Channel Multiplexer	Interfacing terminals, printers, plotters, programmable logic controllers, and other serial devices to the system.	32
	HP 12041B Multi-Use 8-Channel Multiplexer	Interfacing programmable logic controllers to the system.	32
System-to-System Communication	HP 12007B HDLC Modem Interface	Communication via modem and telephone line link with remote HP 1000 System.	33
	HP 12044A HDLC Direct Connect Interface	Communication via hard-wired connection with another HP 1000 System.	33
	HP 12073A Bisync Modem Interface	Communication via modem and telephone line link with remote HP 3000 System.	33
	HP 12082A Bisync Direct Connect Interface	Communication via hard-wired connection with HP 3000 System.	33
	HP 12075A X.25 Network Interface	Communication with other systems or terminals via X.25 Packet-Switching Network	33
	HP 12076A LAN/1000 Link Interface	Communication with other systems or terminals via IEEE 802.3 or Ethernet Local Area Network	34
	HP 12043A Multi-Use Programmable Serial Interface	Communication with IBM or Plug-compatible systems via modem and telephone line link.	38
	HP 12072A Data Link Slave Interface	Communication via multidrop data link with a 12092A Data Link Master Interface in another HP 1000 System.	38
	HP 12092A Data Link Master Interface	Communication via multidrop data link with 12072A Data Link Slave Interfaces in other HP 1000 Systems.	39
Measurement and Control	HP 12060B High-Level Analog Input Card	Measurement of $8 \pm 1.23V$ to $10.23V$ fs analog input channels at rates to 55,000 channels per second.	37
	HP 12061A Expansion Multiplexer Card	Addition of 32 channels to the input capacity of the 12060B card.	37
	HP 12062A Analog Output Card	Provision of four isolated $\pm 10.23V$ fs analog outputs with 12-bit resolution.	37
	HP 12063A Isolated Digital I/O Card	Provides 16 opto-isolated inputs and 16 relay-isolated outputs.	37
Other Interfaces	HP 12005B Asynchronous Serial Interface	Interfacing a single terminal to the system.	38
	HP 12006A Parallel Interface	Interfacing 8 or 16-bit data buses to the system.	38
	HP 12010A Breadboard Interface	Provides I/O master and space for 60 16-pin wire wrap sockets for user-developed interfaces.	38
	HP 12042B Programmable Serial Interface	Breadboard for user-developed modem communications interface.	38
	HP 12065A Color Video Interface	Connection of color graphics output to RGB Color Video Monitors	38

Multi-device Interface Connections

Multiple devices connect to the HP 12009A HP-IB interface and the HP 12040D 8-Channel Multiplexer as shown in Figures 26 and 27. The acronym HP-IB represents the full name "Hewlett-Packard Interface Bus", which is a bus cable whose connection can daisy-chain from one device to the next, can fan out from devices in a star arrangement, or can use a combination of these ways, as illustrated in Figure 26. Multiple devices connect to the multiplexer via its 8-connector panel, as shown in Figure 27.

The Card Cage/Interface Use Record

Because connections to multi-device interfaces are not simply a one interface-one device relationship, it is desirable to keep track of the usage of those interfaces and of card cage capacity usage as well. To facilitate usage tracking, the Ordering Information packet provides a Card Cage/Interface Use Record, pages 30 and 31. This Use Record can be removed from the Ordering Information packet and used to record the usage of the card cage slots and the multi-device capacity usage of HP-IB and multiplexer interfaces, as illustrated in the example on the next page.

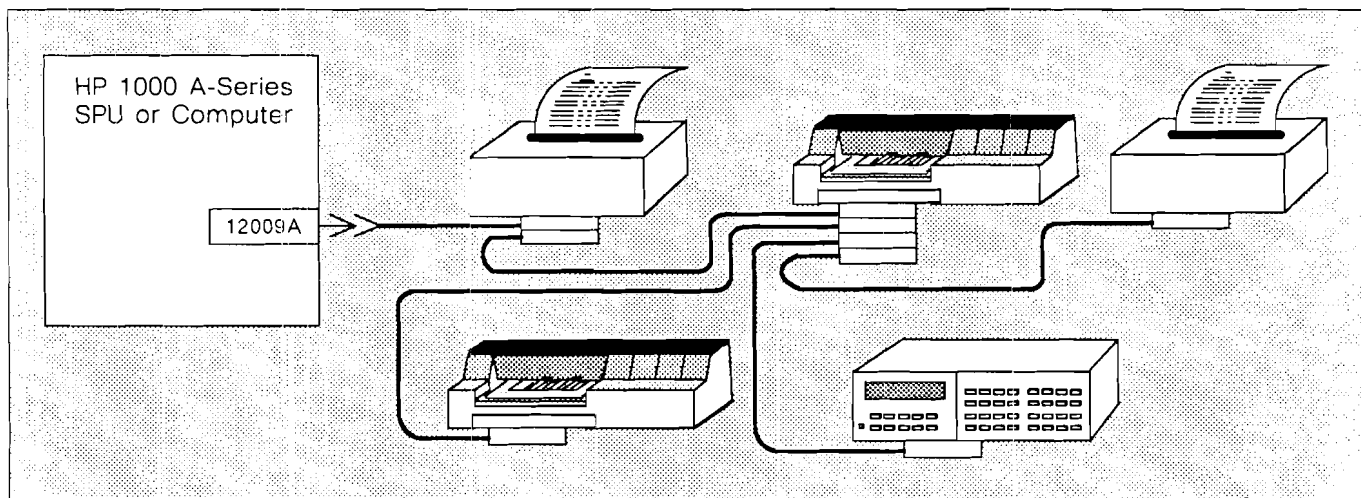


Figure 26. HP-IB Device Connections via 12009A HP-IB Interface

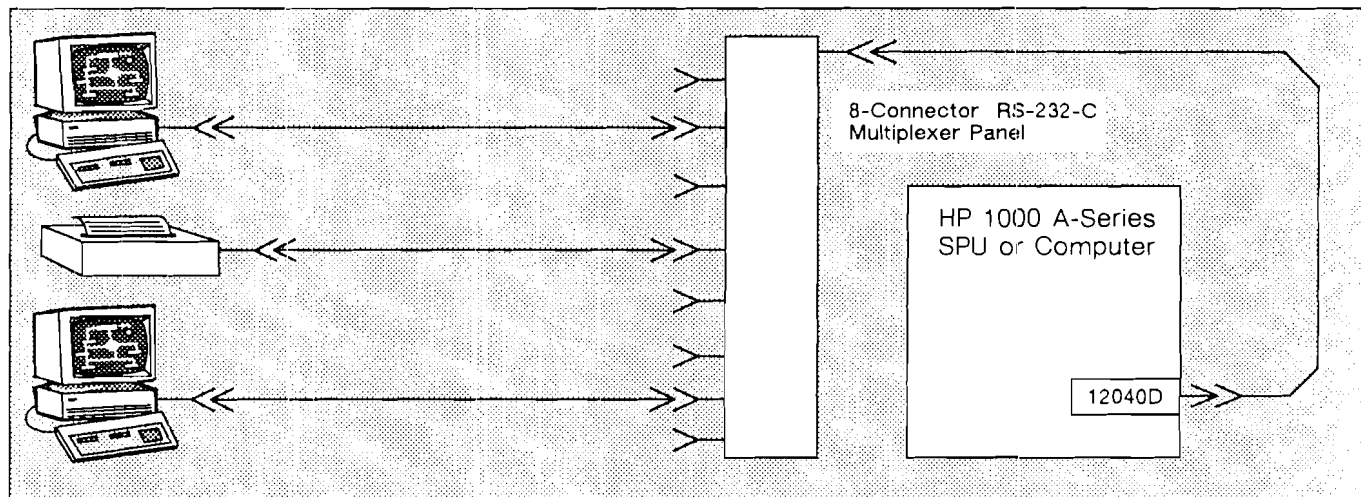


Figure 27. RS-232-C Device Connections via 12040D 8-Channel Multiplexer

Recording Card Cage and Interface Use

The Computer Card Cage Record

Referring to the Example first page of the Card Cage/Interface Use Record on the facing page, note that it contains diagrams of the three basic computer card cages that are used for HP 1000 A-Series Systems. You may recall them from the Ordering HP 1000 A400, A600+, A700, and A900 Systems sections in earlier pages of this guide. The example shows the card cage section filled out for an HP 2489B Micro 29 SPU based system that includes a 12205A Control Store Card, a 12221B 8 megabyte ECC memory array card, a 12009A (HP-IB) Disc Interface, which is included with the SPU, a 12009A (HP-IB) Magnetic Tape Unit (MTU) Interface, two 12040D Multiplexer interfaces for connection of terminals, a printer, and plotters, a 12044A Direct Connect HDLC Interface to another HP 1000 System, a 12076A LAN/1000 Link Interface, and a battery backup card, which extends up into the two card cage slots above its mounting position. Obviously, if further expansion is likely, an HP 2199E with 20 slots instead of 12 would be a better choice.

The Multiplexer and HP-IB Interface Use Record

Beneath the Card Cage Record are a Multiplexer and HP-IB Interface Use records. At the upper right of this section is a record for use of the four-device capacity of the On-Board I/O Multiplexer of the 12100A Single Board Computer if an A400 based system is being configured, not true in this Example. Instead, the product numbers of the various terminals, printer, and plotters, and the cables used to connect them are entered into the record sections for 12040D Multiplexers 1 and 2. Similarly, the product numbers of the discs and magnetic tape unit are entered into the record sections for 12009A HP-IB interfaces D1 and M1, respectively. These various record sections provide a graphic record of how much device interfacing capacity remains available for any of these multi-device interfaces.

I/O Extender Record

The second page (page 31 in the Ordering Information packet) of the Card Cage/Interface Use Record provides additional records for entry of multiplexer usage and HP-IB interface usage. It also provides an I/O Extender Card Cage record, which would be used in the same way as the Computer Card Cage Record, if the computer card cage could not hold all

required interfaces. I/O Extenders are ordered on page 39 of the Ordering Information packet.

Extension of HP-IB and Multiplexer Transmission Distances

When it is necessary to extend the transmission distance between the system and peripheral devices beyond the limit of 15 meters (48.75 ft.) for high speed HP-IB operation or the limit of 91 meters (300 ft.) for multiplexer operation, this can be accomplished with the use of extenders. These are the HP 37204A Multipoint HP-IB Extender for the HP 12009A HP-IB Interface and the HP 39301A Fiber Optic Multiplexer for the HP 12040D Multiplexer Interface, both of which can be used to extend transmission distances up to 1.25 km (4,100 ft.).

The HP-IB Extender

The HP 37204A HP-IB Extender translates the parallel input from the HP-IB interfaces and devices into a high-speed serial bit stream, which it transmits to another extender via 75 ohm coaxial cable (or optionally via fiber optic cable) at rates to 60,000 bits per second. Provision of two coaxial ports supports daisy-chaining of multiple HP-IB Extenders as shown in Figure 28 on the next page for maximum configuration flexibility. The optional fiber optic connection works at full speed up to the maximum transmission distance of 1.25 km vs a drop to 1/10 the data rate for distances greater than 250 meters with coaxial cable links. Fiber optic communication also provides the additional advantages that are discussed in the next paragraph on the Fiber Optic Multiplexer. The HP 37204A HP-IB Extender and related cabling are ordered on page 32 of the Ordering Information packet.

The Fiber Optic Multiplexer

The HP 39301A Fiber Optic Multiplexer multiplexes communications from up to 16 channels (two 12040D 8-channel multiplexers) onto a single duplex fiber optic cable channel, as shown in Figure 29 on the next page. It can thus extend transmission distance between the system and terminals or other multiplexer-connected devices up to 1.25 km (4100 feet). The use of an optical circuit instead of an electrical circuit:

1. Overcomes the effects of severe electrical noise.
2. Permits connection between buildings without concern for lightning hazards.
3. Prevents electronic eavesdropping.

The HP 39301A Fiber Optic Multiplexer and related cables and connection hardware are ordered on page 33 of the Ordering Information packet.

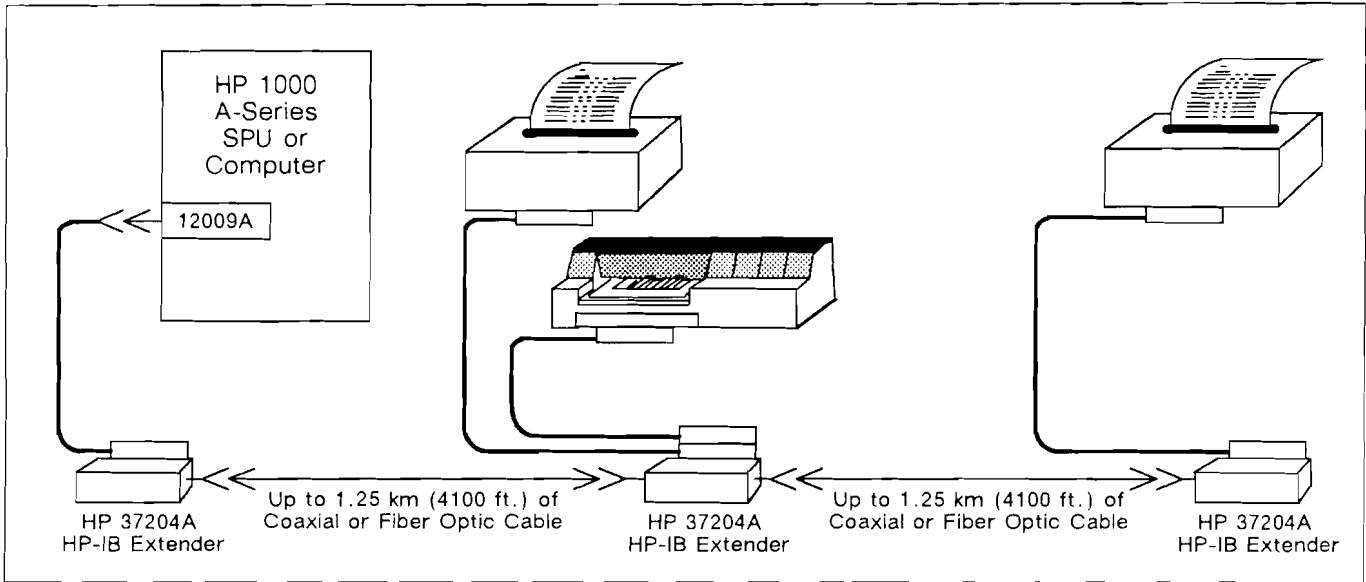


Figure 28. HP-IB Device Connections via HP 37204A HP-IB Extenders

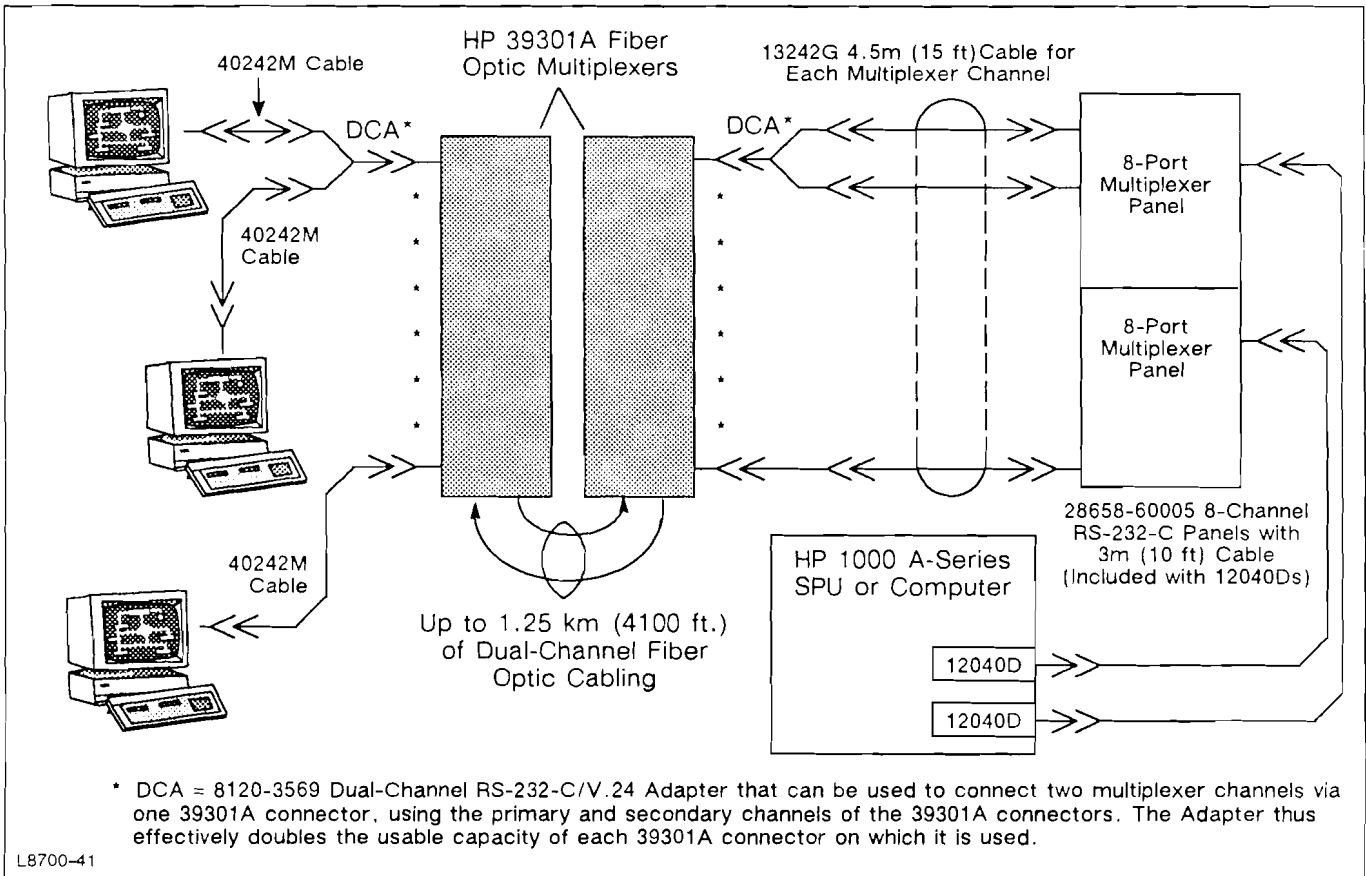


Figure 29. Terminal Connection via HP 39301A Fiber Optic Multiplexer and 8-Channel Multiplexers

Ordering Analog and Digital I/O Interfaces

Analog Input

Analog input is supported by two measurement and control interfaces. The basic functionality is provided by the HP 12060B, an eight-channel ADC card with differential input, ranges from ± 1.23 volts to 10.23 volts full scale, measuring at rates to 55,000 channels per second with 12-bit resolution. A companion interface is the HP 12061A Expansion Multiplexer, which piggy-backs onto the 12060B interface to add 32 channels, bringing the total input capacity for both interfaces to 40 differential input channels.

Analog Output

Analog output is provided by the HP 12062A interface, which has four independent, isolated analog outputs with output capability to ± 10.23 volts full scale, controlled with 12-bit resolution.

Digital Input/Output

Digital I/O is provided by the HP 12063A interface, with 16 opto-isolated digital inputs and 16 relay-isolated contact closure outputs.

Signal Isolation Requires 25 kHz AC Supply

The signal isolation designed into in the 1206xA/B interfaces makes possible the low noise differential analog input measurements and the flexibility afforded by isolation of analog outputs from each other and digital inputs from each other. This isolation is achieved by supplying the respective interfaces with 25 kHz AC power, which is transformer-coupled to the isolated circuits and rectified to satisfy their isolated DC power requirements. The requirement for 25 kHz AC supply excludes the use of HP 1206xA/B Interfaces in the HP 2424A and HP 2426G/H Computers because those computers do not provide 25 kHz power. The HP 243xA/B/G/H Computers and HP 248xB/C SPUs require an HP 12159A 25 kHz Sine Wave Card for support of HP 1206xA/B Interfaces. HP 213xA/B and 2156C/D Computers and 219xE/G/H SPUs provide appropriate 25 kHz ac supply without additional accessories. Table 3, below,

summarizes 25 kHz power supply available from the various HP 1000 A-Series computers and the power consumption of the HP 1206xA/B Interface cards, from which you can determine if a particular configuration of HP 1206xA/B interface cards will be supportable in a particular computer or SPU.

Table 3. 25 kHz AC Power Availability and Usage

Computer/SPU/Interface	25 kHz AC Power
2134A, 2137B, or 2139B Computer 2156C/D Computer 2196G/H, 2197E, or 2199E SPU	50.0W 50.0W 50.0W
2424A or 2426G/H Computer	0.0W
2434A, 2436G/H, 2437B, or 2439B Computer with 12159A 25 kHz Sine Wave Card 2484B, 2486B/C, 2487B, or 2489B SPU with 12159A 25 kHz Sine Wave Card	30.0W 30.0W
12060B High-Level Analog Input Card	- 7.3W
12061A Expansion Multiplexer Card	- 2.0W
12062A Analog Output Card	- 7.6W
12063A Digital Input/Output Card	- 11.4W

Screw-Terminal Termination Accessory Simplifies Signal Connections

HP 1206xAC and 12060BC interface signal cables, unterminated at the application end, can be used with a rack-installable (in EIA 19-inch rack cabinet) HP 12064A Screw-Terminal 68-Circuit Termination Assembly to set up convenient connection of application signal inputs and outputs to the system.

Ordering Information

Order HP 1206xA/B Measurement and Control Interfaces on page 37 of the Ordering Information packet and order the 12159A 25 kHz Sine Wave Card, if appropriate, on Ordering Information page 13 for A400 system, page 17 for A600+ system, page 22 for A700 system, or page 26 for A900 system.

Ordering System Console and Terminals

System Console Selection

A locally interfaced display terminal must be provided for operator communication:

1. In any HP 1000 A-Series Computer System that is based on a 219xE/G/H or 248xB/C System Processor Unit (SPU), or
2. In any HP 1000 A-Series Computer System that is based on a box or board computer that is not connected to an adjacent NS/1000 or DS/1000-IV network node via an HDLC point-to-point interface.

Except for the 700/41 Terminal, any of the supported HP display terminals or PCs listed in Table 4, below, can be used as the system console. These include previously-purchased terminals that have been discontinued. However, it is most cost effective to specify a minimum-capability terminal for the system console, because extra capability, such as graphics, usually cannot be put to good use on a system console. The other main consideration in selecting a system console is to specify one that uses the same type of cable as most of the other terminals in the system to facilitate connection of another terminal as system console if the system console terminal fails.

Table 4. Display Terminals and PCs Supported in HP 1000 A-Series Computer Systems

Product Number	Name	Connects Via		
		12100A SBC and	12005B Interface Option	12040B*/C*/D multiplexer and
700/92 2392A 2393A 2397A	Display Terminal Display Terminal Graphics Terminal Color Graphics Terminal	40242M or 40242Y Cable (See Figure 30)	002 Cable (See Figure 31)	40242M Cable (See Figure 32)
700/41	Terminal (NOT USABLE AS SYSTEM CONSOLE)	13242N Cable	Not supported	13242N Cable
72425A† 72445A†	Vectra Model 25 PC Vectra Model 45 PC	40242M or 40242Y Cable (See Figure 30)	Not supported	24542M Cable
9666A	Operator Interface Unit	40242M or 40242Y Cable (See Figure 30)	002 Cable (See Figure 31)	40242M Cable (See Figure 32)
NOTE A: The following are discontinued products, listed here for reference only.				
2382A 2621B 2625A 2628A 45610B	Office Display Terminal Display Terminal Dual System Terminal Word Processing Terminal Touchscreen Terminal	40242M or 40242Y Cable (See Figure 30)	002 Cable (See Figure 31)	24542M Cable
2622A 2623A 2624B 2626A 2627A	Display Terminal Graphics Terminal Display Terminal Display Station Graphics Terminal	13222Y Cable	001 or 005 Cable	13222Y Cable
2645A 2648A	Display Station Graphics Terminal	13232Y Cable	004 Cable	13232Y Cable

† Vectra Model 25 and 45 PCs also require a monitor graphics adapter, HP AdvanceLink software, the Vectra Disc Operating System, and a Serial/Parallel or Dual Serial Interface Card for operation in the HP 1000 A-Series System, as summarized in "Using Vectra PC as a Terminal" on page 34.

* 12040B and 12040C are discontinued multiplexers, listed here for reference only.

Console/Display Terminal Interface Selection

The following interfaces are available for connection of the system console and other display terminals to the system. These are:

1. The on-board multiplexer on the 12100A Single-Board Computer in all A400 systems can be used to connect the system console and three other multiplexer-connectable devices to the system via separately-ordered cables. See Figure 30, below.
2. The 12005B Asynchronous Serial Interface can be used to connect one terminal to the system. If no more than two terminals and no other multiplexer-connectable devices are to be connected, the 12005B interface is the lowest priced console/terminal connection choice in A600+, A700, and A900 systems. The appropriate interface-to-terminal cable is ordered as an interface option. See Figure 31, below.
3. The 12040D 8-Channel Multiplexer is the best choice in A600+, A700, and A900 systems for connection of more than two terminals and other multiplexer-connectable devices. Channel 0 of the multiplexer can be used to connect the system console (or any other device). The remaining channels can be used for other terminals and other multiplexer-connectable devices. Devices connect to an eight-connector panel via separately-ordered cables. See Figure 32, next page.
4. The 12075A X.25 Interface supports connection to remote terminals, as discussed in a separate section on page 36.

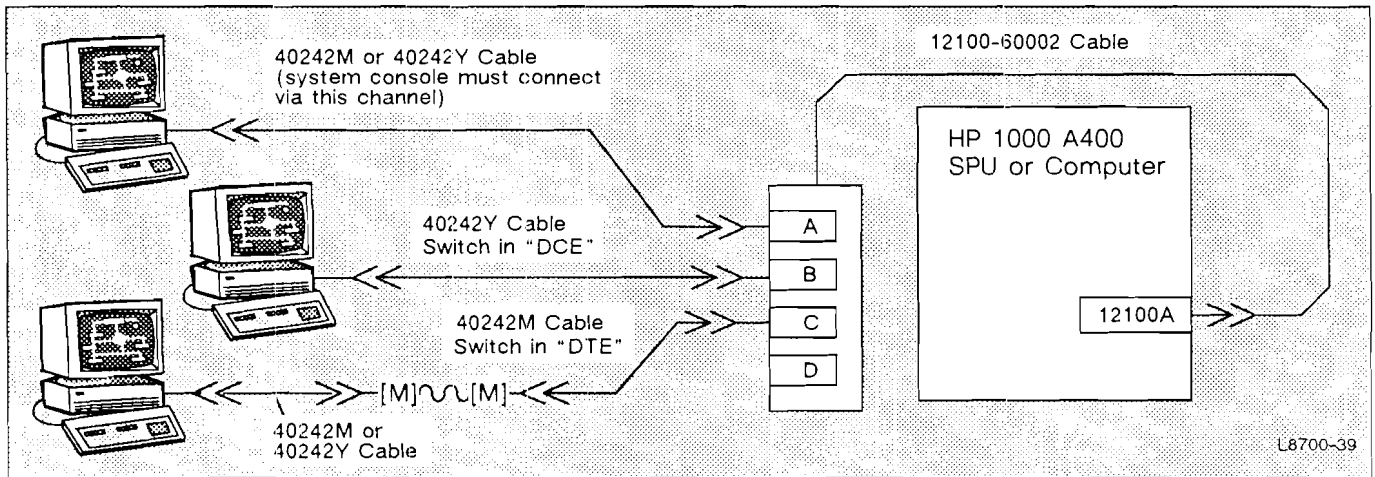


Figure 30. Console/Terminal Connection via A400 Four-Port On-Board I/O Multiplexer

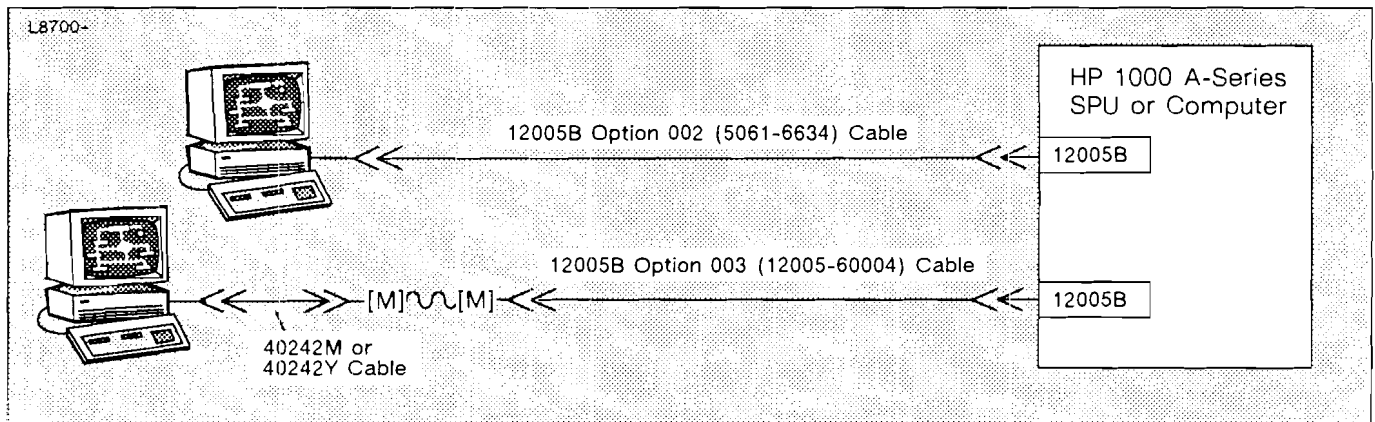


Figure 31. Console/Terminal Connection via 12005B Asynchronous Serial Interface

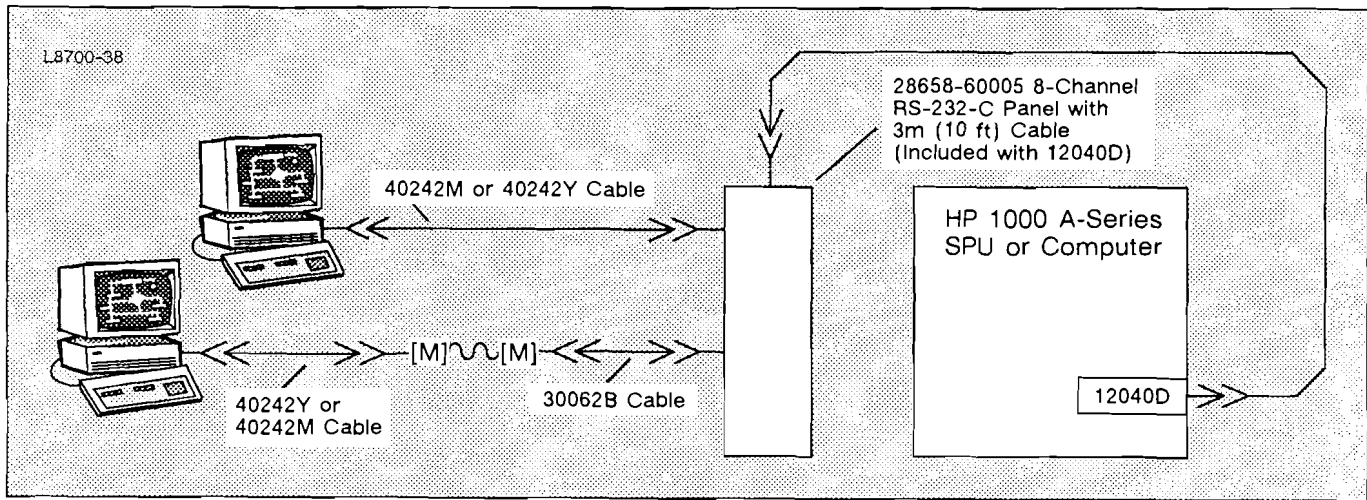


Figure 32. Console/Terminal Connection via 12040D 8-Channel Multiplexer

Using Vectra PC as a Terminal

To use the Vectra PC as a terminal requires:

1. HP 68333F HP AdvanceLink software for emulation of 239xA terminal.
2. HP 45951A Vectra Disc Operating System.
3. HP 24540B Serial/Parallel Interface card or HP 24541B Dual Serial RS-232/422 Interface card.
4. HP 40242Y cable from item 3, above, to A400 On-Board I/O Multiplexer Port or HP 24542M cable from item 3 to 12040C/D Multiplexer Port.
5. Appropriate adapter-monitor combination, selected from those listed at right.

Vectra PC Product Number	Monitor	Required Adapter
72425A	35731A Monochrome Monitor	45981A Multimode Video Adapter
72445A	35741A Color Monitor	45981A Multimode Video Adapter and 45984A Color Adapter
	35743A Enhanced Graphics Display	45983A Enhanced Graphics Adapter

Ordering Information

Order HP Terminals on pages 40 through 44 of the Ordering Information packet and multiplexer cables on Ordering Information page 44. Keep track of interface and card cage usage on Ordering Information pages 30 and 31 and order 12040D Multiplexer and 12005B interfaces on Ordering Information pages 32 and 38, respectively.

Ordering Modems for Connecting Remote Terminals

Communication with Remote Terminals

Communication with terminals over considerable distances usually involves a modem-telephone line link. This link consists of two compatible modems, one interfaced to the computer and the other connected to the terminal. The modems convert the bit streams exchanged between the computer and terminal to a modulated audio tone signal, which is transmitted over a dial-up telephone connection or a dedicated line leased from the telephone company. The different modems that can be used for connecting remote terminals to HP 1000 A-Series Computer Systems are listed in Table 5.

The 12005B interface with option 003 cable can provide program control of the modem it connects to. Two of the four channels in the OBIO multiplexer in the 12100A A400 SBC also support modem control. Modem control with the 12040D 8-channel multiplexer requires use with the HP 37214A Systems Modem, which connects to the 12040D Option 002

multiplexer as shown in Figure 33. The HP 37214A can support up to seven channels, using 37213A plug-in modems, 37215A interfaces to external modems, and 37216A interfaces for direct connection to local terminals.

NOTE: HP 700/41 Terminals have not been tested via remote modem-telephone link connection to HP 1000 Computer Systems. Such connection is NOT supported by Hewlett-Packard.

Ordering Information

Order Modems on page 45 of the Ordering Information packet. Because of slower data rates, order a separate 12040D Option 002 Multiplexer on Ordering Information page 32 for modem communication and enter 37214A in one of the Device P/N spaces for that Multiplexer. Track interface and card cage slot usage on Ordering Information pages 30 and 31. On Ordering Information page 44, order the same cables for modem-to-terminal connection as you would order for multiplexer panel-to-terminal connection.

Table 5. Modems for Remote Terminal Communication with HP 1000 A-Series Computer Systems

A-SERIES INTERFACE	DATA RATE (bits per sec)	MODEMS AT INTERFACE	MODEMS AT TERMINAL
Point-to-point 12005B+003	1200	HP 92205A* or Bell Type 212 or Vadic VA3400	HP 92205A* or Bell Type 212 or Vadic VA3400
	2400	HP 92205B	HP 92205B
Four-Channel OBIO Multiplexer in 12100A A400 SBC	1200	HP 92205A* or Bell Type 212 or Vadic VA3400	HP 92205A* or Bell Type 212 or Vadic VA3400
Eight-Channel 12040C/D Multiplexer	1200	HP 37214A plus one 37213A modem card per channel or Vadic VA3400 per channel	HP 92205A* or Bell Type 212 or Vadic VA3400

* Use HP 92205C in Canada.

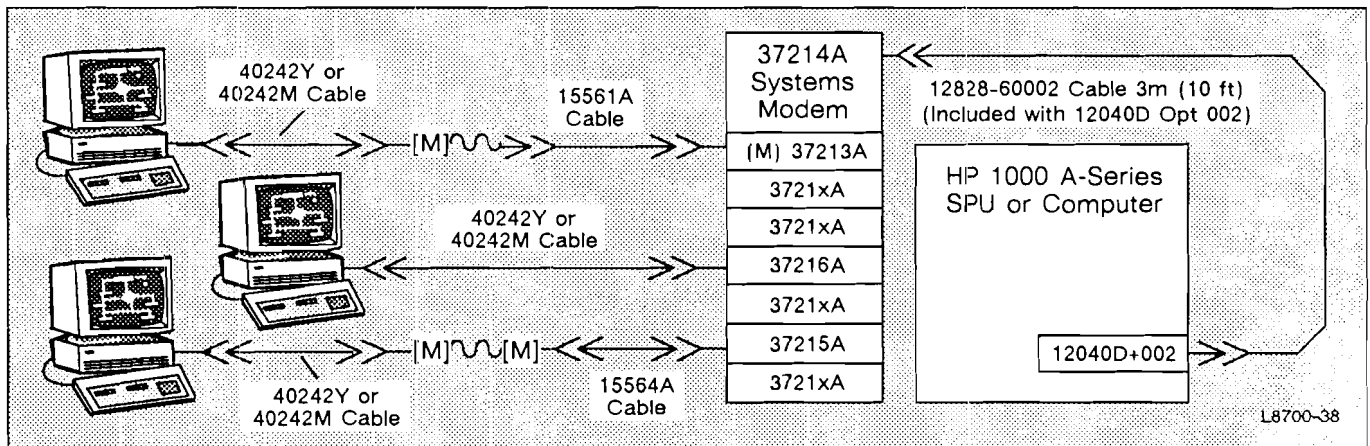


Figure 33. Terminal Connection via 12040D Option 002 8-Channel Multiplexer and 37214A Systems Modem

Ordering X.25 Interface to Remote Terminals

X.25 Communication with Remote Terminals

The 12075A X.25 Interface supports X.25 connection to remote terminals, as shown in Figure 34, below. This does not include support of the system console or of HP 700/41 terminals. Packet switching connection to remote terminals has the advantage that line charges are proportional to actual message traffic, not connect time. This type of connection has the disadvantages that:

1. Block mode support is limited, which may preclude use with some software packages.
2. HP 91751A software is required.

The HP 12075A X.25 Interface in the HP 1000 A-Series system and the HP 2334A Plus Multimux connect to the packet switching network via modems, of which those listed in Table 6 have been tested.

Table 6. Verified 12075A X.25 Modems

CONNECTION VIA	MODEM TYPE	DATA RATE
Private Lines	Bell 201C Bell 208A Bell 209A HP 37230T*	To 2400 bits/sec To 4800 bits/sec To 9600 bits/sec To 9600 bits/sec
Dial-up Lines	Bell 212A	To 1200 bits/sec

* Discontinued product, listed here for reference only

Ordering Information

Order the HP 91751A X.25/1000 software and the HP 2334A Plus Multimux on page 46 of the Ordering Information packet. Order the HP 12075A X.25 Interface on Ordering Information page 34. Keep track of card cage slot usage on Ordering Information pages 30 and 32. On Ordering Information page 44, order the same cables for Multimux-to-terminal connection as you would order for multiplexer panel-to-terminal connection.

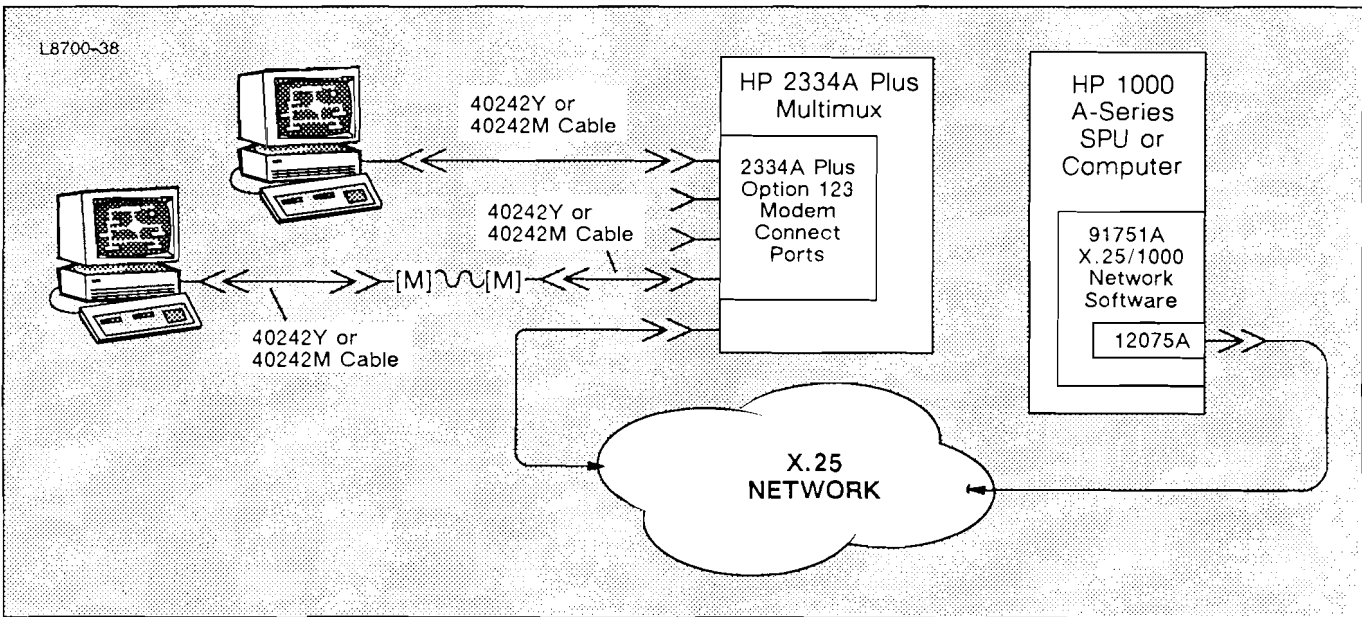


Figure 34. Remote Terminal Connection via 12075A X.25 Interface, Packet-Switching Network, and 2334A Plus Multimux

Ordering Auxiliary Printers for Use With Terminals

Auxiliary Printers for Terminals

Auxiliary printers can be connected to most display terminals and PCs that are supported in HP 1000 A-Series Systems to provide local hardcopy output. These terminals and required connection hardware are listed in Table 7.

Ordering Information

If not yet ordered for the terminal to be equipped with an auxiliary printer, order the appropriate auxiliary output option or PC interface on page 41, 42, or 43 of the Ordering Information packet. Order auxiliary printers and cables on Ordering Information page 47, using information in Table 7.

Table 7. Auxiliary Printers for Display Terminals or PCs Used in HP 1000 A-Series Systems

PRINTER PRODUCT NUMBER	CABLES USED FOR CONNECTION BY TERMINAL AND INTERFACE					
	700/92 or 700/41 (RS-232-C Interface)	2393A or 2397A Opt 046 (HP-IB Interface)	239xA Opt 092 (RS-232-C Interface)	239xA Opt 093 (Parallel Centronics Interface)	Vectra (24540B Serial/ Parallel Interface)	Vectra (24541B Dual Serial Interface)
2225C	Not supported	Not supported	Not supported	40242D	24542D	Not supported
2225D	40242G	Not supported	40242G	Not supported	24542G	24542G
2227A/2228A	40242G	Not supported	40242G	40242D	24542G or 24542D	24542G
2235A	40242G	Not supported	40242G	40242D	24542G or 24542D	24542G
2235B	40242G	10833A/B/C	40242G	Not supported	24542G	24542G
2671A*/G* 2673A*	Not supported	10833A/B/C	Not supported	Not supported	Not supported	Not supported
2671A*/G*+040 2673A*+040	40242G	Not supported	40242G	Not supported	Not supported	Not supported
2671A*/G*+042 2673A*+042	Not supported	Not supported	Not supported	40242D	Not supported	Not supported
2932A/2934A	40242G	Not supported	40242G	Not supported	24542G	24542G
2932A+042 2934A+042	Not supported	Not supported	Not supported	40242D	24542D	Not supported
2932A+046 2934A+046	Not supported	10833A/B/C	Not supported	Not supported	Not supported	Not supported

* Discontinued product, listed here for reference only.

Ordering Industrial Workstation Terminals

Industrial Workstation Terminals

For data collection and operator interface in factory environments, HP offers the HP 3081A Industrial Workstation Terminal and the HP 9666A Operator Interface Unit.

The HP 3081A is the most compact of the HP 1000 A-Series interfaceable industrial terminals. It features a 32-character display and numeric keyboard and communicates via current loop at 2400 Baud. Full alphanumeric keyboard and bar code readers are optional. The bar code reader for the HP 3081A can be equipped with six different input options, including a slot reader that uses infrared light to read "black-on-black" codes on badges for security applications.

Connection of the HP 3081A Industrial Workstation Terminals to the system, shown in Figure 35, differs from the connection of the HP 9666A, which is essentially a ruggedized color graphics display terminal,

which connects to the system in the same way as other display terminals. (See the "Ordering System Console and Terminals" section, pages 32 through 34 for information on connecting the 9666A.)

NOTE: The A400 On-Board I/O Multiplexer cannot be used to connect HP 3081A Industrial Workstation Terminals to an A400-based system because it cannot operate at 2400 Baud, as required for 3081A terminals.

Ordering Information

Order the HP 3081A Industrial Workstation Terminal and its required adapters and cables on page 48 of the Ordering Information packet. Keep track of interface and card cage usage on Ordering Information pages 30 and 31 and order the 12040D Multiplexer interface on page 32.

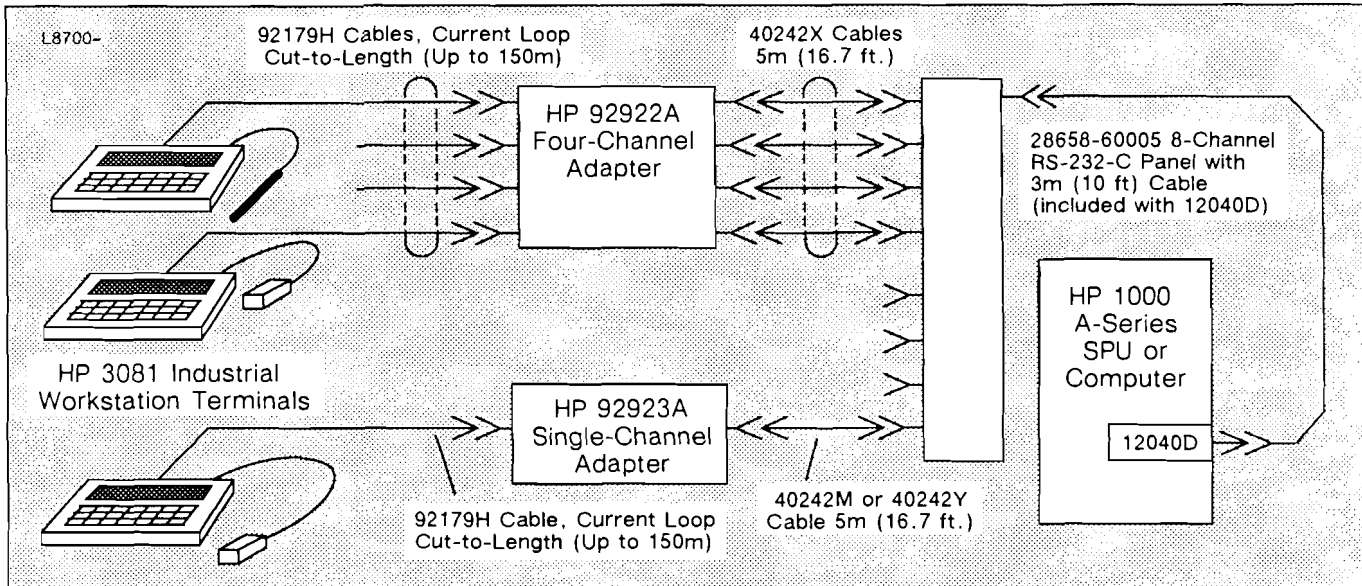


Figure 35. HP 3081A Industrial Workstation Terminal Connection

Ordering Bar Code Readers

Bar Code Reader Input

Manual keystroke entry of data is time consuming and subject to typographical errors. Fortunately, 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, patient identification numbers for hospital records, personal identification numbers on employee badges, and property identification numbers on machines, instruments, or office equipment can be imprinted in an appropriate bar code. Thereafter, the single sweep of a wand or slot reader 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.

Recognizing the time savings and accuracy gains accruing to applications that can use bar codes for data entry, Hewlett-Packard offers printers that can print bar coded labels as well as bar code readers to provide a complete hardware solution to information transfer via bar code media.

Bar Code Printing and Reader Connections to the System

Bar code printing is optional on the HP 2563B, 2564B, and 2566B Line Printers and standard on the 2934A Printer. Bar code readers can be interfaced to HP 1000 Computer Systems as summarized in Table 8 and Figure 36, below. The HP 92915A or 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. HP 39800A and 39801A Bar Code Readers connect directly to a multiplexer port. Bar code input is also optional with the Industrial Workstation Terminals discussed in the previous section.

Ordering Information

Order the HP 39800A, 39801A, 92915A, and 92916A Bar Code Readers on page 49 of the Ordering Information packet. Keep track of interface and card cage usage on Ordering Information pages 30 and 31 and order the 12040D Multiplexer interface on Ordering Information page 32.

Table 8. Bar Code Readers Supported by A-Series Computers

TERMINAL	BAR CODE READER	BAR CODES SUPPORTED	INTERFACING METHOD
Not applicable	39800A Programmable 39801A Non-programmable	3 of 9 and Interleaved 2 of 5 standard Industrial 2 of 5 optional, Codabar optional, and UPC/EAN/JAN optional	Connect with 12040D Multiplexer and 13242Y cable or 12005B+002 Interface and supplied cable.
2392A	92915A	3 of 9, Interleaved 2 of 5, Codabar, and UPC/EAN/JAN	Connects between keyboard and terminal using supplied cables.
2393A, 2397A, 72425A, and 72445A	92916A	3 of 9, Interleaved 2 of 5, Codabar, and UPC/EAN/JAN	Connects to HP-HIL port on keyboard using supplied cable.

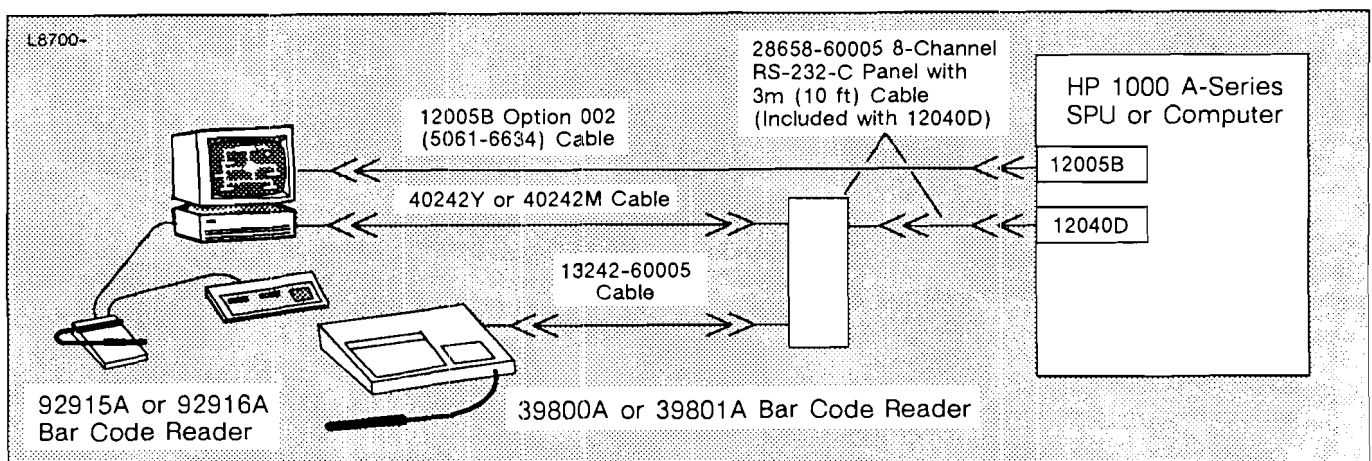


Figure 36. Bar Code Reader Connections to HP 1000 A-Series Systems

Ordering Discs, Disc Mirroring Software, and CTUs

Disc Functions and Selection

Discs (disc memories) provide high-capacity, non-volatile, fast-access mass storage for programs and data for the system. The key functions performed by discs are discussed below. Capacity and basic performance information for currently available discs is given in Table 9. Table 10, page 42, lists discontinued discs that are also supported in HP 1000 A-Series systems.

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 disc memory. If not supported from the disc in an adjacent host system, the bootup device is usually a locally-connected disc memory. When the bootup device is a local disc, it is called the system disc. For this function, fast transfer shortens the time required to boot-up the system.

Fast-Access Storage and Retrieval

Applications in all but the harshest environments typically use a local disc for storing programs and data not currently in use, from which these are retrieved when and as needed. For this function, hard discs are preferred because of the greater capacity and faster storage and retrieval rates available with hard discs.

Software Input and Limited Volume Backup

Flexible discs provide a good medium for installation and backup of individual application programs that can all fit on one flexible disc. However, the relatively limited storage capacity of flexible discs makes them inconvenient and impractical to use for installation or backup of any but the very smallest systems or data bases. For installation and backup of software systems or data bases, the customer should opt for a cartridge tape subsystem (discussed on the next page) or a magnetic tape unit (discussed in the next section, starting on page 44).

Table 9. Currently Available Discs Supported in HP 1000 A-Series Computer Systems
(Listed in order of increasing capacity.)

Product Number	Name/Description	Capacity (MB per Disc)	Access Time (milliseconds)	Average Transfer Rate (kB per second)
9122D	Dual Microfloppy Discs	2 x 0.63	175	63
12122A	Integrated Fixed Disc and Microfloppy Disc for 243xA/B/G/H Computer or 248xB/G/H SPU	19.4 0.63	75 225	150 17
9153B	Fixed Disc and Microfloppy Disc	20 0.63	75 175	150 63
9154B	Fixed Disc	20	75	150
7942A	Fixed Disc and Cartridge Tape Unit	23	48.4	625
9133L	Fixed Disc and Microfloppy Disc	39.9 0.63	55 478	180 63
9134L	Fixed Disc	39.9	55	180
7907A	Fixed Disc and Removable Disc*	20.5 20.5	44.3	600
7946A	Fixed Disc and Cartridge Tape Unit	55	48.4	625
7957A	Fixed Disc	81	41.5	853
7958A	Fixed Disc	130	41.5	853
7936H	Fixed Disc	307	30.8	1,000
7936XP	Fixed Disc with Cache	307	30.8	1,000
7937H	Fixed Disc	571	30.8	1,000
7937XP	Fixed Disc with Cache	571	30.8	1,000

* RTE-A and subsystem software are not available on the removable discs for the 7907A, so a separate magnetic tape or cartridge tape unit is required for software installation and backup.

Cartridge Tape Subsystems

A single tape cartridge provides over 100 times the capacity of a microfloppy disc, which makes it far better suited to software installation and backup. The HP 35401A Autochanger Cartridge Tape Subsystem can automatically back up a large disc onto as many as eight 67 MB cartridge tapes without operator intervention. The HP 35401A and the manual-loading HP 9144A Cartridge Tape Subsystem offer two advantages over magnetic tape units. First, they cost less to purchase. Second, they can connect to the same HP-IB interface as the disc memories. This can also reduce interfacing costs and avoid the use of an additional card cage slot for magnetic tape.

Disc and Cartridge Tape Subsystem Interfacing

All disc memories connect to HP 1000 A-Series systems via the 12009A HP-IB interface. Up to four discs and cartridge tape subsystems from the currently available group can be connected to one 12009A interface, as indicated in Figure 37, below, except for the 12122A Integrated Discs, which use their own exclusive 12009A interface, with no other disc or other connections supported from that interface. All disc interfaces must be installed in the computer card cage. Disc interfacing in the I/O Extender has NOT been tested and is NOT supported.

Interfacing of the discontinued Multi-Access Controller (MAC) discs is illustrated in the A-Series Computer Handbook, 5954-8576, or a later revision.

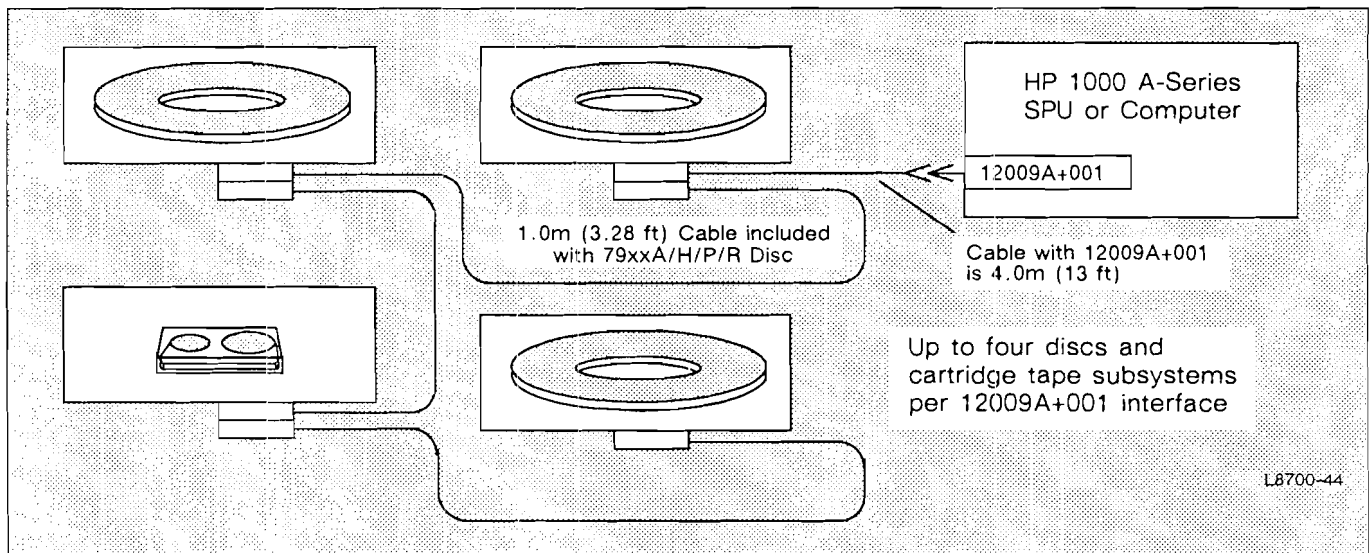


Figure 37. Disc Memory and Cartridge Tape Subsystem Connections to HP 1000 A-Series Systems

Disc Mirroring

Users with special concern for data protection and high availability of software and data may want to configure part or all of their storage capacity in mirrored volumes. Such configuration is supported by the HP 92050A Datapair/1000 software product, as described in the 92050A data sheet in the A-Series Computer Handbook, 5954-8576 or a later revision.

Both volumes of a mirrored pair must have the same number of tracks and must be on discs that have the same number of sectors per track, and the same number of bytes per sector (see Table 11 on page

43). Any volume may be paired, including the bootable volume. However, if a bootable volume is paired, it must be paired with another bootable volume. Each of the paired volumes must be connected to the system via its own 12009A interface, as shown in Figure 38 on the next page.

The paired volume can include part or all of the capacities of one or several discs. Any unpaired capacity is also available to the system as ordinary disc storage capacity, suggested by the extension of the connection from the upper disc of the pair in Figure 38 "To other disc(s)".

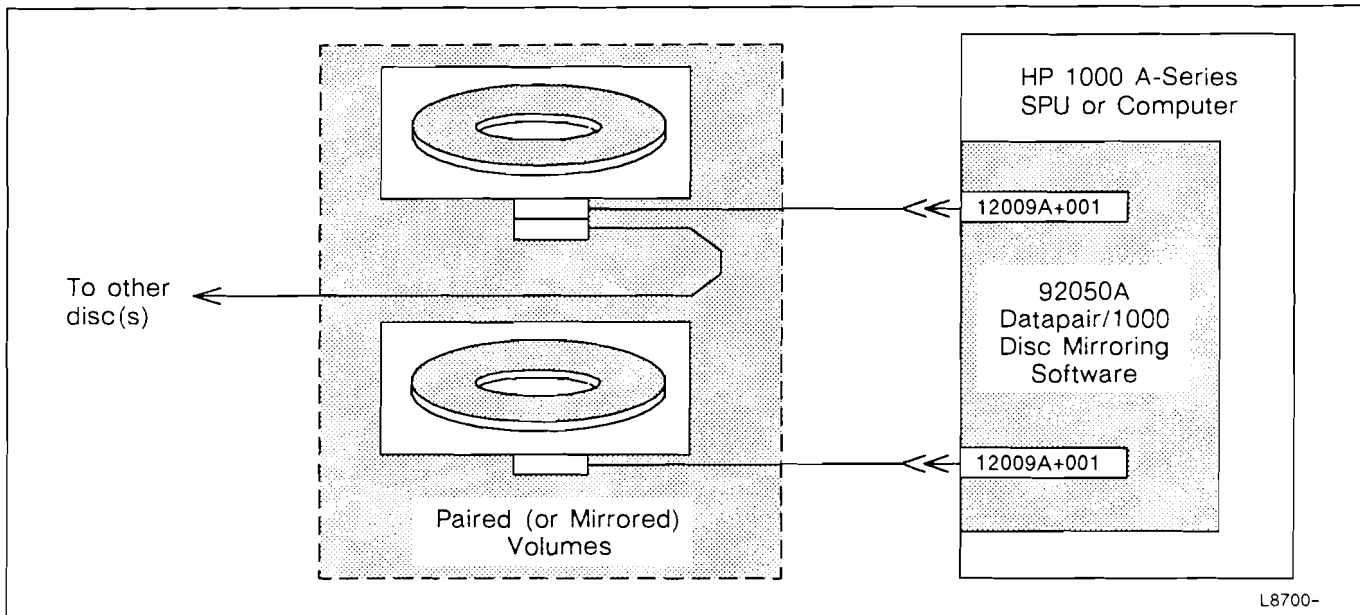


Figure 38. Connection of Paired Volumes to HP 1000 A-Series Systems

Table 10. Discontinued Discs That are Supported in HP 1000 A-Series Computer Systems

Product Number	Name/Description	Capacity (MB per Disc)	Access Time (milliseconds)	Average Transfer Rate (kB per second)
9133H	Fixed Disc and Microfloppy Disc	19.9 0.63	93 175	150 63
9134H	Fixed Disc	19.9	75	150
7941A	Fixed Disc	23	48.4	625
7911P/R	Fixed Disc and Cartridge Tape Unit	28	38.4	1,000
7920M/S†	Removable Media Multi-Access Controller (MAC) Master/Slave Disc	50	33.3	740
7945A	Fixed Disc	55	48.4	625
7912P/R	Fixed Disc and Cartridge Tape Unit	65	38.4	1,000
7925M/S†	Removable Media Multi-Access Controller (MAC) Master/Slave Disc	120	36.1	740
7914CT & 7914P/R	Fixed Disc and Cartridge Tape Unit	132	40.4	1,000
7914ST & 7914TD	Fixed Disc and 1600 cpi Mag Tape Unit	132	40.4	1,000
7933H	Fixed Disc	404	35.1	1,000
7933XP	Fixed Disc with Cache	404	35.1	1,000
7935H*	Removable Media Disc	404	35.1	1,000
7935XP*	Removable Media Disc with Cache	404	35.1	1,000

† MAC discs do not support bootup of the RTE-A system, so they are useful only as peripheral discs in HP 1000 A-Series systems.

* RTE-A and subsystem software are not available on the removable media for the 7935H and 7935XP, so a separate magnetic tape or cartridge tape device is required for software installation and backup.

Table 11. Sector per Track Matching of Discs for Datapair/1000

Disc Product Number	Sectors per Track	Bytes per Sector
7907A	64	256
7911P/R	64	256
7912P/R	64	256
7914CT/P/R	64	256
7933H/XP	92	256
7935H/XP	92	256
7936H/XP	123	256
7937H/XP	123	256
7941A	32	256
7942A	32	256
7945A	32	256
7946A	32	256
7957A	63	256
7958A	63	256

NOTE A: The number of discs and disc interfaces that must be ordered to support a paired volume is DOUBLE what would otherwise be required to provide the same capacity.

NOTE B: Other considerations than pairability may be important in the selection of discs for mirroring. For example, HP 7933H/XP and 7935H/XP Discs take several minutes to spin-up to operating speed after a power failure, which might make them unacceptable in some applications. HP 791xP/R discs may become unavailable for one or two minutes after a tape is inserted into the tape drive.

Ordering Information

Order disc memories, Datapair/1000 software, and cartridge tape subsystems on pages 50 through 52 of the Ordering Information packet. Keep track of interface and card cage slot usage on Ordering Information pages 30 and 31 and order the 12009A HP-IB interface on Ordering Information page 32.

Ordering Magnetic Tape Units

Uses of Magnetic Tape Units

Magnetic Tape Units are used for software installation and backup, as well as data logging, for these reasons:

1. Magnetic tape is the lowest-cost, high-density medium available. It is easily mounted, dismounted, and stored.
2. A reel of magnetic tape has up to 200 times the capacity of a flexible disc, which greatly simplifies installation and backup of software and backup of large volumes of disc storage.
3. Magnetic tape drives have high sequential data transfer rates, equalling or exceeding those of flexible disc drives or cartridge tape subsystems, which is also necessary when backing up large volumes of disc storage.

Magnetic Tape Unit Selection Criteria

Transfer Rate and Capacity

See Table 12, below for relative transfer rates and capacities of the Magnetic Tape Units that are available for use in HP 1000 A-Series Systems.

Mag Tape Compatibility Considerations

Where a library of mag tapes already exists, the ability of the magnetic tape unit to read those tapes can be quite important. A magnetic tape recorded at 800 cpi can only be read on a tape unit at that density. If only one tape unit can be provided for the system, the need for compatibility with existing tapes may conflict to some extent with the need for fast trans-

fers. Of all of the currently-available supported mag tape units, only the 7974A Magnetic Tape Unit can be equipped to read 800 cpi mag tapes.

Mag Tape Appearance Considerations

The 7974A and 7978B Magnetic Tape Units are housed in their own 19-inch EIA rack cabinets. Although these cabinets are of the same general type as the 29429A and 29431G cabinets that are recommended for 219xE/G/H System Processor Units, they differ from the 29429A and 29431G cabinets with respect to height, color of finish, and means of unlatching the front door of the cabinet. Customers who regard uniformity of appearance of the computer installation as highly important should compare these cabinets to each other, side by side before ordering either the 7974A or 7978B tape unit.

Magnetic Tape Unit Interfacing

Magnetic tape units (MTUs) connect to HP 1000 A-Series systems via the 12009A HP-IB interface. As shown in Figure 39, next page, two MTUs can connect to the system via one HP-IB interface, which serves only the MTUs. A maximum of two MTUs can be connected to the system.

Ordering Information

Order magnetic tape units on page 53 of the Ordering Information packet. Keep track of interface and card cage slot usage on Ordering Information pages 30 and 31 and order the 12009A HP-IB interface on Ordering Information page 32.

Table 12. Currently Available Magnetic Tape Units and Cartridge Tape Subsystems Supported in HP 1000 A-Series Computer Systems

Product Number	Name/Description	Recording Density	Operating Mode	Transfer Rate (kB/sec)	Reel Capacity
7970ER	Remarketed Mag Tape Unit	1600 cpi	Start-Stop	72	40 MB in 2400 ft.
7971AR	Remarketed Mag Tape Unit	1600 cpi	Start-Stop	72	40 MB in 2400 ft.
7974A	Magnetic Tape Unit	1600 cpi, 800 cpi optional	Start-Stop Streaming	80/40 160/80	40/20 MB in 2400 ft.
7978B	Magnetic Tape Unit	6250/1600 cpi	Streaming	468/120	140/40 MB in 2400 ft.
7979A	Autoloading Mag Tape Unit	1600 cpi	Streaming	200	40 MB in 2400 ft.
7978B	Autoloading Mag Tape Unit	6250/1600 cpi	Streaming	781/200	140/40 MB in 2400 ft.

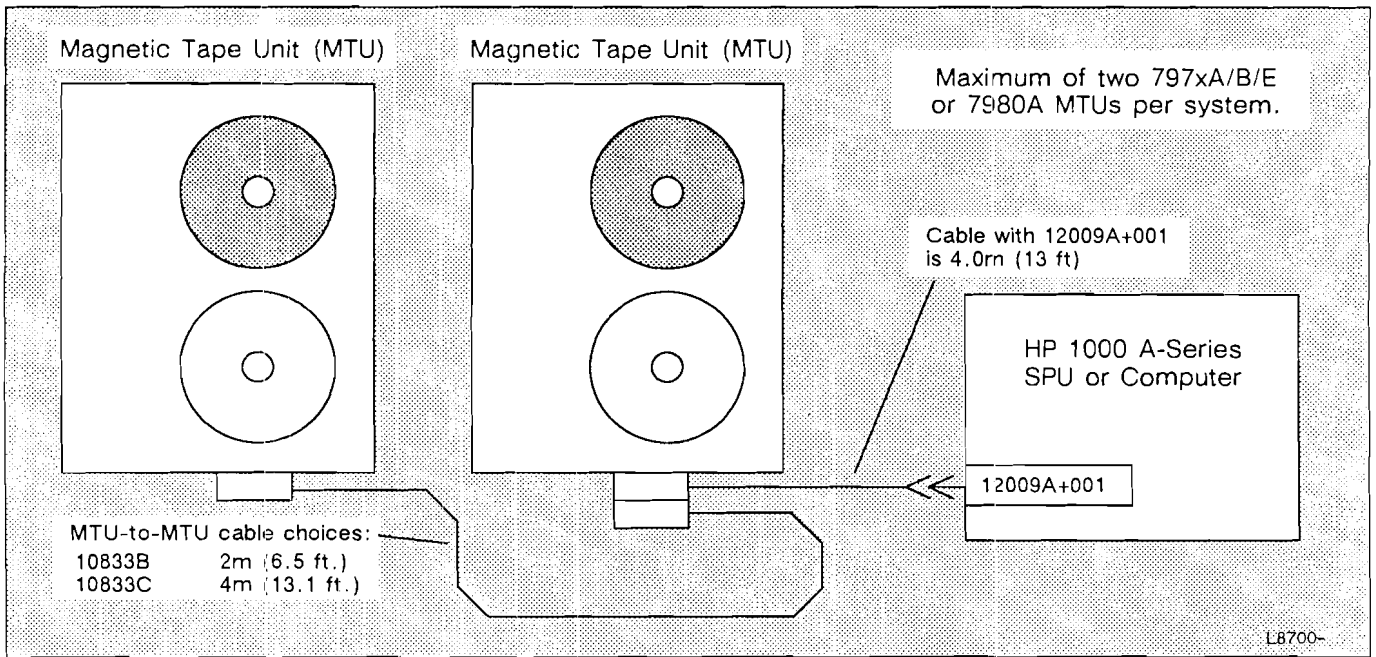


Figure 39. Magnetic Tape Unit Connections to HP 1000 A-Series Systems

Ordering Printers

Printer Selection

Three types of printers are supported on HP 1000 A-Series Computer Systems, making it easy to get the right type of printer for your application. These printer types are compared in Table 13 with respect to relative cost, print speed, noise level, relative paper cost, and estimated print quality. They are further compared in Table 14 with respect to paper type, text quality, graphics, support, and bar code printing capability.

Table 13. Types of Printers Supported by HP 1000 A-Series Systems

Printer Type	Cost Rel. To Thinkjet	Print Speed, (cps or equiv.)	Noise Level (dBA)	Rel. Paper Cost	Print Qual.
Mono-chrome Inkjet	1.0 - 1.6	150 -	50	1.5	C, B
Color inkjet	2.8	167	50	1.5	B
Dot-Matrix Impact Serial	3.8 - 6.1	40 - 480	56 - 63	1.0 - 1.3	C, B+
Dot-Matrix Impact Line	11.9 - 44.6	660 - 1920	65	1.0 - 1.3	B

Inkjet Printers

Inkjet (ThinkJet, QuietJet, and PaintJet) printers offer low price, reasonably fast print speed, and the quietest operation of all printers. The principal disadvantage of inkjet printers is the 50% higher cost of paper designed specifically for inkjet printing and the fact that only one copy is made at a time. The PaintJet 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 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.

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 uses with large printing requirements.

Table 14. Currently-Available System-Connected Printers Supported on HP 1000 A-Series Systems

Printer Product Number and Name	Max. Print Rate	Paper Type	Text Quality	Graphics	Bar Codes
2225D ThinkJet	150 cps	Std fanfold, single sheets	Draft	Not in HP 1000	No
2227A ThinkJet	160 cps	Wide fanfold, single sheets	Draft, NLQ	Vector-to-Raster†	No
2228A QuietJet	160 cps	Std fanfold, single sheets	Draft, NLQ	Vector-to-Raster†	No
3630A PaintJet	167 cps	Std fanfold, single sheets	NLQ	Not in HP 1000	No
2335B RuggedWriter	480 cps	Wide fanfold, 4-part forms	Draft, nLQ	Vector-to-Raster†	No
2932A General-Purpose Printer	200 cps	Wide fanfold, 6-part forms	Draft	Vector-to-Raster†	No
2934A Office Printer	200 cps	Wide fanfold, 6-part forms	Draft, NLQ	Vector-to-Raster†	Yes
2563B Line Printer	300 lpm	Wide fanfold, 6-part forms	Draft	Vector-to-Raster†	Opt
2564B Line Printer	600 lpm	Wide fanfold, 6-part forms	Draft	Vector-to-Raster†	Opt
2566B Line Printer	900 lpm	Wide fanfold, 6-part forms	Draft	Vector-to-Raster†	Opt

† Requires HP 92861A Graphics/1000-II Device-Independent Graphics Library.

Printer Interfacing

Printer connections for various printers in A-Series Computer Systems are summarized in Table 15 and illustrated in Figure 40. The 12040D multiplexer con-

nections shown in Figure 40 are also typical of connections made to the breakout panel of the On-Board I/O multiplexer of the 12100A A400 Single Board Computer.

Table 15. Interfacing of System-Connected Printers to HP 1000 A-Series Systems

MULTIPLEXER CONNECTED PRINTERS		HP-IB CONNECTED PRINTERS	
Each printer uses one port of the four-port On-Board I/O multiplexer of the 12100A Single Board Computer or one channel of the 12040B*/C*/D 8-Channel Multiplexer, connected via the indicated multiplexer-to-printer cable.		Each printer is connected via a 10833B/C cable, using 1/8 of the capacity of the 12009A interface, except as otherwise noted.	
PRINTER	CONNECTS VIA	PRINTER	COMMENTS
2563B with Option 049 2564B with Option 049 2566B with Option 049	92219G Cable	2563B with Option 214 2564B with Option 214 2566B with Option 214 2608SR* with Option 214	A maximum of two 256xB Option 214 Printers and NO OTHER DEVICES can be connected to each 12009A HP-IB interface.
2235B 2932A 2934A	92219G Cable	2235B 2932A with Option 046 2934A with Option 046	Can be used with up to eight (8) HP-IB devices on the same 12009A HP-IB interface. Note, however, that high speed and low speed devices cannot be used on the same 12009A interface.
2225D 2227A 2228A 3630A with Option 001 2686A* 2686A* with Option 300	13242N Cable	2671A*/G* 2673A* 82906A*	

* Discontinued product, listed here for reference only.

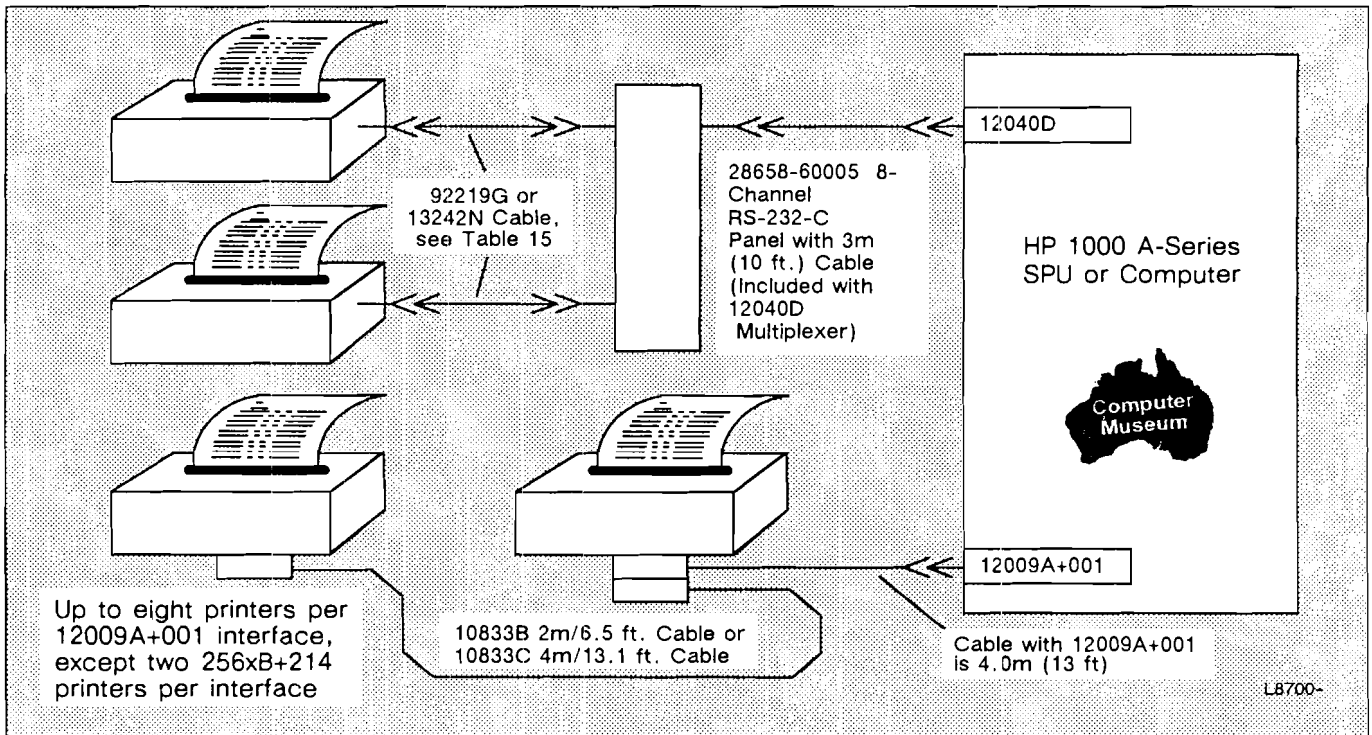


Figure 40. Printer Connections to HP 1000 A-Series Systems

Ordering Information

Order printers on pages 54 through 58 of the Ordering Information packet. Keep track of interface and

card cage slot usage on Ordering Information pages 30 and 31 and order the 12009A HP-IB interface or the 12040D Multiplexer interface on Ordering Information page 32.

Ordering Graphics I/O

Basic Requirements

In addition to the graphics devices that are listed in Table 16, HP 1000 A-Series Computer Systems require the HP 92861A Graphics/1000-II Device-Independent Graphics Library (DGL) for graphics I/O. The DGL provides device interface subroutines for all

of the supported graphics devices listed in this section. In addition, the DGL provides 2-D subroutines that users can incorporate into their application programs, thereby facilitating development of 2-D graphics applications. For more information, see the HP 92861A data sheet in the A-Series Computer Handbook, 5954-8576 or a later revision.

Table 16. Currently-Available Graphics Devices and Interfaces Supported on HP 1000 A-Series Systems

Device Product Number and Name	Display/Plot/Print Area	Data Rate or Plotting Speed	Usable Resolution	Graphics Features	Comments
Graphics Display 2393A Graphics Terminal	6.3 x 8.4 in. (160 x 214 mm)	210 vectors/sec	512 (h) x 390(v) or 640 (h) x 400 (v).	Polygon fill, 11 line types	Monochrome display
2397A Color Graphics Terminal	6.3 x 8.4 in. (160 x 214 mm)	210 vectors/sec	512 (h) x 390(v) or 640 (h) x 400 (v).	Polygon fill, 11 line types, 8 colors from a palette of 64	Color display
9666A Operator Interface Unit					
12065A Color Video Interface	Depends upon Monitor used	100 to 1500 vectors per sec	512 (h) x 512(v) or 567(h) x 455 (v)	RGB, RS-343 video output	Requires RGB video monitor
Graphics Input 46087A Graphics Tablet	8.5 x 11.7 in. (216 x 297 mm)	65 coordinate pairs per sec	40 lines per millimeter		Connects between keyboard and dis- play unit of 239xA Graphics Terminal or Vectra PC
46088A Graphics Tablet	11.7 x 17 in. (297 x 432 mm)	65 coordinate pairs per sec	40 lines per millimeter		
46060A HP Mouse	Not applicable	Not applicable	Not applicable		
Graphics Hard Copy 7440A ColorPro Plotter	7.5 x 10.7 in. (191 x 272 mm)	15.7 in./sec (40 cm/sec)	0.004 in. (0.1 mm)	8 pens	
7475A Graphics Plotter	10.8 x 16.2 in. (275 x 414 mm)	15 in./sec (38.1 cm/sec)	0.004 in. (0.1 mm)	6 pens	
7550A Graphics Plotter	10.7 x 16.1 in. (272 x 411 mm)	31.5 in./sec (80 cm/sec)	0.004 in. (0.1 mm)	8 pens, auto sheet feed	
7570A DraftPro Plotter	25.2 x 39.4 in. (550 x 1000 mm)	15.7 in./sec (40 cm/sec)	0.004 in. (0.1 mm)	8 pens	
7595A DraftMaster I Plotter	36.5 x 48.5 in. (927 x 1232 mm)	24 in./sec (60 cm/sec)	0.004 in. (0.1 mm)	8 pens	
7596A DraftMaster II Plotter	36.5 x 48.9 in. (927 x 1243 mm)	24 in./sec (60 cm/sec)	0.004 in. (0.1 mm)	8 pens, auto roll feed	
2227A QuietJet Plus Printer	13.2 x 9.5 in. (335 x 241 mm)	Not specified	96 x 96 dots per in. (37.7 x 37.7 dots per cm.)		
2228A QuietJet Printer	7.5 x 9.5 in. (190 x 241 mm)	Not specified			
2235B RuggedWriter Printer	13.6 x 9.5 in. (345 x 241 mm)	Not specified	90 x 90 dots per in.		
2563B Line Printer	13.2 x 42.6 in. (335 x 1083 mm)	14.5 in./min. (36.8 cm/min.)	70 x 72 dots per in. (27.5 x 28.3 dots per cm.)		Option 022 or 023 provides hardware vector-to-raster conversion in 2563B, 2564B, or 2566B Line Printer, offloading the host HP 1000 System
2564B Line Printer	13.2 x 42.6 in. (335 x 1083 mm)	29 in./min. (73 cm/min.)			
2566B Line Printer	13.2 x 42.6 in. (335 x 1083 mm)	50 in./min. (127 cm/min.)			
2932A General-Purpose Printer	11.3 x 42.6 in. (289 x 1083 mm)	8 in./min. (20.3 cm/min.)	90 x 90 dots per in. (35 x 35 dots per cm.)		
2934A Office Printer	11.3 x 42.6 in. (289 x 1083 mm)	8 in./min. (20.3 cm/min.)			

Advanced Graphics Software

Customers can purchase the HP 92862A Graphics/1000-II Advanced Graphics Package (AGP) for advanced applications. The AGP builds on the 92861A DGL, which is required. AGP provides additional subroutines for 3-D and interactive graphics as well as a workstation monitor. See the HP 92862A data sheet in the A-Series Computer Handbook, 5954-8576 or a later revision, for details.

Graphics Display

Graphics display is the key to graphics-mediated operator interaction with the system. HP 2393A Graphics Terminal and 2397A Color Graphics Terminal, the 9666A Operator Interface Unit, and the HP 12065A Color Video Interface to an RGB color monitor are all available to provide the graphics display function in HP 1000 A-Series systems, as listed in Table 16 on the previous page.

Graphics Input

A picture can be created or changed on a graphics terminal by using the graphics cursor control keys or the HP 46060A HP Mouse to move, draw, or pick objects. The HP 46087A and 46088A Graphics Tablets are ideal for digitizing and sketching drawings.

Graphics Hardcopy Output

Plotters

Graphics plotters are available for plotting hardcopy on media ranging from A-Size (ISO A4 size) on up to E-size (ISO A0 size). All are multi-pen plotters with a carousel capable of holding 6 or 8 pens. Their key performance parameters are compared in Table 16 on the previous page.

Printers

All of the currently available HP 1000 supported printers that use dot-matrix impact technology can be used to print graphics as well as alphanumeric output. These print a raster output which has been converted from vector inputs. The HP 256xB printers can be equipped with vector-to-raster conversion hardware (256xB Option 022 or 023) that offloads the computation intensive vector-to-raster conversion workload from the HP 1000 A-Series host system, thereby improving overall system throughput.

Interfacing of Graphics Devices

Connection of graphics devices to the HP 1000 A-Series system is summarized in Table 17, below, and illustrated in Figure 41 on the next page.

Table 17. Interfacing of Multiplexer Connected and HP-IB Connected Graphics Devices

MULTIPLEXER CONNECTED DEVICES		HP-IB CONNECTED DEVICES	
Each device uses one port of the four-port On-Board I/O multiplexer of the 12100A Single Board Computer or one channel of the 12040B*/C*/D 8-Channel Multiplexer, connected via the indicated multiplexer-to-device cable.		Each device is connected via a 10833B/C cable, using 1/8 of the capacity of the 12009A interface, except as otherwise noted.	
DEVICE	CONNECTS VIA	DEVICE	COMMENTS
2393A or 2397A 9666A	40424Y† or 40242M Cable 40424Y† or 40242M Cable	Terminals are not connected via HP-IB	Terminals are not connected via HP-IB
2563B with Option 049 2564B with Option 049 2566B with Option 049	92219G Cable 92219G Cable 92219G Cable	2563B with Option 214 2564B with Option 214 2566B with Option 214 2608SR* with Option 214	A maximum of two 256xB Option 214 Printers and NO OTHER DEVICES can be connected to each 12009A HP-IB interface.
2227A or 2228A 2235B 2932A 2934A	13242N Cable 92219G Cable 92219G Cable 92219G Cable	2235B 2932A with Option 046 2934A with Option 046	Can be used with up to eight (8) HP-IB devices on the same 12009A HP-IB interface. Note, however, that high speed and low speed devices cannot be used on the same 12009A interface.
7440A+001 7475A+001 7550A 7570A 7595A 7596A	13242N Cable 13242N Cable 17355D Cable 13242N Cable 13242N Cable 13242N Cable	7440A+002 7475A+002 7550A 7570A+17570A 7595A 7596A	
7470A*+001 7510A*+001 7580B*+060 7585B*+060 7586B*+060	13242N Cable 17355D Cable 13242N Cable 13242N Cable 13242N Cable	7470A*+002 7510A*+002 7580B*+060 7585B*+060 7586B*+060 9111A*+100	

† 40424Y Cable is required for connection to ports of the 12100A Single Board Computer.

* Discontinued product, listed here for reference only.

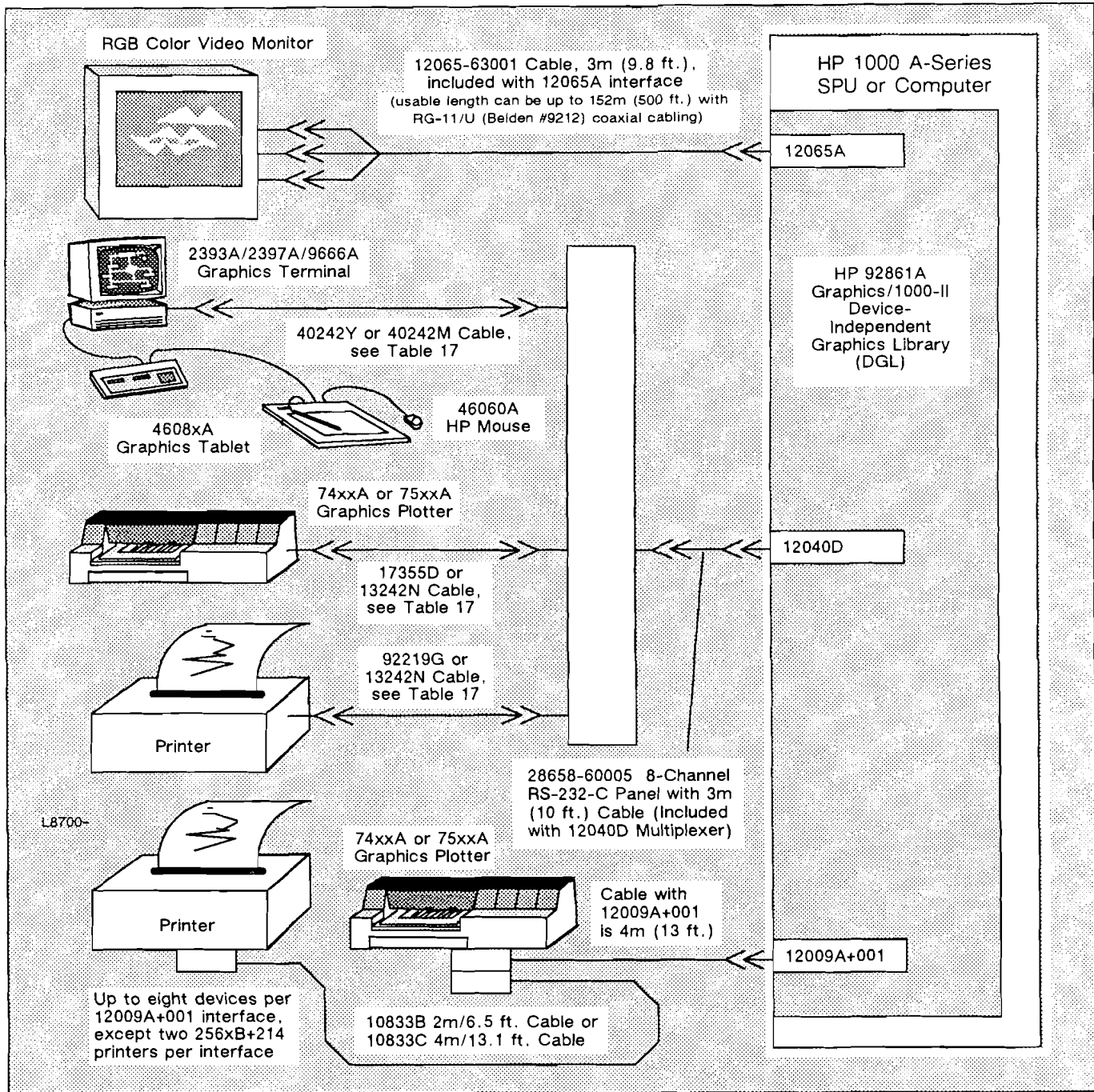


Figure 41. Graphics Device Connections to HP 1000 A-Series Systems

Ordering Information

Order graphics software on pages 59 through 61 (or in a Development Pack on page 79 or 80) of the Ordering Information packet. On other Ordering Information pages, order the HP Mouse, graphics tablets, and graphics plotters (pages 61 and 62), the HP 12065A Color Video Interface (page 38), graph-

ics terminals (pages 41 and 42), 2227A, 2228A, and 2235B graphics printers (page 54), 256xB graphics printers (pages 54 through 57), and 293xA graphics printers (page 58). Keep track of interface and card cage slot usage (pages 30 and 31) and order the 12009A HP-IB interface or the 12040D Multiplexer interface on Ordering Information page 32.

Ordering Communication with Other HP Systems

A Choice of Connections to Other HP Systems

As shown in Figure 42, below, HP 1000 A-Series Systems can connect to all (HP-UX based) series of HP 9000 Computer Systems and HP 3000 Systems, in addition to other HP 1000 Systems. HP 91790A NS/1000 Network Services Software, operating in a disc-based system, supports all communication with remote HP Systems. DS/1000-IV Distributed Systems

Software, which can be either disc-based or memory-based, supports point-to-point communications, including communication with DS/1000-IV nodes, and X.25 communication, but not IEEE 802.3 Local Area Network communication. Additional software is required for X.25 communications, as shown in Figure 42. The respective connections and their capabilities are summarized in Table 18 on the next page. For detailed information on the networking software and interfaces, see the A-Series Computer Handbook, 5954-8576 or a later revision.

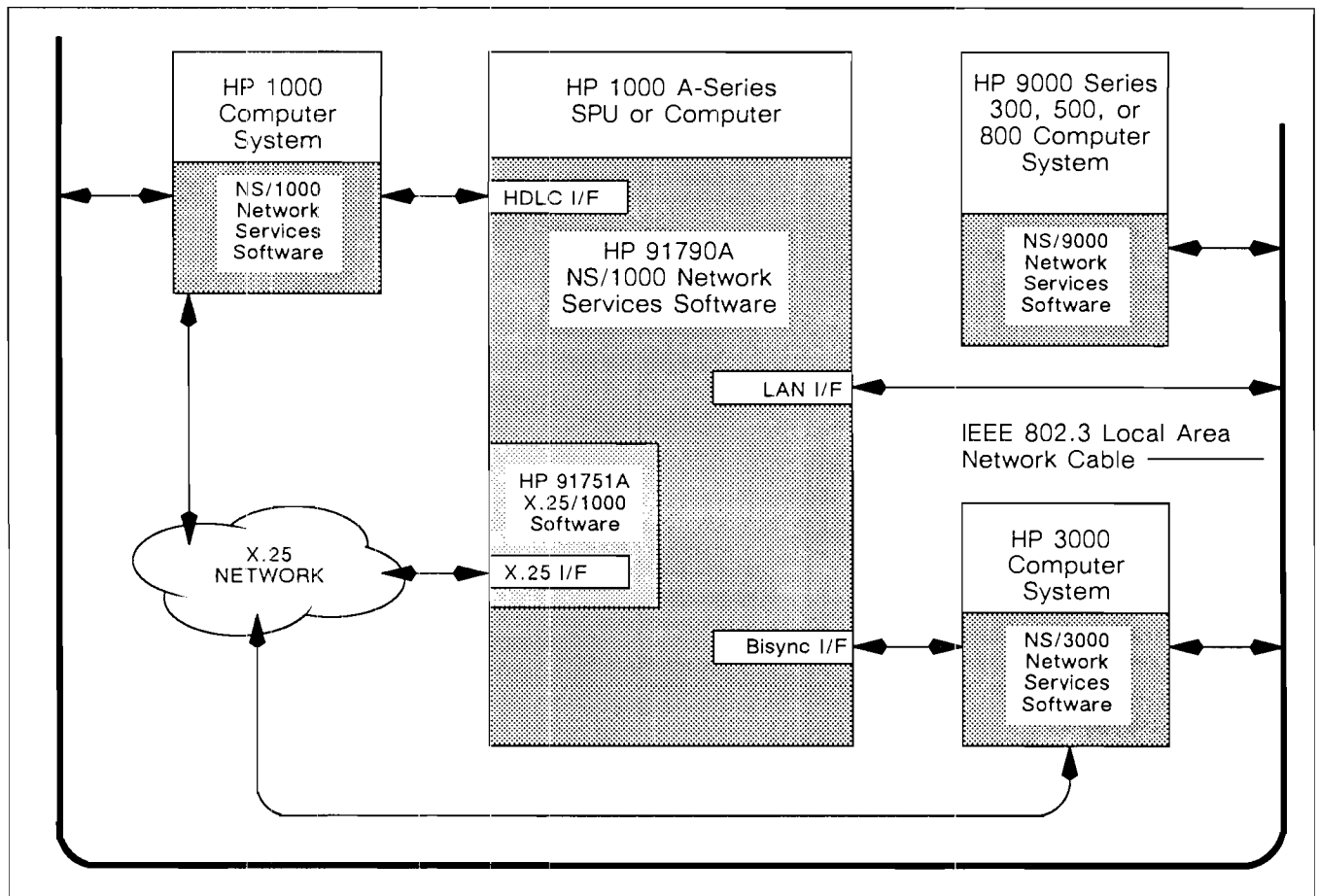


Figure 42. HP 1000 A-Series Connections to Other Hewlett-Packard Computer Systems

Ordering Communication with Other HP Systems, continued

Table 18. Software and Interfaces for Communication with Other HP Systems

TO COMMUNICATE WITH REMOTE	VIA	ORDER THIS SOFTWARE	ORDER THIS INTERFACE	COMMENTS
HP 1000 A-Series or E/F-Series System	HDLC Modem Link	HP 91790A or HP 91750A	HP 12007B	Point-to-point connection that supports DS/1000-IV services, including remote boot-up of an adjacent disc-based or memory-based DS/1000-IV network node and direct connect interface hardware data rates to 257,000 bits per second.
	HDLC Direct Connect Link		HP 12044A	
HP 3000 System	Bisync Modem Link	HP 91790A or HP 91750A	HP 12073A	Point-to-point connection that supports DS/1000-IV services and direct connect interface hardware data rates to 57,600 bits per second.
	Bisync Direct Connect Link		HP 12082A	
HP 1000 A-Series System or HP 3000 System or HP 9000 System	IEEE 802.3 LAN Link (direct tap connection to LAN coaxial cable)	HP 91790A	HP 12076A	Multitapped coaxial cable supports NS/1000 services at burst transfer rates to 10,000,000 bits per second. The LAN connection can also be used to communicate with DEC VAX systems.
HP 1000 A-Series or E/F-Series System or HP 3000 System	X.25 Packet-Switching Network (modem conn.)	HP 91790A and HP 91751A or HP 91750A and HP 91751A	HP 12075A	Offers maximum connection flexibility and the advantage of communications line charges based on actual message traffic, not just connect time. Hardware data rates to 19,200 bits per second depend on modem. Supports DS/1000-IV services. This connection can also be used to communicate with remote terminals and non-HP systems.

Ordering Information

Communications Software

Order HP 91790A NS/1000 Network Services software on page 63 of the Ordering Information packet, HP 91750A DS/1000-IV Distributed Systems software on Ordering Information page 64, and HP 91751A X.25/1000 software on Ordering Information page 46.

Communications Interfaces and Cables

Order HP 12007B and 12044A HDLC interfaces, HP 12073A and 12082A Bisync Interfaces, related cables, and the HP 12075A X.25 Network Interface on page 34 of the Ordering Information packet. Order the HP 12076A LAN/1000 Link Interface and related cables and connection accessories on Ordering Information pages 35 and 36. Keep track of card cage usage on Ordering Information pages 30 and 31.

Ordering Communication with IBM Systems

A Choice of Three Different Types of Communication

Figure 43 illustrates the different types of communication that HP 1000 A-Series Systems can establish with IBM and plug-compatible systems. All of these different types of communication are interfaced via the same basic HP 12043A Multi-Use Programmable Serial Interface, which communicates with the remote IBM or plug-compatible system via modem and telephone line link. The respective software packages load the appropriate control store instructions into the interface prior to operation. This establishes appropriate functioning of the interface for the particular type of communication. For detailed information on the

networking software and the HP 12043A interface, see the A-Series Computer Handbook, 5954-8576 or a later revision.

Ordering Information

Order the HP 91781A, 91782A, and 91784A IBM communications software products on pages 65, 66, and 67, respectively, of the Ordering Information packet. Order the HP 12043A Multi-Use Programmable Serial Interface on Ordering Information page 38, keeping track of card cage usage on Ordering Information pages 30 and 31.

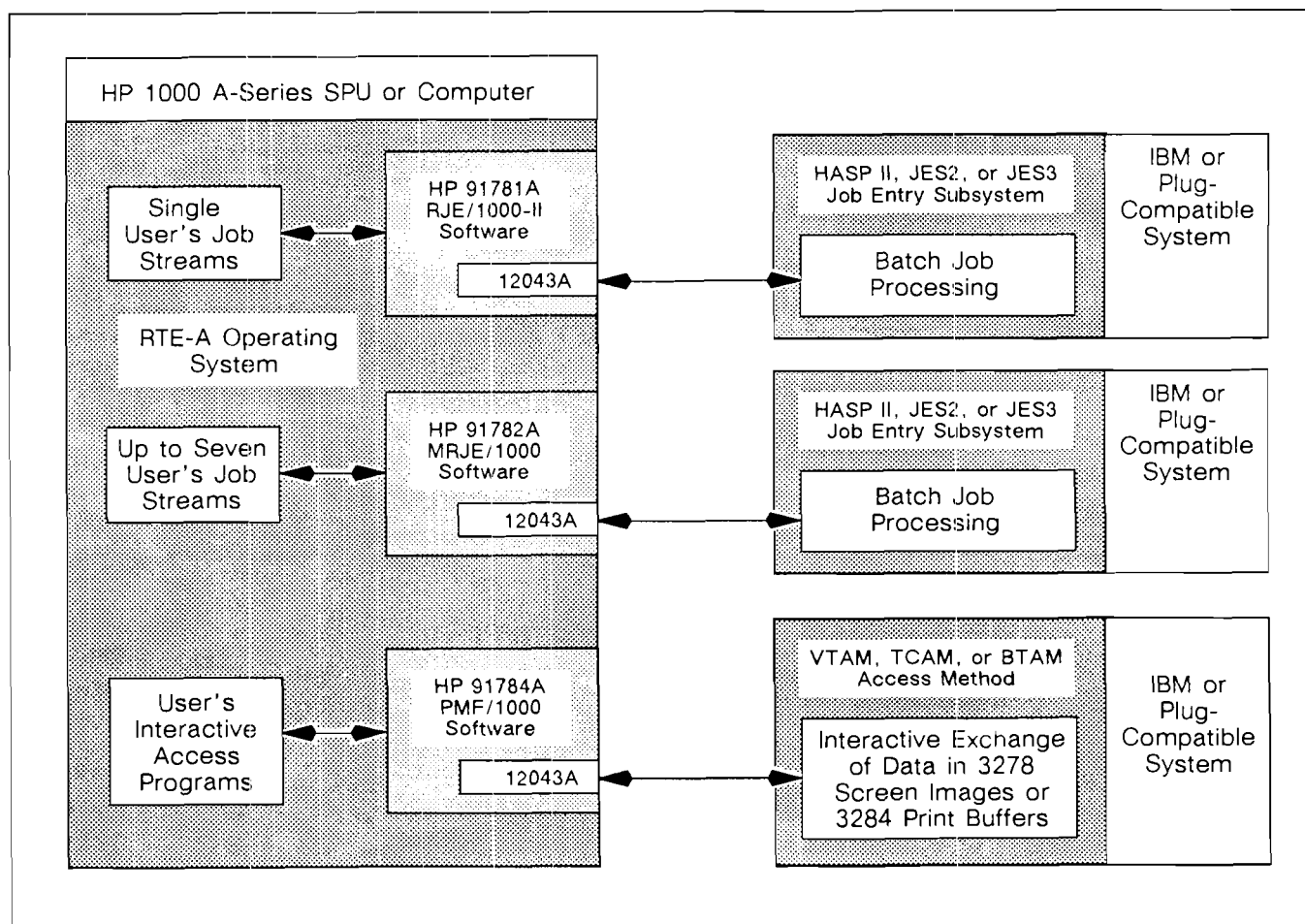


Figure 43. HP 1000 A-Series Communication with IBM Systems

Ordering Communication with PLCs

Modular Software and Hardware Supports PLCs from Five Different Manufacturers

Figure 44 illustrates the modular structure of the PCIF/1000 software that supports HP 1000 A-Series Systems communication with Programmable Logic Controllers (PLCs). For detailed information on the HP 94200B and 94202A through 94206A PCIF/1000 software and the HP 12041B and 12040D Multiplexer Interfaces used for communication with PLCs,

see the A-Series Computer Handbook, 5954-8576 or a later revision.

Ordering Information

Order PLC communications software on pages 68 through 70 of the Ordering Information packet. Order HP 12041B or 12040D Multiplexer interfaces on Ordering Information page 32, keeping track of card cage usage on Ordering Information pages 30 and 31.

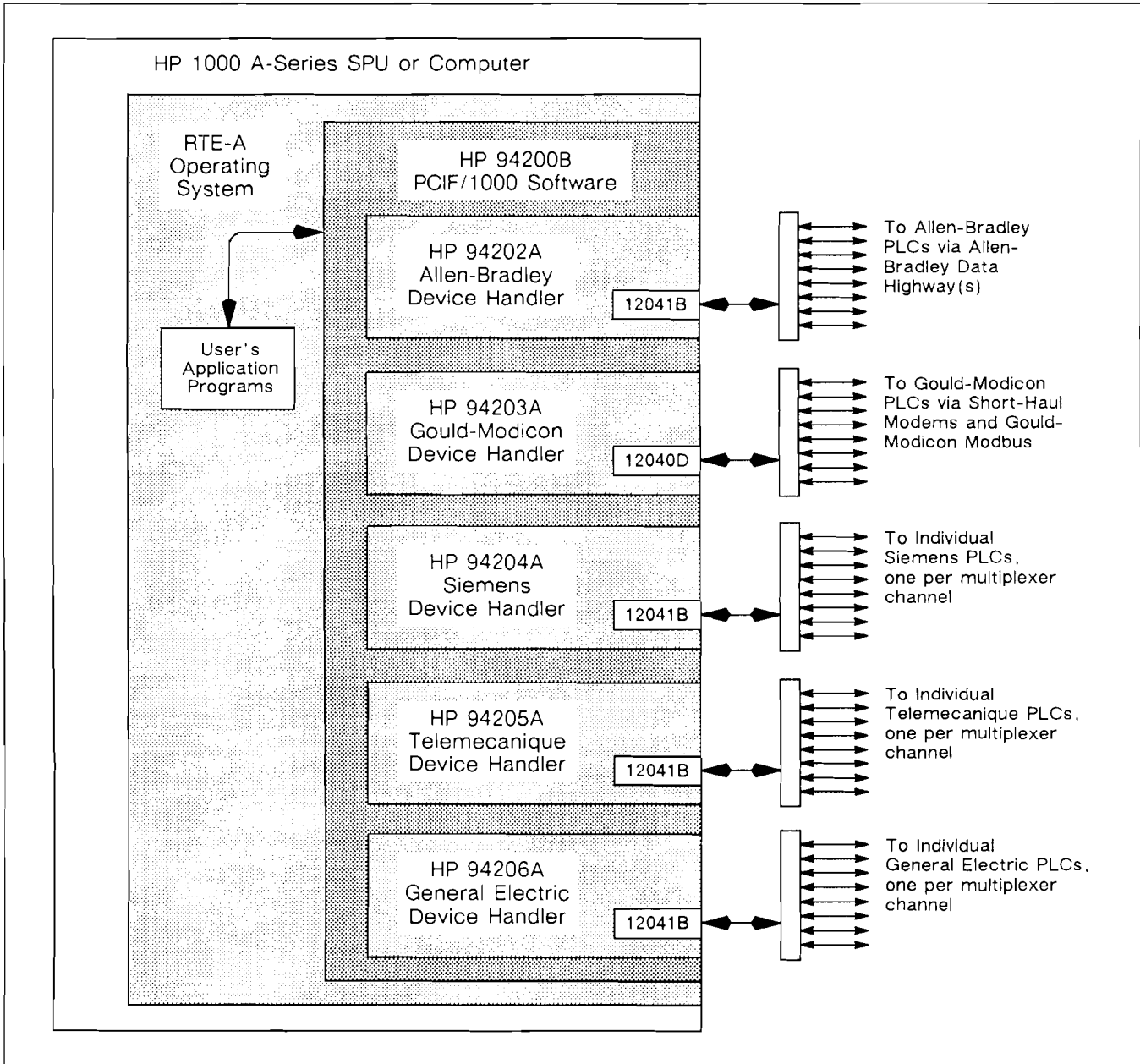


Figure 44. HP 1000 A-Series Communication with Programmable Logic Controllers

Ordering Program Development Capability

Basic Requirements and the Program Development Process

The basic requirements for program development are illustrated in Figure 45, below, which also generally outlines the program development process.

Step 1 - Entry of Program Code

A terminal other than the system console is required by each concurrent user for calling up the appropriate program development software from the disc and

for entry, or commanding the entry, of the source program, which is accomplished via Edit/1000.

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.

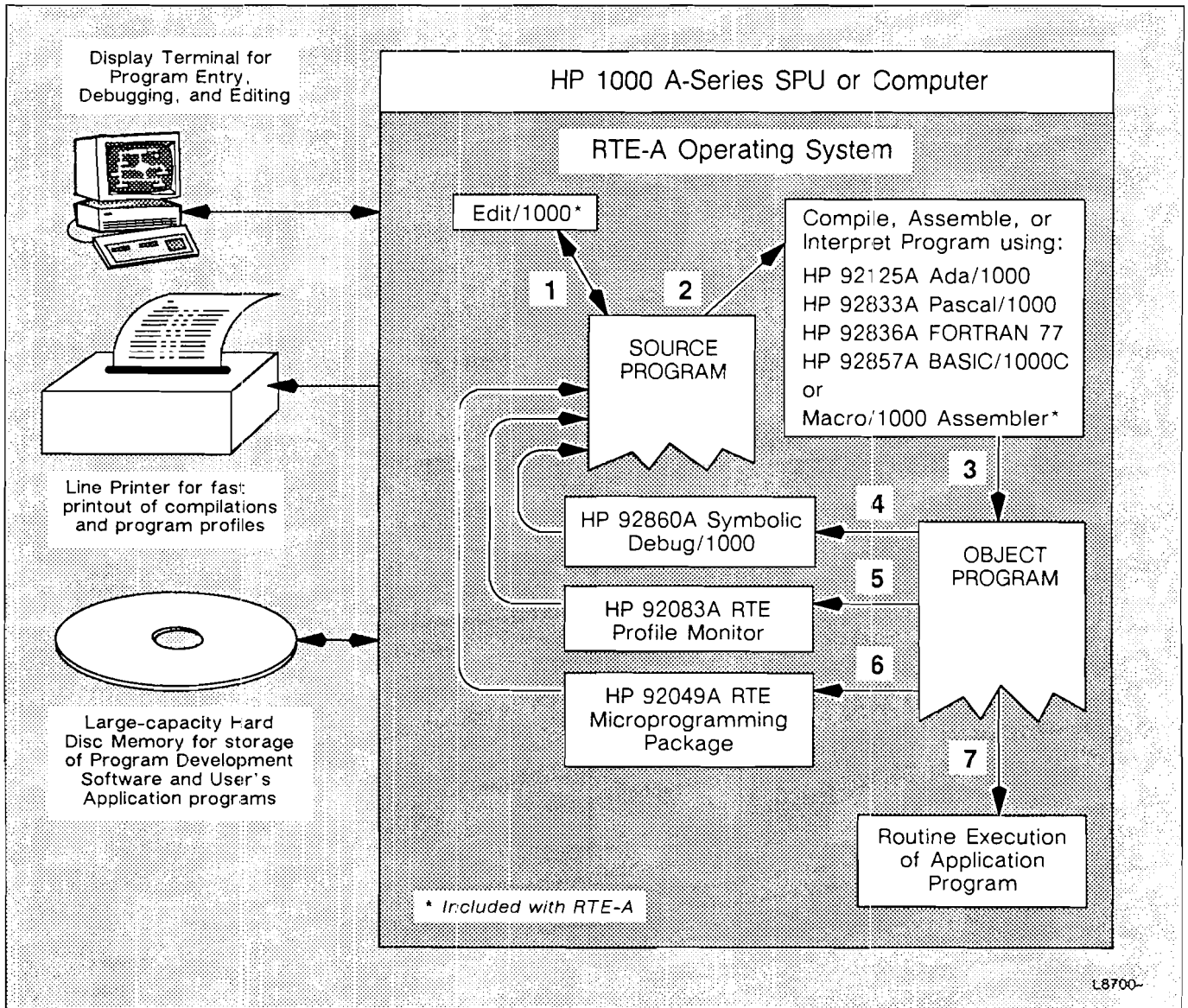


Figure 45. Program Development in HP 1000 A-Series Systems

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 7, routinely executing the program. However, if there are defects in the program, or if the program takes too much time to execute, some of the other intermediate steps will also have to be taken.

Step 4 – Program Debugging

Program defects need to be isolated and corrected, a process that is aided by the HP 92860A Symbolic Debug/1000 product. Symbolic Debug/1000 supports interactive symbolic debugging at the source language level, providing controlled execution that facilitates program fault isolation. With corrections made to the source code, it can be recompiled and retested. Symbolic Debug/1000 provides complete support for programs written in FORTRAN, Pascal, BASIC, and Assembly language. Its support of Ada is relatively limited; see the Symbolic Debug/1000 data sheet in the A-Series Computer Handbook, 5954-8576 or a later revision for more information.

Step 5 – Program Profiling

A program that takes too long to perform its functions needs to be speeded up. A key tool to help programmers find out what parts of the program to speed up is the HP 92083A RTE Profile Monitor. Programs typically spend 80% to 90% of their time in less than 5% of the code. The Profile Monitor provides a precise analysis of the activity distribution within a program, isolating the most-used parts of the program. Speeding up those parts of the program yields the greatest shortening of overall execution time. Execution time can be shortened by:

- Optimizing commonly used program loops,
- Changing buffer sizes in system calls,
- Restructuring crucial program algorithms,
- Rewriting some of the high-level language code in Assembly language for a three to four-fold improvement in execution speed, or
- Microprogramming frequently-used code.

Step 6 – Microprogramming

In HP 1000 A900 Systems, the HP 92049A RTE Microprogramming Package and the HP 12205A Control Store Card (order on page 26 of the Ordering Information packet) support development of microprograms (microcode) by the user. The conver-

sion of Assembly language program code to a microprogram can yield a three to five-fold reduction of execution time, a good gain when the most time-consuming code in an application has to be speeded up. The microcoded routine becomes part of the computer's instruction set and is invoked from program code as a computer instruction. Of course, the microprogram is new source code, but is shown separately from the other program processing software in Figure 45 to highlight its special category and its use as a performance enhancement tool.

Step 7 – Routine Execution

After debugging, profiling, and tuning the program (which may also involve microcode development in an HP 1000 A900 System) 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.

Ordering Program Development Software in Development Packs

HP 92836A FORTRAN 77, 92833A Pascal/1000, 92857A BASIC/1000C, and 92860A Symbolic Debug/1000 are available along with IMAGE/1000 or IMAGE/1000-II, and the Graphics/1000-II Device-Independent Graphics Library (DGL) in the HP 91156A, 91156B, 91157A, and 91157B Development Packs at attractive package prices.

Additional Information

For information on interfacing and ordering the terminals, printers, and discs needed for program development, see the respective sections on pages 32, 46, and 40 in this guide. For more information on the program development software for HP 1000 A-Series Systems, see the respective data sheets in the A-Series Computer Handbook, 5954-8576 or a later revision.

Ordering Information

Order program development software on pages 71 through 74 (or in Development Pack on page 79 or 80) of the Ordering Information packet. Order terminals, printers, and discs on Ordering Information pages 40, 54, and 50 and the interfaces to connect them to the system on Ordering Information page 32. Keep track of card cage and interface usage on Ordering Information pages 30 and 31.

Ordering Data Base Management Capability

Basic Hardware Requirements

Figure 46 shows the basic hardware requirements for data base management (one or more display terminals for user access to the data base, one or more disc memories with enough capacity to hold the data base, related programs, and the RTE-A operating system, a line printer for hard copy reports, and a magnetic tape unit for data base backup). For guidance on interfacing and ordering terminals, discs, printers, and magnetic tape units, see pages 32, 40, 46, and 44 in this guide.

A Choice of two Data Base Management Systems

HP 1000 A-Series systems can be equipped with either of two different data base management systems. HP 92081A IMAGE/1000-II is designed to

protect against data loss and assure data base consistency. It is, therefore, recommended for applications that are especially sensitive to data loss. HP 92069A IMAGE/1000 is offered for general applications. For more information on these IMAGE data base management systems, see the 92081A and 92069A data sheets in the A-Series Computer Handbook, 5954-8576 or a later revision.

Ordering Information

Order data base management software on pages 75 and 76 (or in a Development Pack on page 79 or 80) of the Ordering Information packet. Order terminals, printers, discs, and magnetic tape units on Ordering Information pages 40, 54, 50, and 53, and the interfaces to connect them to the system on Ordering Information page 32. Keep track of card cage and interface usage on Ordering Information pages 30 and 31.

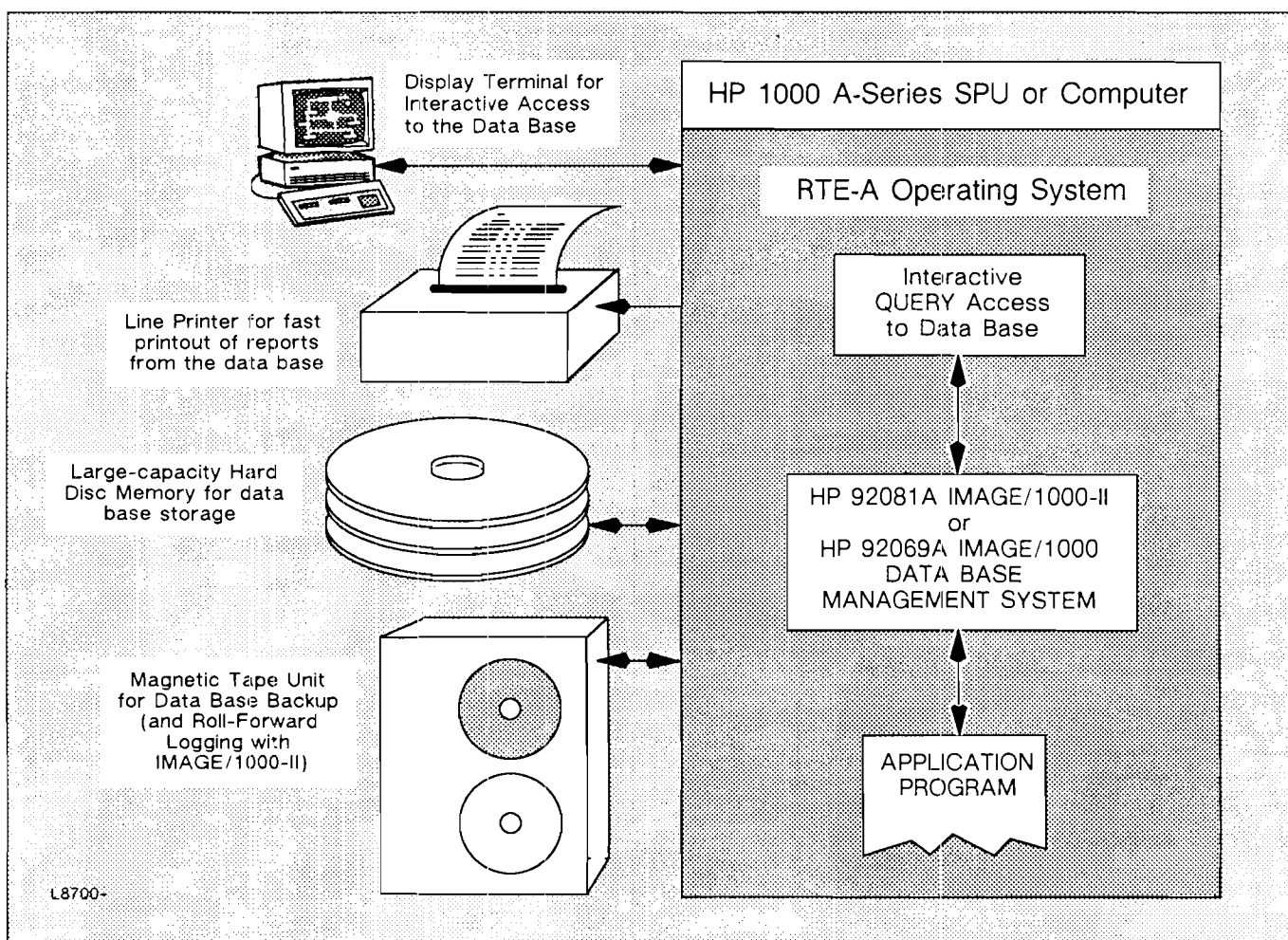


Figure 46. Data Base Management in HP 1000 A-Series Systems



Ordering Forms Data Entry Capability

Basic Hardware Requirements

Figure 47 shows the basic elements involved in forms-based data entry in HP 1000 A-Series systems. In addition to HP 94250B Forms/1000 software, at least one block mode terminal not in use as the system console is required for interactive design of the forms to be displayed and used for data entry. In addition, storage space on a hard disc is required for the user-designed forms, from which they can be called up for data entry use.

NOTE: The HP 700/41, 2382A, and 2621B* Terminals do NOT support block mode operation and thus are NOT supported for use with Forms/1000. All other supported display terminals listed in Table 4 on page 32 do support block mode operation and are thus supported with Forms/1000.*

* Discontinued terminal, listed here for reference only.

For guidance on interfacing and ordering terminals and discs, see pages 32 and 40 in this guide. For more information on Forms/1000, see the HP 94250B data sheet in the A-Series Computer Handbook, 5954-8576 or a later revision.

Ordering Information

Order forms-based data entry software on page 77 of the Ordering Information packet. Order terminals and discs on Ordering Information pages 40 and 50, and the interfaces to connect them to the system on Ordering Information page 32. Keep track of card cage and interface usage on Ordering Information pages 30 and 31.

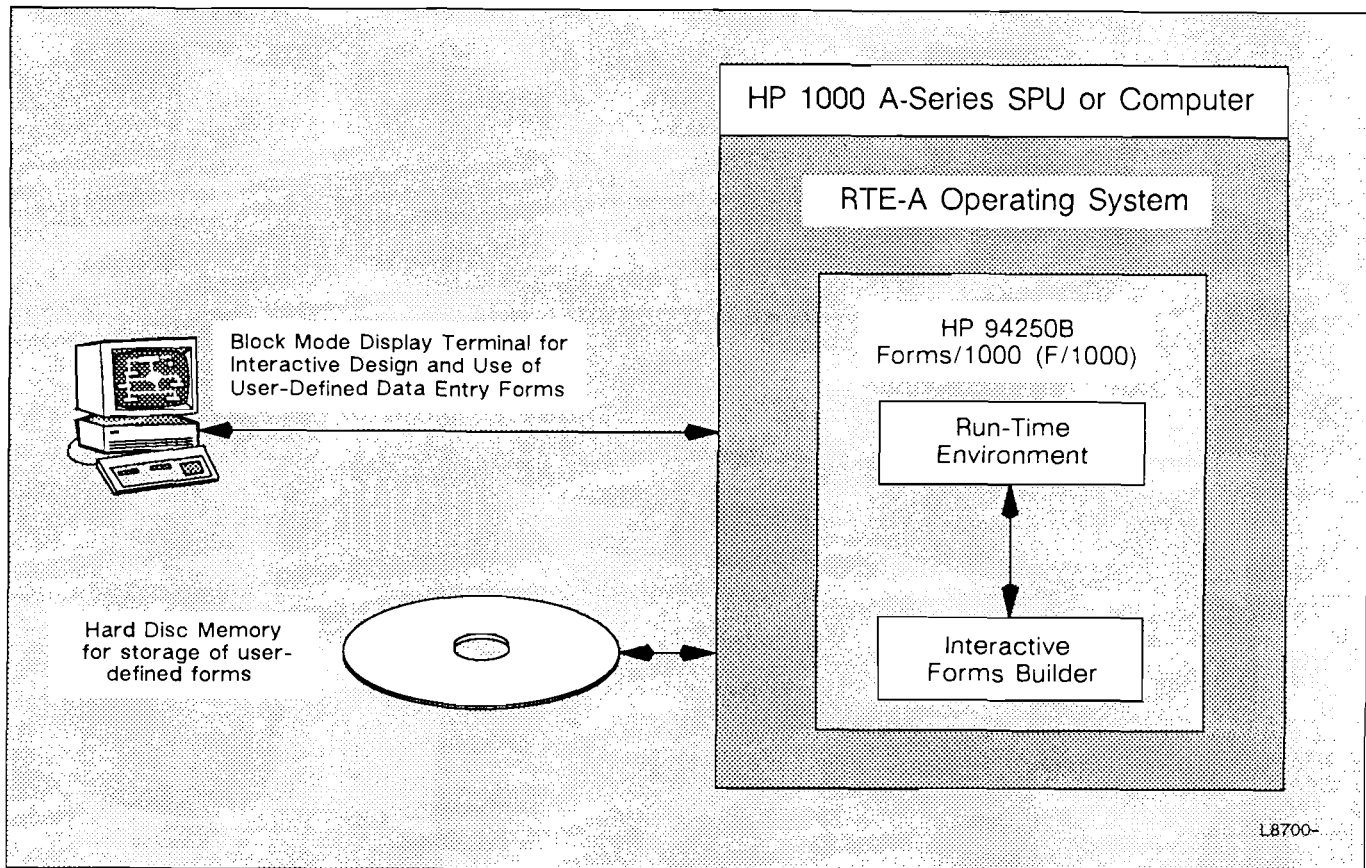


Figure 47. Forms Data Entry in HP 1000 A-Series Systems

Ordering Quality Data Management (QDM) Capability

QDM System Functions

Figure 48, below, shows the essential elements of a quality data management system based on the HP 92131A Quality Decision Management/1000 (QDM/1000) product.

Data Collection

QDM/1000 works with the display terminals to gather manually-keyed quality data and with HP 9000 Series 200/300 computers to receive automatically-submitted data.

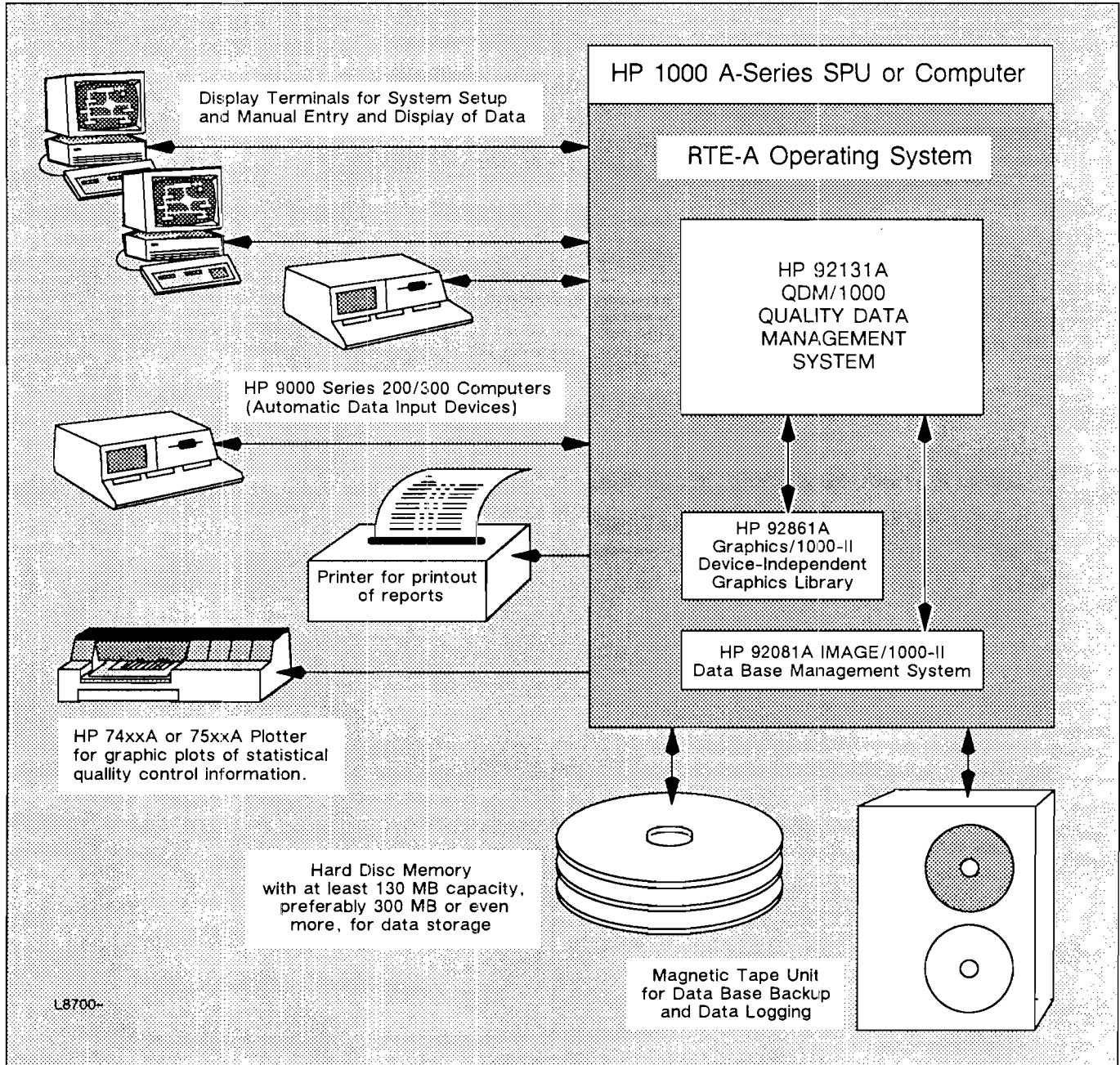


Figure 48. Quality Data Management in HP 1000 A-Series Systems

Data Validation and Storage

QDM/1000 validates and enters the collected data into a data base managed by the HP 92081A IMAGE/1000-II Data Base Management System, which is a requirement for use of HP 92131A QDM/1000. Because of the size of QDM data bases, a disc with at least 130 megabytes capacity, preferably much more, should be provided for data storage. In addition, a magnetic tape unit is required for data base backup and data logging.

Data Reporting

QDM/1000 supports printout of detailed reports and plotting of Pareto charts, control charts, scattergrams, and histograms to facilitate interpretation of the quality data it gathers and archives. An HP 256xA or 293xA Printer is required for hard copy of reports and, for its graphics output, QDM/1000 uses the HP 92861A Graphics/1000-II Device-Independent Graphics Library (DGL), and an HP 74xxA or 75xxA Plotter. All of these reporting-support devices and the 92861A DGL software are required for use of HP 92813A QDM/1000.

Ordering IMAGE/1000-II and DGL Software in Development Packs

The required HP 92081A IMAGE/1000-II Data Base Management System and the 92861A Graphics/1000-II Device-Independent Graphics Library (DGL) are available along with FORTRAN 77, Pascal/1000, BASIC/1000C, and Symbolic Debug/1000 in the HP 91156A and 91157A Development Packs at attractive package prices; order the development packs on pages 79 and 80 of the Ordering Information packet.

Assist Services

QDM/1000 is a large, complex system that requires considerable support to implement successfully. For

that reason, Hewlett-Packard has established several QDM-Assist products to help customers achieve successful installations. These products are listed in the "Ordering Consulting and Project Services" section, page 87.

Review of Main and Disc Memory Estimates

Because of the many interactions with respect to system hardware and software, main memory and disc memory capacity requirements estimates made using the Memory Requirements Estimator on pages 8 through 11 of the Ordering Information booklet should be reviewed thoroughly by a QDM knowledgeable HP Systems Engineer to confirm the adequacy of the numbers before initiating an order.

Additional Information

For guidance on interfacing and ordering terminals, discs, printers, plotters, and magnetic tape units, see pages 32, 40, 46, 48, and 44 in this guide. For more information on HP 92131A QDM/1000, 92081A IMAGE/1000-II, and the 92861A DGL, see the respective data sheets in the A-Series Computer Handbook, 5954-8576 or a later revision.

Ordering Information

Order quality data management software on page 78 of the Ordering Information packet. Order graphics software and data base management software on Ordering Information pages 59 and 76 or as part of a Development Pack on Ordering Information pages 79 and 80. Order terminals, printers, plotters, discs, and magnetic tape units on Ordering Information pages 40, 54, 59, 50, and 53, and the interfaces to connect them to the system on Ordering Information page 32. For data link connection to HP 9000 Series 200/300 Computers, order the HP 12092A Data Link Master Interface on Ordering Information page 39. Keep track of card cage and interface usage on Ordering Information pages 30 and 31.

Ordering Add-on Memory

Maximum Memory for A-Series Computer Systems

With the introduction of memory array cards based on 1M-bit chips, four 8 MB parity memory cards in A400, A600+, or A700 systems or four 8 MB ECC memory cards in A900 systems are sufficient to provide the maximum 32 MB memory capacity that is supported under the RTE-A operating system. For that reason, a maximum of four memory array cards is now supported on any A-Series system. (Card cage design further limits the number of memory array cards that can be supported in Micro 27 and Micro 29 systems to three and two, respectively.)

Rules for Addition of Memory

Addition of New Parity Memory Cards to Existing Memory in A400, A600+, and A700

The new HP 12103K, L, or M parity memory array cards can be added to existing memory in A400, A600+, or A700 systems at any 0.5 MB boundary – no particular progression of array card sizes is required. For example, you can add an HP 12103M 8 MB Parity Memory Array Card directly to an A400 SPU or computer, to provide 8.5 MB of memory.

Addition of New ECC Memory Cards to Existing Memory in A900

The new HP 12221B ECC memory array cards can be added to existing memory in A900 systems by locating them next to the memory controller and moving array cards with lesser capacity to the other side of the new cards.

Addition of “Old” Parity Memory Cards to Existing Memory in A400 or A600+ Systems

The basic rule for addition of HP 12103B or 12103C Parity Memory Array Cards to an A400 or A600+ system is that this equation is satisfied:

$$\frac{\text{Memory Size Now in Backplane}}{\text{Size of Array Card to be Added}} = \text{An Integer}$$

For example, an HP 12103D 1 MB Parity Memory Array Card cannot be added to the 512 kB parity memory controller in an A400 system unless a 512 kB (12103C) array card is added first to make memory size now in backplane greater than or equal to the 1 MB to be added.

Addition of ECC Memory Cards to Existing Memory in A600+ Systems

The basic rule for addition of ECC memory to an A600+ system is that the system must have an ECC memory controller. A600+ ECC memory additions must also satisfy this equation:

$$\frac{\text{Memory Size Now in Backplane}}{\text{Size of Array Card to be Added}} = \text{An Integer}$$

For example, an A600+ system, with a 1 MB ECC memory controller must have added to it an HP 12111B 1 MB ECC Memory Array Card to bring total memory to 2 MB before an HP 12111C 2 MB ECC Memory Array Card can be added.

Addition of Parity and/or ECC Memory Cards to Existing Memory in A700 Systems

HP 12111x ECC memory array cards can be mixed with HP 12103x Parity and 12104A ECC memory array cards without restriction other than the limitation of a maximum number of memory array cards per system.

Mixing of ECC and Parity Memory in A600+ and A700 Systems

Within the total limitation of a maximum number of memory array cards, HP 12111x ECC memory array cards and HP 12103x parity memory array cards can be used together in the same system. ECC memory can thus be used to assure maximum availability of the operating system and critical resident programs and data and lower priced parity memory can be used for programs and data that do not require the extra protection of ECC memory.

Use of Memory Connectors

HP 12038A, B, C, and D and 12222A, B, C, and D controller-to-array card connectors are used to connect one, two, three, and four memory array cards, respectively, to the memory controller. Any change in the total number of array cards connected requires a change to the appropriate memory connectors. For example, an increase from two memory array cards to three in an A400, A600+, or A700 system would require the purchase of a 12038C memory connector to replace the 12038B connector previously used.

Ordering Information

Order Add-on Memory and memory connectors on page 81 of the Ordering Information packet.

Ordering Upgrades and Return Credit Products

HP 1000 Upgrade Paths

The HP 1000 Upgrade Program is one of the many ways in which Hewlett-Packard assures our customers that their investment in HP 1000 application development will be protected and highly leverageable in the future. Figure 50 shows the upgrade paths that are supported by the HP 1000 Upgrade Program. Hewlett-Packard also offers upgrades from HP 1000 Systems to HP 9000 Series 800 Systems, a topic that is covered in HP 9000 Series 800 sales literature.

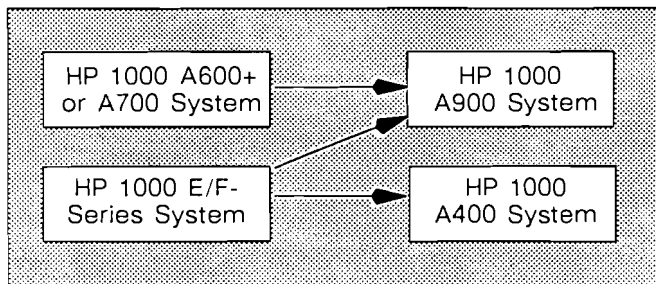


Figure 50. HP 1000 Family Upgrade Paths

Upgrade Credits

An extensive array of upgrade credits, outlined below, are offered to make upgrades attractive to HP 1000 customers.

A600+/A700-to-A900 Upgrade Path

Credit for Returned A600+ or A700 Computer or SPU. Credit of up to 25% of list price is available for return of A600+ or A700 computers or SPUs toward the purchase of an A900 computer or SPU.

Credit for Returned Memory. Credit of up to 50% is available for returned memory cards toward the purchase of an A900 computer or SPU.

Software License Credit. 100% credit is given for all software license upgrades. This means that customers pay only the difference in price between a license to use their software on an A900 system and the license previously purchased to use the software on an A600 or A700 system. This is implemented by software Use Options 896 and 897 for all applicable software.

E/F-Series-to-A900 Upgrade Path

Credit for Upgrade from E/F-Series. Option 010 to all HP 1000 A900 Computers and SPUs provides a Credit of \$2,000 for upgrade from an HP 1000 E/F-Series system.

Software License Credit. 100% credit is given for upgrades from Use Option 700 subsystem software licenses where the same software is usable on both HP 1000 E/F-Series and HP 1000 A900 systems. Customers pay only the difference in price between a license to use their software on an A900 system and the Use Option 700 license previously purchased to use the software on their E/F-Series system. This is implemented by Software Use Option 897 for all applicable software.

E/F-Series-to-A400 Upgrade Path

Credit for Upgrade from E/F-Series. Option 010 to all HP 1000 A400 Computers and SPUs provides a Credit of \$200 for upgrade from an HP 1000 E/F-Series system.

Direct Software License Usability. The customer is granted the license to use on the new A400 system all subsystem software for which the customer holds a Use Option 700 license previously purchased for use with the E/F-Series system that is being replaced.

Return Credit Products

In addition to return credit for A600+ and A700 Computers or SPUs, Return Credit Products also offer credits for the return of certain interfaces. Return Credit Products may also be available on the return of certain peripheral devices, when the return credit is applied toward the purchase of a specific peripheral device(s).

Ordering Information

Order Option 010 E/F-Series upgrade credits for A400 SPUs and computers on pages 12 and 13 of the Ordering Information packet. Order Option 010 E/F-Series upgrade credits for A900 SPUs and computers on Ordering Information pages 24, 25, and 26. Order software upgrades on Ordering Information pages 27, 28, 29, 51, 52, 59, 60, 61, and 63 through 78. Order Return Credit Products on Ordering Information pages 82, 83, and 84.

Ordering System Support

Why Order Software Support

Software support provides the mechanism whereby individual users can benefit from the experience of the entire community of users, as requested enhancements are incorporated and software and documentation defects are corrected in successive revisions of the product. Customers who subscribe to software support services automatically receive the latest revisions of the software and manuals. Many customers prefer this mode of obtaining the latest software revisions to the alternate means of ordering the latest software with an update option that grants a discount. Moreover, software support can also bundle other helpful services with the updates, as discussed below.

Software Support Services

Services for a Central (or first) System

Software Materials Subscription (SMS). The basic service offered individually for RTE-A and all other software products is Software Materials Subscription (SMS). SMS, ordered for RTE-A as 92077A+Sxx, provides software and manual updates, Software Status Bulletins, and HP Communicator magazine. The xx in Sxx designates the medium on which software updates are provided – S22 orders SMS with updates on CS/80 cartridge tape, S44 provides updates on 270 kB Microfloppy discs, and S51 delivers updates on 1600 cpi mag tape.

Response Center Support (RCS). RCS adds a call-in information support service to SMS. One person and one alternate person can call the supporting HP Response Center to ask questions relating to the use of RTE-A. RCS is ordered for RTE-A as 92077A+Hxx, with the xx in Hxx designating the medium on which software updates are provided – H22 orders RCS with updates on CS/80 cartridge tape, H44 provides updates on 270 kB Microfloppy discs, and H51 delivers updates on 1600 cpi mag tape.

Account Management Support (AMS). AMS adds a local account SE, and on-site assistance to the response center caller and SMS support provided under RCS. AMS is ordered for RTE-A as 92077A+Txx, with the xx in Txx designating the medium on which software updates are provided – T22 orders AMS with updates on CS/80 cartridge tape, T44 provides updates on 270 kB Microfloppy discs, and T51 delivers updates on 1600 cpi mag tape.

Category Support extends the level of (RCS or AMS) support that is provided for RTE-A to other software in a particular category. For example, VC+ is in the Data Management Category, whose category support product designation is 99083D+C00. Ordering SMS for the individual software products in the system that are in the data management category provides software and manual updates. Ordering the category support product extends AMS or RCS sup-

port ordered for the operating system to all the products in that category.

AMS Family Support provides Account Management Support for applications software separately from the operating system. For example, to provide AMS Family support for QDM/1000 software, you would order 99102D+T00, which is AMS support for Factory Automation Family software, in addition to 92131A+S00 (SMS for QDM/1000).

RCS Family Support provides Response Center Support for applications software separately from the operating system. For example, to provide RCS Family support for QDM/1000 software, you would order 99102D+H00, which is AMS support for Factory Automation Family software, in addition to 92131A+S00 (SMS for QDM/1000).

Additional System Services (Right to Copy)

Extended Software Materials Subscription (Ext-SMS) extends Software Materials Subscription by providing the right to copy all central system materials for use on one additional system. Ext-SMS is ordered for RTE-A as 92077A+W00.

Additional System Coverage (ASC) extends RCS or AMS coverage on the central system to one additional system under the same system manager as the central system. It also provides the right to copy all central system materials for use on one additional system. ASC is ordered for RTE-A as 92077A+V00.

Additional System Services Materials

Extended Software Materials Subscription (Ext-SMS), when ordered for RTE-A as 92077A+W22 (or W44 or W51) adds software and manual updates for one additional system on the specified media. 92077A+W00 is prerequisite to 92077A+W22, W44, or W51.

Additional System Coverage (ASC), when ordered for RTE-A as 92077A+V22 (or V44 or V51) adds software and manual updates for one additional system on the specified media. 92077A+V00 is prerequisite to 92077A+W22, W44, or W51.

Optional Services

Additional Response Center Caller adds response center support for one additional caller to the HP Response Center. It is ordered for RTE-A as 92077A+P00.

Manual Update Service provides one copy of updates to software manuals for a product. It is ordered for RTE-A as 92077A+Q00. It would be used for an additional set of manuals not covered by SMS, RCS, ASC, Ext-SMS with materials, or ASC with materials.

Software Notification Service provides subscriptions to the HP Communicator and Software Status Bulletin. It is ordered for RTE-A as 92077A+N00.

HP 1000 Software Support Examples

Example 1: RTE-A in A900 with QDM/1000

For an HP 1000 A900 system operating under RTE-A with VC+ and with QDM/1000, FORTRAN 77, Symbolic Debug/1000, IMAGE/1000-II, and Graphics/1000-II DGL, with a magnetic tape unit as the software load device, the following software support products would be ordered to provide RCS support for the basic software and Account Management Support for the QDM/1000 software.

To Support:	Order:
RTE-A Operating System (RCS support)	92077A+H51 and 92077A+H51-890
Language Category FORTRAN 77 (SMS)	99081D+C00 92836A+S00
Productivity Tool Category Symbolic Debug/1000 (SMS)	99082D+C00 92860A+S00
Data Management Category VC+ (SMS) IMAGE/1000-II (SMS) Graphics/1000-II DGL (SMS)	99083D+C00 92078A+S00 92081A+S00 92861A+S00
Factory Automation Family (AMS) QDM/1000 (SMS)	99102D+T00 92131A+S00

Example 2: Additional System with Right-to-Copy

For a second system identical to the system of Example 1, above, the following software support products would be ordered to provide Additional System Coverage with right-to-copy updates.

To Support:	Order:
RTE-A Operating System (ASC support)	92077A+V00 and 92077A+V00-890
Language Category(ASC) FORTRAN 77 (Ext SMS)	99081D+V00 92836A+W00
Productivity Tool Category (ASC) Symbolic Debug/1000 (Ext SMS)	99082D+V00 92860A+W00
Data Management Category (ASC) VC+ (Ext SMS) IMAGE/1000-II (Ext SMS) Graphics/1000-II DGL (Ext SMS)	99083D+V00 92078A+W00 92081A+W00 92861A+W00
Factory Automation Family (ASC) QDM/1000 (Ext SMS)	99102D+V00 92131A+W00

Example 3: Additional System with Material

For a third HP 1000 A600+ system with the same software as to the system of Example 1, above, but a cartridge tape subsystem as the load device, the following software support products would be ordered to provide Additional System Coverage with with update materials on cartridge tape media.

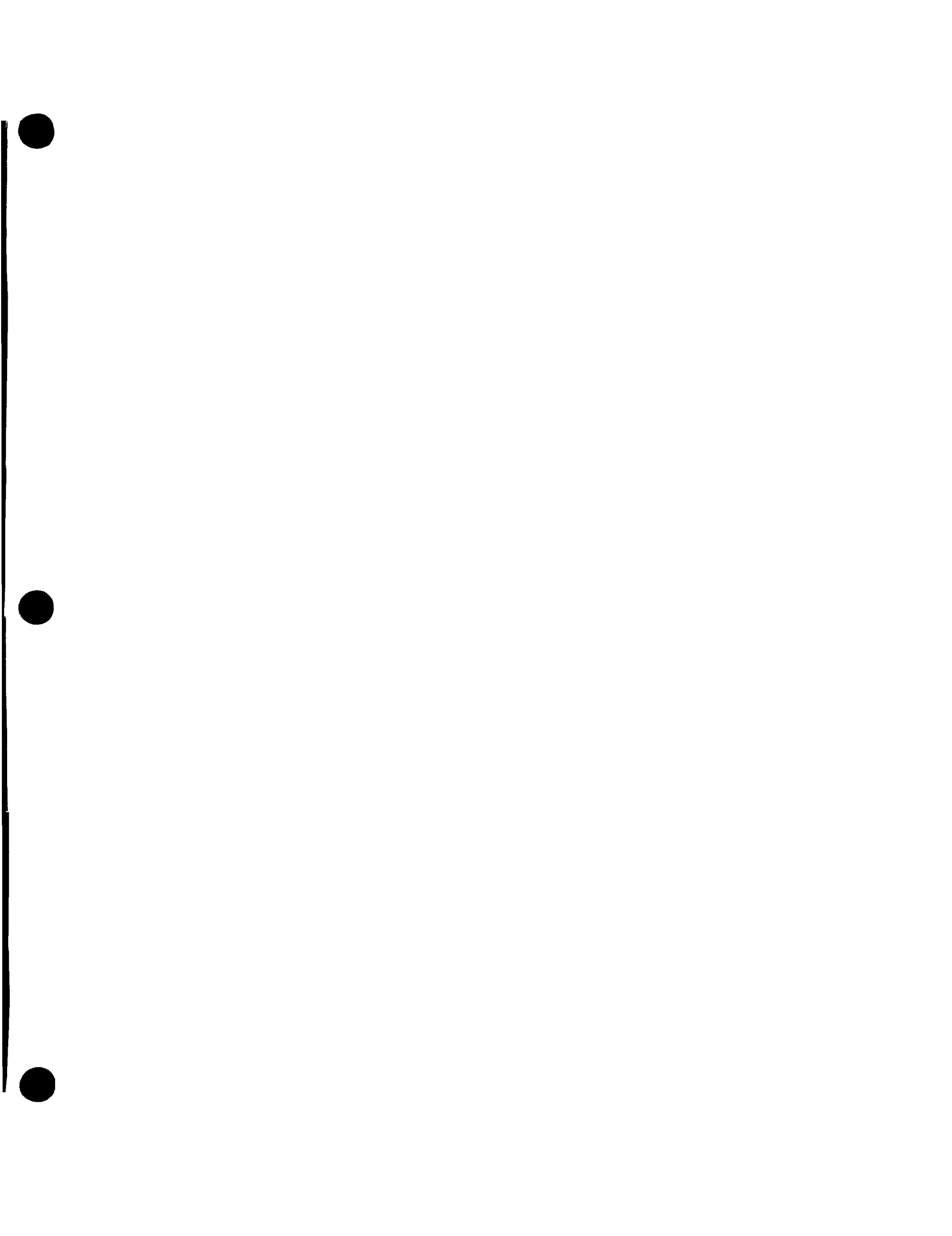
To Support:	Order:
RTE-A Operating System (ASC support, with update materials on Cartridge Tape)	92077A+V00, 92077A+V00-600, 92077A+V22, and 92077A+V22-600
Language Category (ASC) FORTRAN 77 (Ext SMS)	99081D+V00 92836A+W00
Productivity Tool Category (ASC) Symbolic Debug/1000 (Ext SMS)	99082D+V00 92860A+W00
Data Management Category (ASC) VC+ (Ext SMS) IMAGE/1000-II (Ext SMS) Graphics/1000-II DGL (Ext SMS)	99083D+V00 92078A+W00 92081A+W00 92861A+W00
Factory Automation Family (ASC) QDM/1000 (Ext SMS)	99102D+V00 92131A+W00

This third example provides Response Center Support for the operating system and its subsystems and Account Management Support for QDM/1000, as with Examples 1 and 2. Support is provided through the central site System Manager. However, the "with material" alternative delivers all software and documentation updates directly to the additional system.

Ordering Information

Order software support on the following pages of the Ordering Information packet:

Supported Product or Category	Page
RTE-A Operating System	88
Programming Languages	91
Productivity Tools (PMF/1000, RTE Profile Monitor, Symbolic Debug/1000, and PCIF/1000)	92
Data Management Software (Datapair/1000, Image/1000 and Image/1000-II, VC+, Graphics/1000-II DGL and AGP, and Forms/1000)	93
Data Communications "A" and "B" Software (LAN/1000 Link, RJE/1000-II, and NS/1000)	94
Data Communications "C" Software (DS/1000-IV, X.25/1000, and MRJE/1000)	95
Factory Automation Software (QDM/1000)	96
Diagnostics Software	96







With 5954-8580(D) or 5954-8580, supersedes 5954-8564(D)
or 5954-8564 for Ordering HP 1000 A-Series Systems

Printed in U.S.A. 10/87
5954-8577