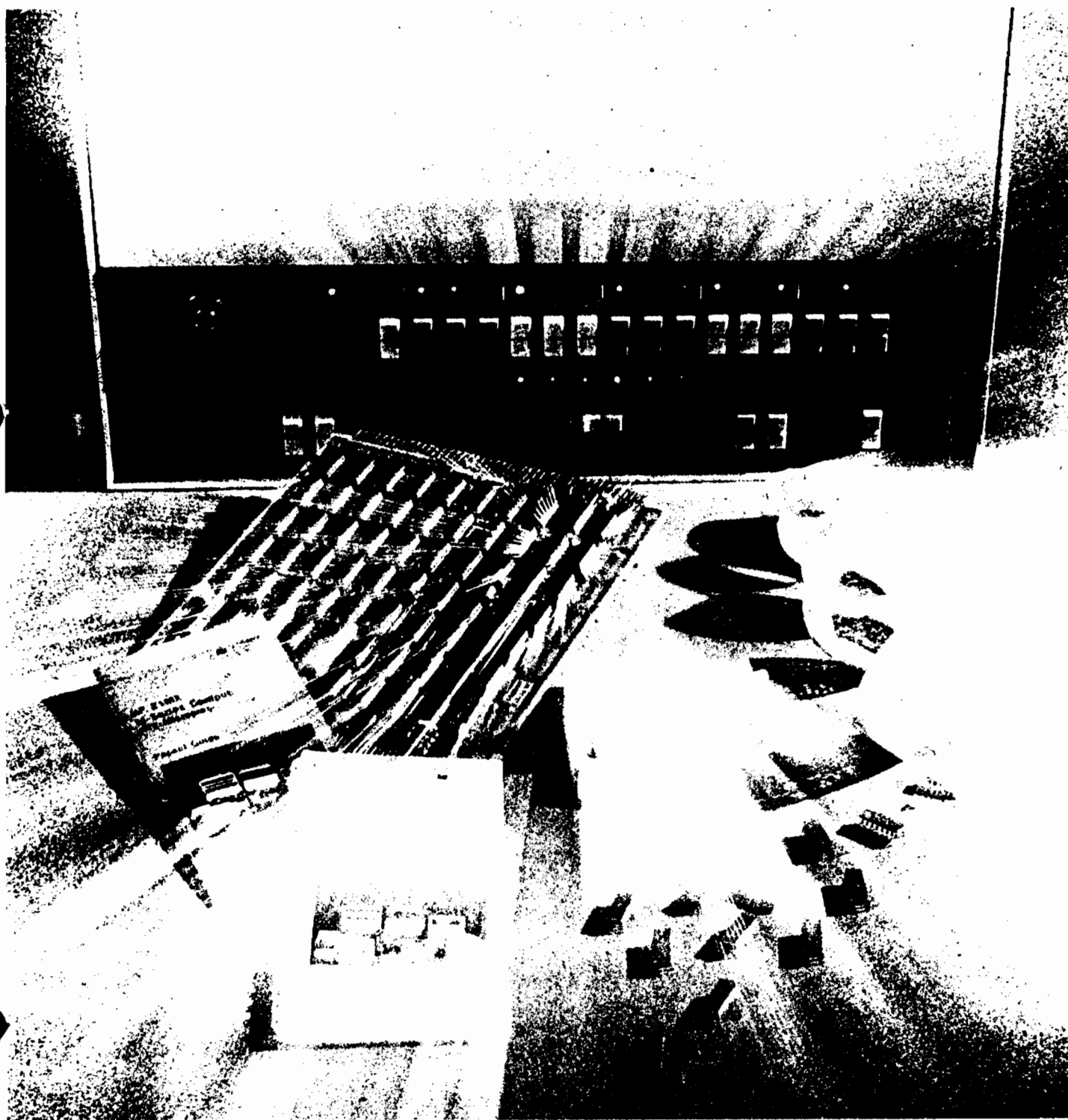


HP 1000 computers

HEWLETT  PACKARD

Selection and Configuration Guide

Effective July 1, 1979





Hewlett-Packard Interface Bus I/O Kit

model
59310B



Technical Data 4/76

The HP 59310B is a duplex I/O card for connecting up to fourteen Hewlett-Packard Interface Bus* (HP-IB) measurement and stimulus instruments and other digital devices to the HP 2100A/S or 21MX series computer. It includes the customer's choice of real-time RTE-II/III or BCS software.

Features

- Simple implementation of computer based instrumentation systems.
- Standard instrumentation interface (HP-IB).
- Simple passive cable interconnecting system.
- Concurrent operation of multiple buses and multiple instrument clusters by one minicomputer with RTE-II/III.
- Bus transfers programmable in HP Real-Time BASIC, FORTRAN, or HP Assembly language.
- On-line addition of instruments with RTE-II/III operating system.

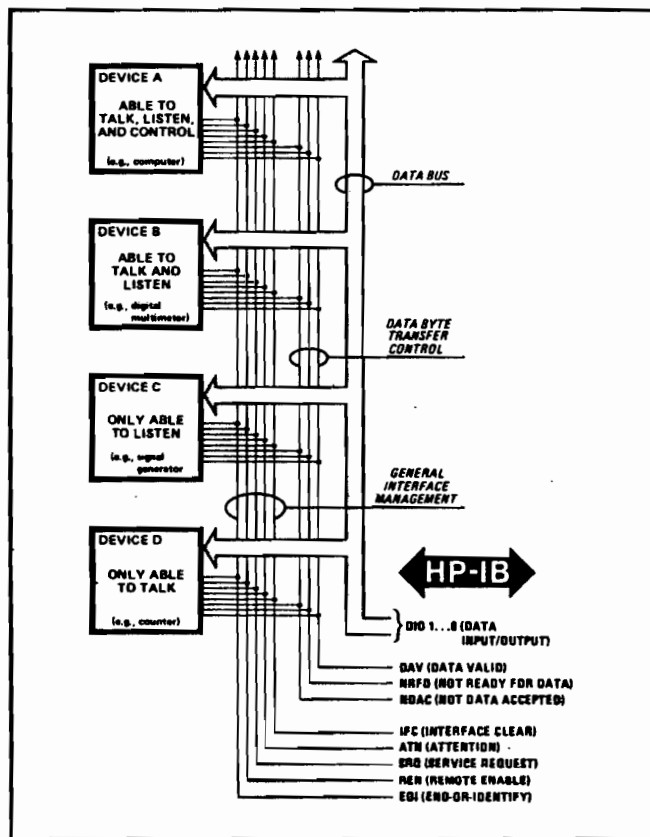
EASY IMPLEMENTATION OF USER-ASSEMBLED SYSTEMS

The Bus System provides a simplified means of physically connecting digital multimeters, scanners, counters, power meters, signal and sweep generators, digital clocks, timing generators, printers, and other digital devices which conform to IEEE Standard 488-1975, to the computer. Devices may be quickly interconnected in the most convenient way, using standardized bus cables that provide for flexible piggyback connection. Standardization of physical hardware and general signal meanings for the individual devices in the system also simplifies system programming and operation.

INTERFACE BUS CAPABILITIES

The HP 59310B Bus I/O Interface card connects to the signal lines shown in Figure 1, acting as device A. Eight bi-directional DATA BUS lines carry coded messages in bit-parallel, byte-serial form to/from other devices on the bus, with each byte transferred from one TALKER to one or more LISTENERS simultaneously. Data is exchanged asynchronously using interface messages to set up, maintain, and terminate an orderly flow of device-dependent messages. Three DATA BYTE TRANSFER CONTROL lines are used to control the transfer of each byte of coded data on the eight data lines. The five remaining GENERAL INTERFACE MANAGEMENT lines ensure an orderly flow of information within the HP-IB.

**The Hewlett-Packard Interface Bus is Hewlett-Packard's implementation of IEEE Standard 488-1975 "Digital Interface for programmable instrumentation".*



the scheduling of an associated service program, thereby providing quick, flexible response to alarm or normal service request conditions.

BCS SOFTWARE SUPPORT PACKAGE (OPTION 423)

The 59310B card with option 423 BCS software package meets the specifications of controller subset C22 of IEEE Standard 488-1975. The BCS software package provides driver and utility library software and a manual that support operation in HP's memory-based Basic Control System (BCS). BCS is a single-program system intended for very simple applications. It provides interrupt processing for efficient input/output, but no time scheduling capability.

DMA and Non-DMA Operation

Two versions of the driver are provided, giving a choice of DMA operation for use in computers with that capability, or non-DMA operation.

Program Languages

The BCS software package supports programming in FORTRAN II and HP Assembly language.

Automatic Addressing

The addressing requirements of the bus may be implied within a read or write request by the sub-unit field in the equipment table entry of the device. When the sub-unit field is non-zero, the BCS driver will automatically perform an addressing sequence prior to the input or output operation. The sequence is: an Untalk Command, an Unlisten Command, and Device Listen (for Write request) or Talk (for Read request) address, followed by enabling of the 59310B card to Talk (for Write request) or Listen (for Read request).

User Addressing

Addressing sequences other than that provided by the automatic addressing mode may be generated by use of Control and Write requests to the 59310B card, which has a sub-unit field equal to zero in its equipment table entry. When the sub-unit field is zero, the automatic addressing sequence is disabled, and all bus control and addressing are accomplished by the user's program.

Programmable Capabilities

The capabilities programmable with the option 423 BCS software package are summarized in Table 2.

Table 2. Programmable Capabilities Provided by BCS Software Package (FORTRAN Program Statements Shown)

PROGRAM STATEMENTS	USES
CALL CIOC(U,R,S,B,L)	Direct call to BCS Input/Output Control System from FORTRAN/ALGOL program with request R to unit reference number U, status of call returned in S, transfer to/from buffer B having length L.
CALL BREAD(U,F,D,N1,N2,B,L)	Buffered reading and conversion of N2 elements of N1 records from HP-IB device U to real form, using buffer B of length L, with result stored in data array D, format controlled by FORMAT statement labelled F.
CALL CMD(U,A1,C1) or CALL CMD(U,A1,C1,A2,C2,...,A6,C6)	Writes universal command or ASCII data string C1 to bus address A1 via 59310B card unit reference number U. Up to five additional commands and/or ASCII data strings C2 through C6 can be written to corresponding bus addresses A2 through A6 by extending the parameter string in the program statement, as shown in the second example.
CALL DEVCL(U)	Clears all devices on HP-IB connected to 59310B card unit reference number U.
CALL LOCL(U)	Sets all devices on HP-IB connected to 59310B card unit reference number U to local control.
CALL REMOT(U,M)	Sets all devices on HP-IB connected to 59310B card unit reference number U to remote control, with mode M provided for requesting local lock-out (LLO).

Computer and Operating System Compatibility

The 59310B HP-IB I/O Kit compatibility with computers and operating systems is summarized in the following matrix. Operating system compatibility depends upon ordering the appropriate software option (422 for RTE-II/III or 423 for BCS). No other operating system (e.g., DOS) is provided or supported.

Computer Model*	Operating System		
	RTE-II	RTE-III	BCS
HP 2100A	Yes	No	Yes
HP 2100S	Yes	No	Yes
HP 2105A	No	No	Yes
HP 2108A	Yes	Yes	Yes
HP 2112A	Yes	Yes	Yes

*Specifications of all but the 2100S Computer are provided in the 21MX Microprogrammable Processors data booklet, HP Literature Request Number 5952-4683.

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

Product Summary and Support

HARDWARE FURNISHED

1. Interface Card (59310-60101).
2. 3.69 meter (12 foot) cable from interface card to standard bus connector (59310-60002).

MANUALS FURNISHED

1. Bus I/O Kit Operating and Service Manual (59310-90007).
2. Manual of Diagnostics (59310-90061).
3. User's Guide (59310-90064).

SOFTWARE FURNISHED

Bus I/O Card Diagnostic, absolute binary tape (59310-16001).

OPERATING SYSTEM OPTIONS

The customer's selection of one of the following operating system options is included in the 59310B Interface Bus I/O Kit.

Option 422: Real-Time Operating System Software and Manual Package, consisting of:

1. Non-SRQ RTE Driver DVR37, binary tape (59310-16002).
2. SRQ RTE Driver DVR37, binary tape (59310-16003).
3. RTE Utility Library, binary tape (59310-16004).
4. RTE Driver DVR37, Programming and Operating Manual (59310-90063).

Option 423: Basic Control System Software and Manual Package, consisting of:

1. Non-DMA BCS Driver D.37A, binary tape (59310-60020).
2. DMA BCS Driver D.37B, binary tape (59310-60021).
3. BCS Utility Library, binary tape (59310-60050).
4. BCS Driver D.37A/B Program Procedure Manual (59310-90022).

INSTALLATION

Installation is the responsibility of the customer. The Interface Bus I/O card plugs into any 2100A/S or 21MX Computer I/O slot in the computer or I/O extender. Connection of the bus to interfaced instruments or devices and configuration into the operating system completes installation.

WARRANTY

The 59310B Interface Bus I/O Kit is covered by a 90-day warranty. Service Contracts are available from your local HP sales and service office for extended service coverage.

ORDERING INFORMATION

59310B Interface Bus I/O Kit.

System Responsibility

Instrument or device-dependent operational characteristics have been excluded from the IEEE Standard 488-1975 definition. This opens up a tremendous diversity of possible instrument combinations that might be connected to the 59310B I/O Kit. Because of that diversity, Hewlett-Packard cannot, as a practical matter, be responsible for the performance of HP-IB instrument systems connected to HP minicomputers via the 59310B I/O card. That responsibility remains with the user. We assist the user by furnishing a User's Guide with the 59310B I/O Kit.



Sales and service from 172 offices in 65 countries.
1501 Page Mill Road, Palo Alto, California 94304

In Europe, Post Office Box 85, CH-1217 Meyrin 2, Geneva, Switzerland.
In Japan, Yokogawa-Hewlett-Packard, 1-66-1, Yoyogi, Shibuya-ku, Tokyo, 151.

Hardware Specifications

APPLICATION

The 59301B card interfaces 2100A/S or 21MX series Computers to instruments and devices interconnected to it via the HP Interface Bus (HP-IB). The HP Interface Bus is Hewlett-Packard's implementation of IEEE Standard 488-1975; the 59310B card meets the specifications for controller subset C22 of that standard.

LISTEN (DATA INPUT) FUNCTIONS

Addressable Listen: The card may be addressed to Listen by another controller on the HP-IB.

Programmable Listen: The card may be set to Listen by requests in user's programs.

End of Record Detection: The card sets an End of Record (EOR) flag if the EOI line goes low while it is Listening, or (if programmed) when an ASCII line feed (012_g) is received. This flag can generate an interrupt or be tested by software to initiate further action.

Service Requesting: If ready to receive data, but not addressed to Listen, the card will generate a Service Request.

Serial Poll Identification: A Serial Poll Enable Command from another controller on the HP-IB sets the Serial Poll Mode Flag on the card. Sensing of this flag by interrupt or user's program serves to initiate the local computer's Status Byte response to the other controller, when the local computer is addressed to talk.

TALK (DATA OUTPUT)FUNCTIONS

Addressable Talk: The card may be addressed to Talk by another controller on the HP-IB.

Programmable Talk: The card may be set to Talk by requests in user's programs.

End of Record Signalling: The computer can set EOI low with, or after, the last byte, or (if programmed) when an ASCII line feed (012_g) is output.

Service Requesting: If ready to send data, but not addressed to Talk, the card will generate a Service Request.

CONTROLLER (BUS MANAGEMENT)FUNCTIONS

Controller Activation: The controller functions of the card are activated by another controller or under program control if it is a system controller.

Addressing and Universal Commands: The computer sets attention (ATN) low and sends addressed and/or universal commands to devices on the bus under control of user's programs.

Service Request Processing: The card lets the computer monitor the Service Request (SRQ) line to detect requests for service, either via interrupt or software monitoring.

Serial Polling: Provides for determining the device(s) issuing SRQ, via user's program sending universal control word to each device and using the Listen mode.

Parallel Polling: Provides for determining the device(s) needing service, using one universal control word to all devices and reading the status bits returned on the data lines.

SYSTEM CONTROLLER (BUS MANAGEMENT) FUNCTIONS

Interface Clear: The card lets the computer gain undisputed control by setting the Interface Clear (IFC) line low.

Remote Enable Control: The card provides for switching programmable devices on the bus from local to remote control by setting the bus signal line Remote Enable (REN) low.

Automatic Activation of Controller Functions: The card automatically becomes the active controller when first turned on, or when it sets IFC low.

OPERATING MODES

ASCII Mode: Enabled under control of programs to control the IFC, REN, and ATN lines, using reserved data codes, as follows:

CODE		FUNCTION
OCTAL	ASCII	
033	ESC	Sets IFC low for 100 μ sec
002	STX	Sets REN high
003	ETX	Sets REN low
016	SO	Sets ATN high
017	SI	Sets ATN low
012	LF	Sets EIO with LF

Reserved codes output from the computer to the card are not transmitted to any devices on the HP-IB.

Packing: User's programs can specify data transfer to or from the computer in 16-bit words, two bytes to a word. The first byte out or in comes from, or goes to, the upper half of the word (bits 8-15).

INTERRUPT SOURCES

One or more of the following four flags may be selected to cause an interrupt.

Input Register Loaded Flag: Set when data has been received by card addressed to Listen.

Output Register Accepted Flag: Set when data has been accepted by card addressed to Talk.

End of Record Flag: Set when the bus signal line End or Identify (EOI) is low and the card has been receiving data while addressed to Listen; also set if line feed code is received when ASCII mode is enabled.

Multi-Function Flag: While card is an active controller, this flag will be set if SRQ or IFC goes low. If inactive, the flag will be set if a serial poll is requested.

PARALLEL POLL INTERRUPT

In parallel poll mode, any device on the bus responding to parallel poll will interrupt the computer.

DIRECT MEMORY ACCESS (DMA) OPERATION

Qualification: DMA operation is limited to HP-IB devices capable of completing the NRFD-DAV-NDAC handshake sequence with the HP-IB interface in less than 3 microseconds.

On Input: Every third cycle inputs directly to memory, giving maximum data rates to 669k bytes/sec with a 2100A/S Computer, 411k bytes/sec with a 21MX Computer (2 bytes per computer word).

On Output: Every third cycle outputs directly from memory, giving maximum data rates to 669k bytes/sec with a 2100A/S Computer, 411k bytes/sec with a 21MX Computer (2 bytes per computer word).

Requesting DMA Cycles: Either the Input Register Loaded Flag or the Output Register Accepted Flag may request DMA cycles. While DMA operations are in progress, the EOR flag may be used to interrupt for reading variable length records.

DATA RATES

Data rates are computer-limited to the DMA maximums specified above. Actual average rates will be slower because of their dependence upon instrument response and driver software execution times.

ELECTRICAL CHARACTERISTICS

Bus Signal Lines: The following 16 signal lines:

DI01 - DI08	Data I/O Lines 1 - 8
DAV	Data Valid
NRFD	Ready for Data
NDAC	Data Accepted
IFC	Interface Clear
ATN	Attention
EOI	End Or Identify
SRQ	Service Request
REN	Remote Enable

Logic Levels: High $\geq 2.0V$ /Low $\leq 0.8V$.

Line Termination: Each of the 16 bus signal lines is terminated with $3 k\Omega$ to VCC and $6.2 k\Omega$ to logic common. VCC varies from +4.5V to +5.0V, depending upon the computer model in which the bus I/O card is installed.

Line Drivers: The signal lines DI01 through DI08, DAV, ATN, and EOI are drivers with the following circuit characteristics:

Type: Three State.

Low State: $\leq 0.4V$ @ 48 mA.

High State: $\geq 2.4V$ @ 5.2 mA.

The signal lines NRFD, NDAC, IFC, REN, and SRQ have the following signal characteristics:

Type: Open Collector.

Low State: $\leq 0.4V$ @ 48 mA.

High State: Determined by resistor termination.

Leakage Current (High State): 0.25 mA @ 5.5V.

Line Receivers: Each of the 16 bus signal lines is received by a circuit with the following characteristics:

Type: Schmitt Trigger.

Positive Transition Threshold: +1.5V.

Negative Transition Threshold: +1.1V.

Low State Input Current: -1.6 mA @ 0.4V.

High State Input Current: 0.04 mA @ 2.4V.

Maximum Cable Length: 2 meters (6.5 feet) per device connected to the bus: 20 meters (65 feet), total, connected to each interface card.

ENVIRONMENT

The 59310B meets all environmental specifications of the 2100A/S and 21MX Computers for humidity, temperature, altitude, vibration, and shock.

INTERFACE CURRENT

0.1A (-2V), 3A (+4.5V)

WEIGHT

1.82 kg (4 lb).

MEMORY REQUIRED (Words₁₀)

RTE Driver (non-SRQ): < 1000.

RTE Driver (SRQ): < 1200.

RTE Utility Library: < 200.

BCS Driver (Non-DMA): 450.

BCS Driver (DMA): 630.

BCS Utility Library: 264.

BCS Software: 6144.

Software Specifications

DIAGNOSTIC SOFTWARE

The 59310B HP-IB I/O Kit includes a diagnostic routine for quickly confirming correct operation. Options provide for checking DMA or non-DMA operation and looping on specific tests, as communicated via the computer's switch register or system keyboard-display unit. The operator design portion of the diagnostic provides for transfer of data, control, and status to/from individual devices on the bus.

RTE SOFTWARE SUPPORT PACKAGE (OPTION 422)

The 59310B card with option 422 RTE software package meets the specifications of controller subset C26 of IEEE Standard 488-1975. The RTE software package provides driver and utility library software and a manual that support operation in HP's disc-based RTE-II and RTE-III Real-Time Executive systems, as summarized below.

Multi-Bus Operation

The multiprogramming capabilities of the RTE-II and RTE-III systems make possible concurrent control and data transfers via multiple 59310B HP-IB interface cards. Thus, multiple automatic test or lab data acquisition systems can be controlled by a single disc-based computer system.

On-Line Program Development

RTE-II/III multiprogramming also makes it possible to be developing new programs while existing programs are actively controlling and communicating with bus-interfaced devices.

Program Languages

The RTE software package supports programming in HP Real-Time BASIC*, FORTRAN IV/II, and HP Assembly language.

**When the RTE-II/III system is equipped with the Multi-User Real-Time BASIC subsystem.*

On-Line Addition of Bus Devices

The RTE software package supports addition, deletion, or exchanging of HP-IB devices on-line, without regenerating the executive software system.

Programmable Capabilities

The capabilities programmable with the option 422 RTE software package are summarized in Table 1.

Table 1. Programmable Capabilities Provided by the RTE Software Support Package

PROGRAM STATEMENTS		USES
For Real-Time BASIC		
For FORTRAN IV/II		
Device I/O Programming		
x	READ#U:D(1),...D(N)	Reads data digits D(1) through D(N) from HP-IB device U (formatted per FORMAT statement labelled F in FORTRAN program).
x	READ (U,F)D(1),...D(N)	Reads data digits D(1) through D(N) from HP-IB device U (formatted per FORMAT statement labelled F in FORTRAN program).
x	PRINT#U:D(1),...D(N)	Prints or writes data digits D(1) through D(N) to HP-IB device U (formatted per FORMAT statement labelled F in FORTRAN program).
x	WRITE(U,F)D(1),...D(N)	Prints or writes data digits D(1) through D(N) to HP-IB device U (formatted per FORMAT statement labelled F in FORTRAN program).
Device Control Programming		
x	HPIB (U,D,P)	Issues device control request D (clear, EOR, status query, or configuration on/off) to HP-IB device U, using configuration parameter P for configuration "on" request.
x	CALL HPIB (U,D,P)	Issues device control request D (clear, EOR, status query, or configuration on/off) to HP-IB device U, using configuration parameter P for configuration "on" request.
x	SRQ (U,20B,PNAME)	Sets up alarm scheduling of named program PNAME in response to Service ReQuest (SRQ) from HP-IB device U.
x	CALL SRQ (U,20B,PNAME)	Sets up alarm scheduling of named program PNAME in response to Service ReQuest (SRQ) from HP-IB device U.
x	SRQ (U,21B,0)	Disables SRQ alarm program scheduling for HP-IB device U.
x	CALL SRQ (U,21B,0)	Disables SRQ alarm program scheduling for HP-IB device U.
Bus I/O Programming		
x	CMDR (U,C,D)	Issues bus I/O request to write command C and/or read input data D via HP-IB interface card U.
x	CALL CMDR (U,C,D)	Issues bus I/O request to write command C and/or read input data D via HP-IB interface card U.
x	CMDW (U,C,D)	Issues bus I/O request to write command C and/or output data D via HP-IB interface card U.
x	CALL CMDW (U,C,D)	Issues bus I/O request to write command C and/or output data D via HP-IB interface card U.
Bus Control Programming		
x	HPIB (U,R,0)	Issues bus control request R (clear, EOR, status query, configuration clear for all devices, parallel poll, or REN true/false via HP-IB interface card U).
x	CALL HPIB (U,R,0)	Issues bus control request R (clear, EOR, status query, configuration clear for all devices, parallel poll, or REN true/false via HP-IB interface card U).
Error Handling and Status Recovery Programming		
x	E = IBERR(U)	Retrieves device or interface card U error code E.
x	S = IBSTS(U)	Retrieves device or interface card U status byte S.

Automatic Addressing

The RTE driver offers an automatic addressing mode of operation in which it assumes responsibility for all HP-IB bus protocol. This includes control modes and device addressing. In this mode, the user need only be concerned about the data being transferred to, or received from, one of the devices on the bus. Each device is addressed by logical unit number, which is allocated at the time the 59310B and the RTE software are configured into the RTE-II/III operating system.

Direct I/O

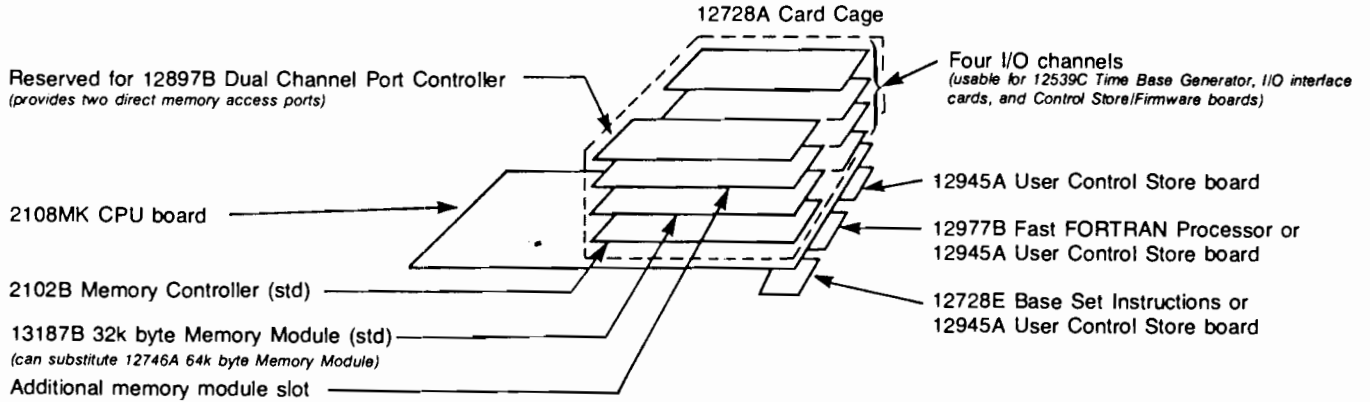
Direct I/O is the other operating mode offered by the RTE driver. This mode gives the user direct access to the HP-IB for special bus manipulation and device access. This mode is used to address multiple listeners or to provide universal or selected device control commands. All command and addressing requirements are under control of the user, who addresses the bus via the 59310B interface card, identified by its own logical unit number.

Vectored Response to Service Requests

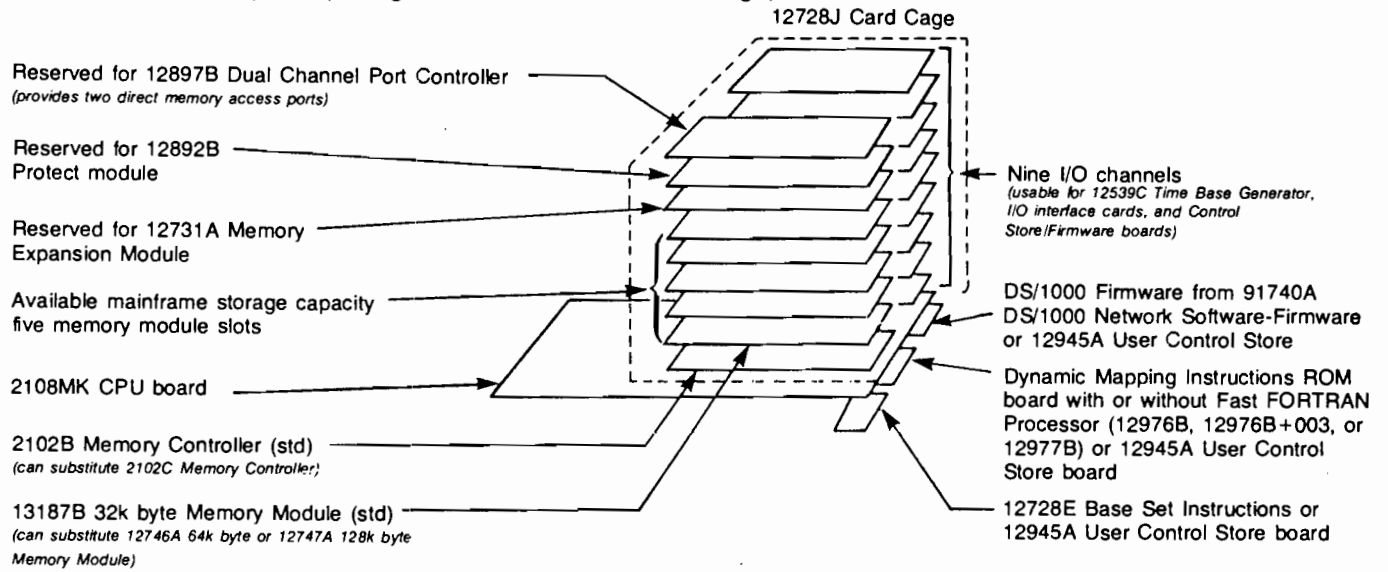
Two versions of RTE driver DVR37 offer a choice of vectored response to service request (SRQ) from a particular bus device(s) or operation without that capability for approximately 20% savings in memory usage. When enabled for an HP-IB device, the SRQ from that device causes

HP 1000 M-Series Board Computers, Computers, Memory Systems, and Accessories

2108MK BoardComputer (configuration with 8-slot card cage)



2108MK BoardComputer (configuration with 18-slot card cage)



MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
---------	-------------	------------	------------	----------------	---------------	-----------------

1. HP 1000 M-SERIES BOARD COMPUTER AND ACCESSORIES

To high volume users, the M-Series Board Computer and selected accessories are available individually for custom assembly in systems. The Board Computer may be used by itself or with 8-slot or 18-slot card cage, the Base Set Instruction ROM board, and/or the standard HP 1000 Computer control panel assembly.

2108MK Processor board with memory controller and 32k bytes of standard performance memory	\$ 2,950d*	n/a	S+T	-1	-12.275A
-014 Deletes memory controller and 32k bytes of memory. If option 014 is selected, at least 32k bytes of memory must be ordered in its place.	-1,635	n/a	Must order alternate memory system (page 8 or 15-17)	+1	+2.775A
12728A (8-slot) Card Cage kit	475d*	n/a	2108MK	+4	+2
12728C Front control panel assembly	325d*	n/a	2108MK		-1.7A
12728D Documentation package	150d*	n/a	2108MK		
12728E Base Set Instructions	350d*	n/a	2108MK		-1.2A
12728J (18-slot) Card Cage kit	625d*	n/a	2108MK	+9	+5

‡ Identifies Monthly Software Support Charge (MSSC)

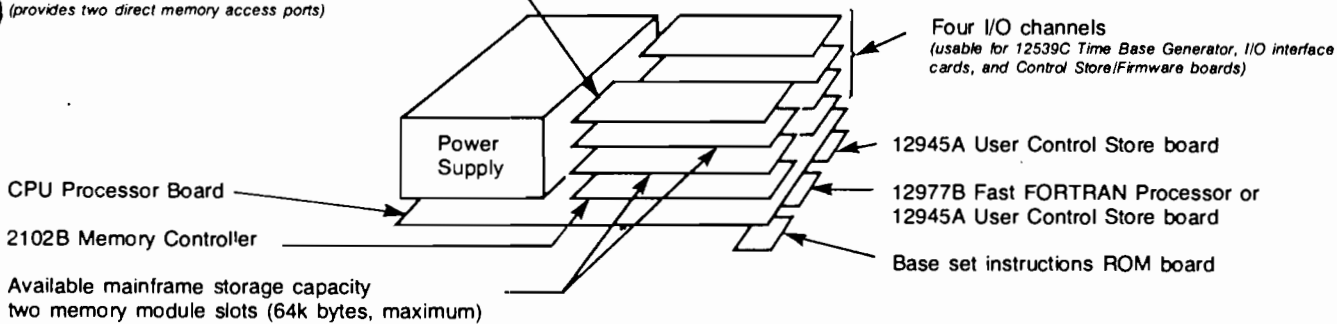
d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

S+T = Software operating system, selected from those listed on page 38 or 41, or written by the user, and terminal and standard input unit (pages 18 and 19) are minimum required for operation.

HP 1000 M-Series Computers

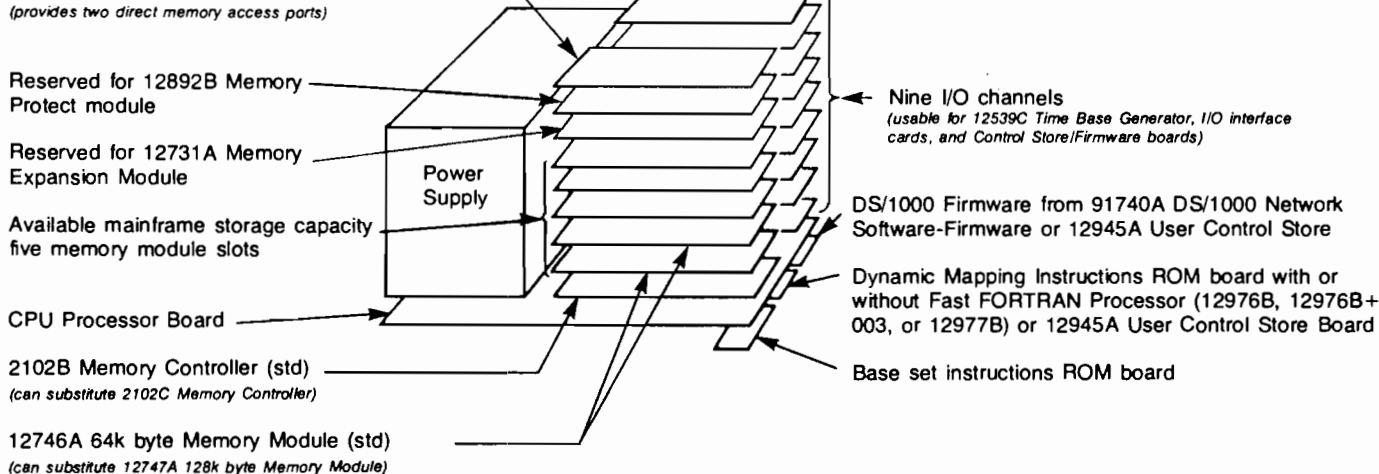
2105A Computer configuration (front view)

Reserved for 12897B Dual Channel Port Controller
(provides two direct memory access ports)



2108M Computer configuration (front view)

Reserved for 12897B Dual Channel Port Controller
(provides two direct memory access ports)



2112M Computer configuration

The 2112M Computer configuration is similar to the 2108M Computer configuration, except that it provides ten memory module slots and fourteen I/O channels and includes the 12786A 128k byte Standard Performance Memory Package, which provides the 12892B Memory Protect and 12731A Memory Expansion modules, the Dynamic Mapping Instructions ROM board, and a 12747A 128k byte Memory Module in place of the 12746A 64k byte Memory Module.



MODEL #	DESCRIPTION	List Price	BMMC/MSSC†	Pre-requisites	Slots I/O	Mem	CPU +5V Current
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2. HP 1000 M-SERIES COMPUTERS

HP 1000 M-Series Computers are microprogrammed machines with 128 standard instructions, including floating point and EAU, full user microprogramming capability, 211 control processor instructions, power fail interrupts, memory parity check, and multi-level vectored interrupt structure. Paper tape and disc loader ROMs are furnished, along with sockets for addition of two other loader ROMs.

2105A*	Computer supporting 2 modules of semiconductor memory and 4 powered I/O channels in 133 mm (5.25 in) panel height.	\$ 5,250d*	\$ 66	S+T & Mem	+4	+2	+12.8A
2108M*	Computer with memory controller and 64k bytes of standard performance memory, using 1 module of a total capacity of 5 memory modules and supporting 9 powered I/O channels in 222 mm (8-3/4 in) panel height.	6,950d*	71	S+T	+9	+4	+37.1A†
-014	Deletes memory controller and 64k bytes of memory. If option 014 is selected, at least 64k bytes of memory must be ordered in its place.	-2,700d*	-21	Must order alternate memory system (page 6 or 15-17)	+1		+1.7A
-300	Computer installed in low profile cabinet.	850	3				

* Option 015 provides operation from 176-264V, 50/60 Hz power at no increase in cost.

Mem = In addition to S+T requirements, the 2105A requires memory (page 15).

† Available +5V current is 5A less at low line voltages (88-95 Vac).

2105B
2112B

5 5300 } Subject to discount but
6200 } NO Functional unit Credit

HP 1000 M-Series Board Computers, Computers, Memory Systems, and Accessories, continued

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	I/O	Slots Mem	CPU +5V †Current
2. HP 1000 M-SERIES COMPUTERS, continued							
2112M*	Computer with memory controller, 128k bytes of standard performance memory, and dynamic mapping system, using 1 module of a total capacity of 10 modules of semiconductor memory and supporting 14 powered I/O channels in 311 mm (12-1/4 in) panel height.	\$9,700d*	\$103	S+T	+14	+9	+30.7A†
-013	Replaces 128k byte memory module and dynamic mapping system with 64k byte memory module.	-1,800 /	-33				+6.4A
-014	Deletes memory controller, 128k bytes of memory, and dynamic mapping system. If option 014 is selected, at least 128k bytes of standard performance memory must be ordered in its place.	-4,500	-53	Must order alternate memory system (below)		+1	+8.1A
-300	Computer installed in low-profile cabinet.	850	3				

3. HP 1000 M-SERIES MEMORY SYSTEMS

Memory systems for HP 1000 M-Series Computers consist of a memory controller and one or more memory modules, which, for memory sizes up to 64k bytes, may be ordered from the components listings on pages 15-17. Fault control requires at least one check bit array board. For 128k byte and larger memory sizes, one of the memory packages, which includes the appropriate memory controller, memory modules, and dynamic mapping system (and check bit array board(s) in fault control packages), must be ordered.

A. STANDARD PERFORMANCE MEMORY PACKAGES

12784A	128k byte Memory package (included in 2112M)	\$ 4,500d*	\$ 53	B		-1	-8.1A
12784B	256k byte Memory package	6,500d*	79	B/C		-2	-8.5A
12784C	512k byte Memory package	11,000d*	131	B/C		-4	-9.5A
12784D	1024k byte Memory package	18,000d*	235	B+J or C		-8	-11.4A

B. STANDARD PERFORMANCE FAULT CONTROL MEMORY PACKAGES

12785A	128k byte Memory package	\$ 5,500d*	\$ 69	B/C		-2	-10.4A
12785B	256k byte Memory package	8,000d*	95	B/C		-3	-10.9A
12785C	512k byte memory package	13,500d*	159	B/C		-5	-11.9A
12785D	1024k byte Memory package	23,000d*	291	B+J or C		-10	-14.1A

4. HP 1000 M-SERIES ACCESSORIES

A. MAINFRAME PLUG-INS

12539C	Time Base Generator	\$ 350d*	\$ 3	A/B/C		-1	-0.8A
12777A	Priority jumper card.	60d*		A/B/C		-1	
12892B	Memory Protect‡	500d*	9	B/C		Ded.	-1.3A
12897B	Dual Channel Port Controller	750d*	8	A/B/C		Ded.	-2.4A
12992C	Terminal Loader ROM	100d*		A/B/C			-0.2A
12992D	Mag Tape Loader Rom	100d*		A/B/C			-0.2A
12992E (9885M)	Flexible disc loader ROM	100d*		A/B/C			-2.2A
12945A	User Control Store 512W	100d*	9	A/B/C		-1	-1.7A
12978A	Writable Control Store 256W	1,000d*	9	A/B/C		-1	-4.6A
13197A	Writable Control Store 1kW (max. of three)	2,000d*	12	A/B/C		-1	-2.2A
12791A	Firmware Expansion Module (max. of one)	500d*	3	A/B/C		-1	-5.4A‡

‡ Identifies Monthly Software Support Charge (MSSC)

A = 2105A; B = 2108M+014 or 2108MK+014 with 12728J Card Cage; C = 2112M+014; J = 12990B.

S+T = Software operating system, selected from those listed on page 38 or 41, or written by the user, and terminal and standard input unit (pages 18 and 19) are minimum required for operation.

† +5V current requirements listed assume operation in 2105A, 2108M, or 2112M Computer with power fail recovery system; requirements will be greater for use in those computers without power fail recovery system or for use with 2108MK Board Computer. For more information, see the Power Specifications tables in the rear of the HP 1000 Computers Hardware Data book and in the 2108MK, 2109EK Board Computer data sheet in that data book.

* Option 015 provides operation from 176-264V, 50/60 Hz power at no increase in cost.

d* Identifies discountable price for product that is eligible for Computer OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

† Available +5V current is 5A less at low line voltages (88-95 Vac).

‡ Base requirement is 1.2A plus 0.525A for each set of 3 ROMs installed on the module (max. of eight sets).

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
4. HP 1000 M-SERIES ACCESSORIES, continued						
B. FIRMWARE PRODUCTS						
12977B	M-Series Fast FORTRAN Processor	\$ 950d*	\$ 10	A/B/C		-3.6A
C. POWER FAIL RECOVERY SYSTEMS						
12944A	Power Fail Recovery System for 2105A	\$ 600	\$ 3	A		
12944B	Power Fail Recovery System for 2108M	700d*	5	B		
12991B	Power Fail Recovery System for 2112M or 12990B	800d*	5	C/J		
D. RACK MOUNTING HARDWARE						
12903A	Rack Slides for 2105A	\$ 70d*		A		
12903B	Rack Slides for 2108M, 12979B, or 12990B	150d*		B/I/J		
12903C	Rack Slides for 2112M	150d*		C		
E. EXTENDERS						
12979B*	Dual-Port I/O Extender, adds 16 fully-powered I/O slots. 222 mm (8-3/4 in) panel height. Up to two I/O Extenders may be added.	\$ 4,500d*	\$ 12	A/B/C	+16	-2.0A
12898A	DCPC for I/O Extender	350d*	11	12979B & 12897B		
12781A	Dual CPU Kit, provides for connection of second HP 1000 M-Series Computer to 12979B.	700d*	0	B/C/I		-2.0A
12990B*	Memory Extender, adds 9 fully-powered Memory Module slots. 222 mm (8-3/4 in) panel height.	4,500d*	6	C or 12976B or 12784/5D	+9	

‡ 12892B module is included in the 2112M Computer and in the 12784A/B/C/D and 12785A/B/C/D Memory Packages.

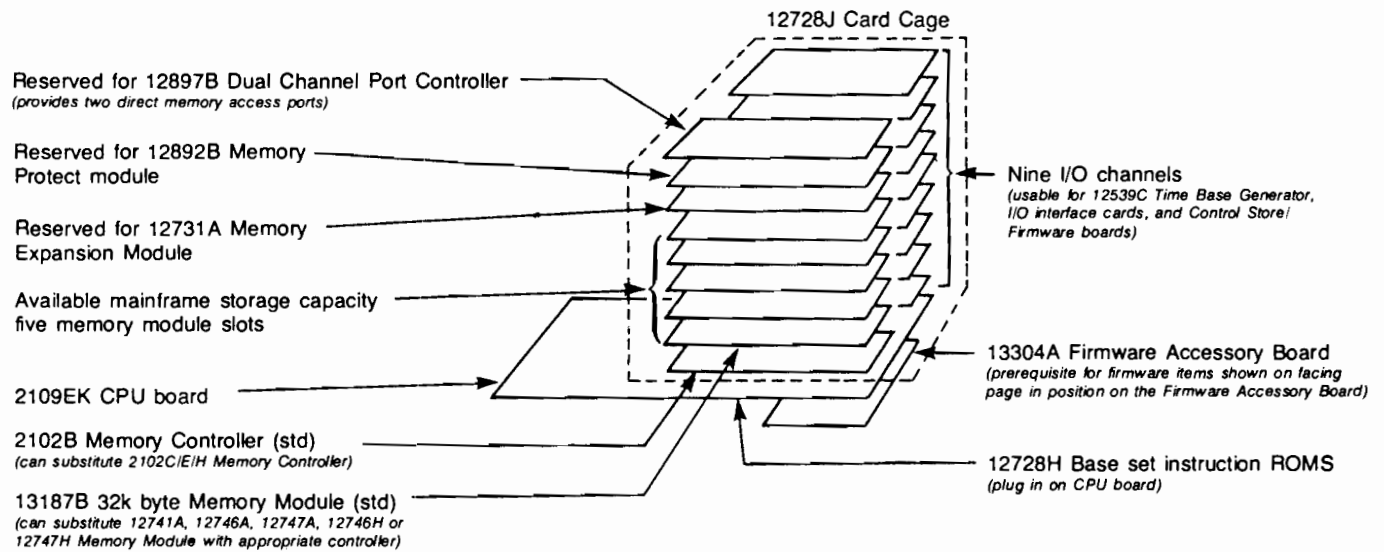
d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; I = 12979B; J = 12990B.

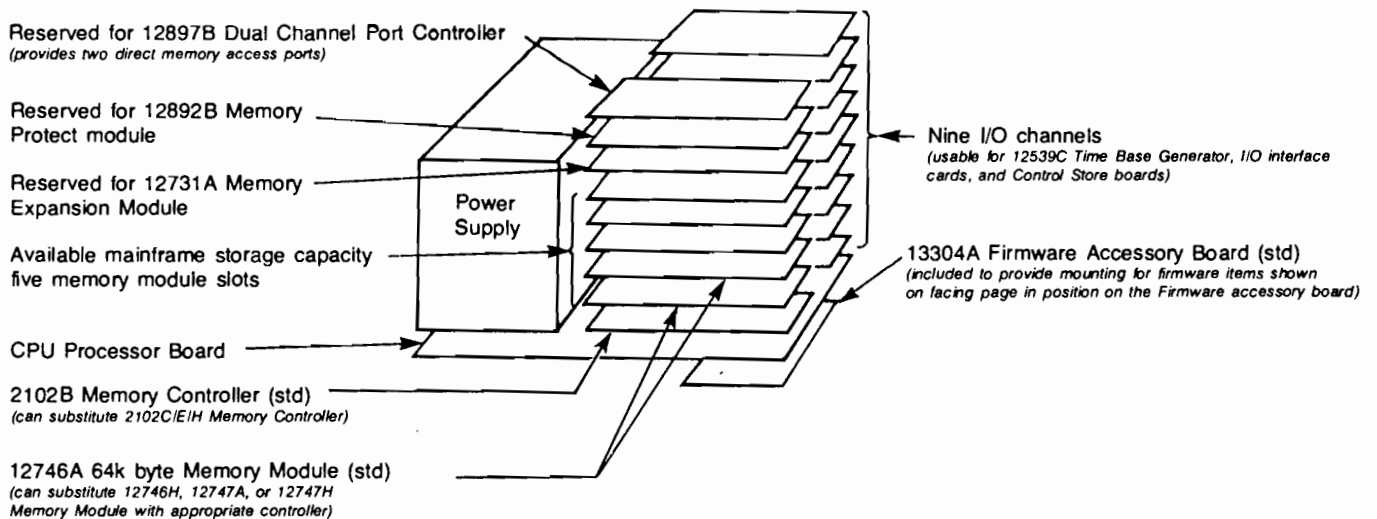
* Option 015 provides operation from 176-264V, 50/60 Hz power at no increase in cost.

HP 1000 E-Series Computers

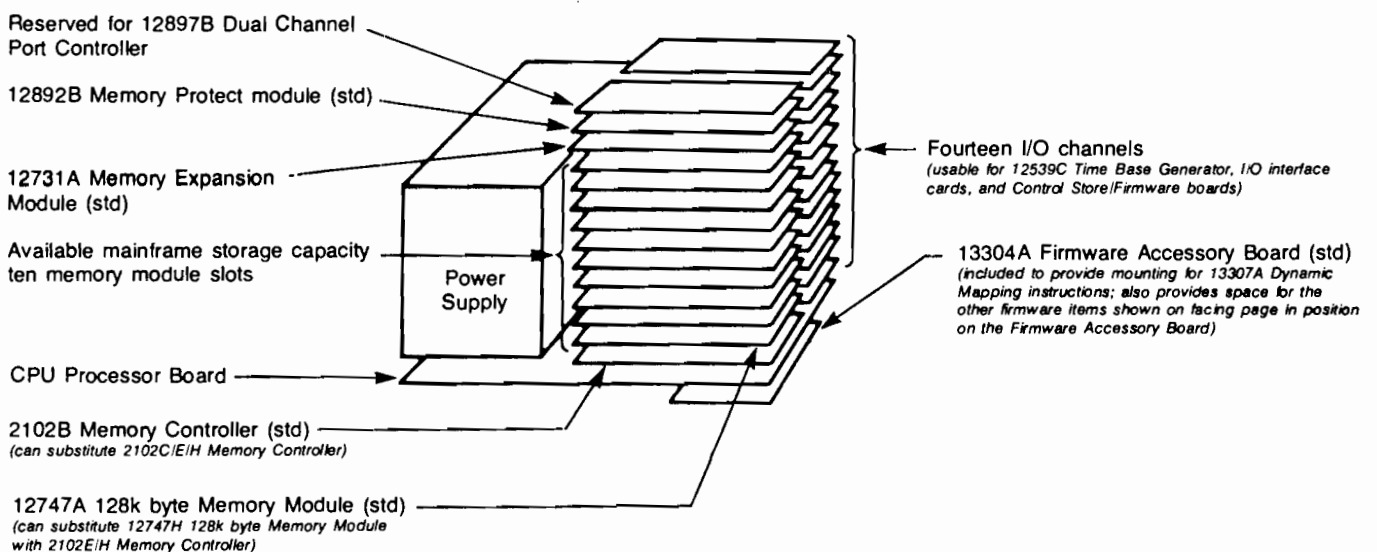
2109EK BoardComputer (configuration with 18-slot card cage)



2109E Computer configuration (front view)



2113E Computer configuration (front view)



HP 1000 E-Series Board Computers, Computers, Memory Systems, and Accessories

MODEL #	DESCRIPTION	List Price	BMMC/MSSC†	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. HP 1000 E-SERIES BOARD COMPUTERS AND ACCESSORIES						
To high volume users, the E-Series Board Computer and selected accessories are available individually for custom assembly in systems. The Board Computer may be used by itself or with an 18-slot card cage, the Base Set Instruction ROMs, and/or the standard HP 1000 Computer control panel assembly; the 2109EK is approximately twice as powerful as the 2108MK Board Computer.						
2109EK	Processor board with memory controller and 32k bytes of standard performance memory.	\$ 3,450d*	n/a	S+T	-1	-12.3A
-014	Deletes memory controller and 32k bytes of memory. If option 014 is selected, at least 32k bytes of memory must be ordered in its place.	-1,635	n/a	Must order alternate memory system (page 10)	+1	+2.8A
12728F	Documentation package	150d*	n/a	2109EK		
12728G	Front control panel assembly	325d*	n/a	2109EK		-1.5A
12728H	Base Set instruction ROMs	350d*	n/a	2109EK		
12728J	18-slot Card Cage kit	625d*	n/a	2109EK	+9 +5	

2. HP 1000 E-SERIES COMPUTERS

HP 1000 E-Series Computers are microprogrammed machines with 128 standard instructions, including floating point and EAU, full user microprogramming capability, 211 control processor instructions, power fail interrupts, memory parity check, and multilevel vectored interrupt structure. Faster components and variable microcycle timing make these machines approximately twice as fast as the HP 1000 M-Series Computers. They have four times the control store capacity of the M-Series. Paper tape and 7900/7905/7906/7920/7925 Disc loader ROMs are included, along with sockets for addition of two other loader ROMs.

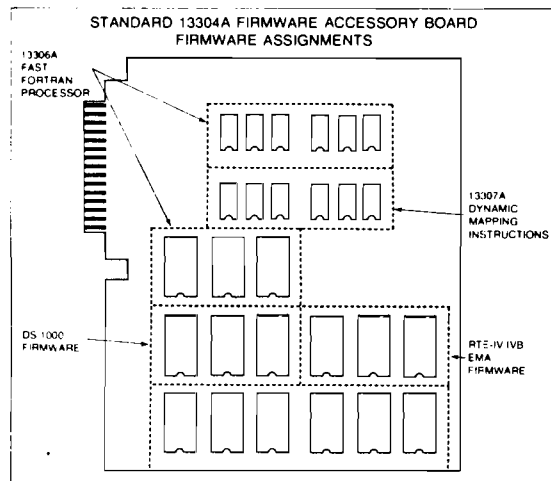
2109E*	Computer with memory controller and 64k bytes of standard performance memory, using 1 module of a total capacity of 5 modules of semiconductor memory and supporting 9 powered I/O channels in 222 mm (8-3/4 in) panel height. Also includes firmware accessory board.	\$ 8,700d*	\$ 74	S+T	+9 +4	+35.3A†
-012	64k bytes of high performance memory instead of standard performance memory.	650				-1.4A
-014	Deletes memory controller and 64k bytes of memory. If option 014 is selected, at least 64k bytes of memory must be ordered in its place (see page 10 or 15-17).	-2,700d*	-21	Must order alternate memory system (page 10 or 15-17)	+1	+2.7
-300	Computer installed in low-profile cabinet.	850	3			

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

S+T = Software operating system, selected from those listed on page 38 or 41, or written by the user, and terminal and standard input unit (pages 18 and 19) are minimum required for operation.

* Option 015 provides operation from 176-264V, 50/60 Hz power at no increase in cost.

† Available +5V current is 5A less at low line voltage (88-95 Vac).



HP 1000 E-Series Board Computers, Computers, Memory Systems, and Accessories, continued

MODEL #	DESCRIPTION	List Price	BMMC/MSSC†	Pre-requisites	Slots I/O Mem	CPU +5V ‡ Current
2. HP 1000 E-SERIES COMPUTERS, continued						
2113E*	Computer with memory controller, 128k bytes of standard performance memory, and dynamic mapping system, using 1 module of a total capacity of 10 modules of semiconductor memory and supporting 14 powered I/O channels in 311 mm (12-1/4 in) panel height. Also includes Firmware accessory board.	\$11,000d*	\$103	S+T	+14 +9	+30.1A†
-012	64k bytes of high performance memory instead of 128k bytes of standard performance memory (deletes dynamic mapping system).	-1,100	-31			+3.8A
-013	Deletes 64k bytes of memory and dynamic mapping system.	-1,800	-31			+5.2A
-014	Deletes memory controller, 128k bytes of memory, and dynamic mapping system. If option 014 is selected, at least 128k bytes of memory must be ordered in its place (see listing below).	-4,500	-50	Must order alternate memory system below	+1	+6.9A
-300	Computer installed in low-profile cabinet.	850	3			

3. HP 1000 E-SERIES MEMORY SYSTEMS

Memory systems for HP 1000 E-Series Computers consist of a memory controller and one or more memory modules which, for memory sizes up to 64k bytes, may be ordered from the components listings on pages 15-17. Fault control requires at least one check bit array board. For 128k byte and larger memory sizes, one of the memory packages, which includes the appropriate memory controller, memory modules, and dynamic mapping system (and check bit array board(s) in fault control packages) must be ordered.

A. STANDARD PERFORMANCE MEMORY PACKAGES

12786A	128k byte Memory package	\$ 4,500d*	\$ 50	D	-1	-6.9A
12786B	256k byte Memory package	6,500d*	76	D/E	-2	-7.3A
12786C	512k byte Memory package	11,000d*	128	D/E	-4	8.3A
12786D	1024k byte Memory package	18,000d*	232	D+J or E	-8	-10.2A

B. STANDARD PERFORMANCE FAULT CONTROL MEMORY PACKAGES

12787A	128k byte Memory package	\$ 5,500d*	\$ 66	D/E	-2	-9.2A
12787B	256k byte Memory package	8,000d*	92	D/E	-3	-9.7A
12787C	512k byte Memory package	13,500d*	156	D/E	-5	-10.7A
12787D	1024k byte Memory package	23,000d*	288	D+J or E	-10	-12.9A

C. HIGH PERFORMANCE MEMORY PACKAGES

12788A	128k byte Memory package	\$ 5,500d*	\$ 50	D/E	-1	-8.2A
12788B	256k byte Memory package	7,500d*	76	D/E	-2	-8.7A
12788C	512k byte Memory package	13,000d*	128	D/E	-4	-9.7A
12788D	1024k byte Memory package	22,000d*	232	D+J or E	-8	-11.6A

D. HIGH PERFORMANCE FAULT CONTROL MEMORY PACKAGES

12789A	128k byte Memory package	\$ 6,500d*	\$ 66	D/E	-2	-9.2A
12789B	256k byte Memory package	9,000d*	92	D/E	-3	-9.7A
12789C	512k byte Memory package	16,000d*	156	D/E	-5	-10.7A
12789D	1024k byte Memory	26,000d*	288	D+J or E	-10	-12.9A

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

† Identifies Monthly Software Support Charge (MSSC).

‡ +5V current requirements listed assume operation in 2109E or 2113E Computer with power fail recovery system; requirements will be greater for use in those computers without power fail recovery system or for use with 2109EK Board Computer. For more information, see the Power Specifications tables in the rear of the HP 1000 Computers Hardware Data book and in the 2108MK, 2109EK Board Computer data sheet in that data book.

D = 2109E +014 or 2109EK +014 with 12728J Card Cage; E = 2113E +014; J = 12990B.

MODEL #	DESCRIPTION	List Price	BMMC/ MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
4. HP 1000 E-SERIES ACCESSORIES						
A. MAINFRAME PLUG-INS						
12539C	Time Base Generator	\$ 350d*	\$ 3	D/E	-1	-0.8A
12777A	Priority jumper card	60d*		D/E	-1	
12892B	Memory Protect‡	500d*	9	D	Ded.	-1.3A
12897B	Dual Channel Port Controller	750d*	8	D/E	Ded.	-2.4A
12992B	Disc Loader ROM (7905/7906/7920) for RPL compatibility	100d*		D/E		-0.2A
12992C	Terminal Loader ROM	100d*		D/E		-0.2A
12992D	Mag Tape Loader ROM	100d*		D/E		-0.2A
12992E	(9885M) Flexible disc loader ROM	100d*		D/E		-0.2A
12992F	Disc Loader ROM (7900) for RPL compatibility	100d*		D/E		-0.2A
13304A	E-Series Firmware Accessory Board (included in 2109 & 2113E)	400d*	3	2109EK		-1.8A
13197A	Writable Control Store 1KW (max. of three)	2,000d*	12	D/E	-1	-2.2A
12791A	Firmware Expansion Module (max. of two)	500d*	3	D/E	-1	-5.4A§
B. FIRMWARE AND SUBSCRIPTION SERVICE PRODUCTS						
13306A	E-Series Fast FORTRAN Processor	\$ 650d*	\$ 5	13304A/12791A		
13306S	Firmware Subscription Service for 13306A E-Series Fast FORTRAN Processor.		10‡	13306A		
C. POWER FAIL RECOVERY SYSTEMS						
12944B	Power Fail Recovery System for 2109E	\$ 700d*	\$ 5	D		
12991B	Power Fail Recovery System for 2113E/12990B	800d*	5	E/J		
D. RACK MOUNTING HARDWARE						
12903B	Rack Slides for 2109E/12979B/12990B	\$ 150d*		D/VJ		
12903C	Rack Slides for 2113E	150d*		E		
E. EXTENDERS						
12979B*	Dual-Port I/O Extender, adds 16 fully-powered I/O slots. 222 mm, (8-3/4 in) panel height. Up to two I/O Extenders may be added.	\$ 4,500	\$ 12	D/E	+16	-2.0A
12898A	DCPC for I/O Extender	350	11	12979B & 12897B		
12781A	Dual CPU Kit, provides for connection of second HP 1000 E-Series Computer to 12979B.	700		D/E & I		-2.0A
12990B*	Memory Extender, adds 9 fully-powered Memory Module slots. 222 mm (3-3/4 in) panel height	4,500	6	E or 13305A or 12786/7/8/9D	+9	

‡ Identifies Monthly Software Support Charge (MSSC).

‡ 12892B module is included in the 2113E Computer and in the 12786A/B/C/D, 12787A/B/C/D, 12788A/B/C/D, and 12789A/B/C/D Memory packages.

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

D = 2109E or 2109EK with 12728J Card Cage; E = 2113E; I = 12979B; J = 12990G.

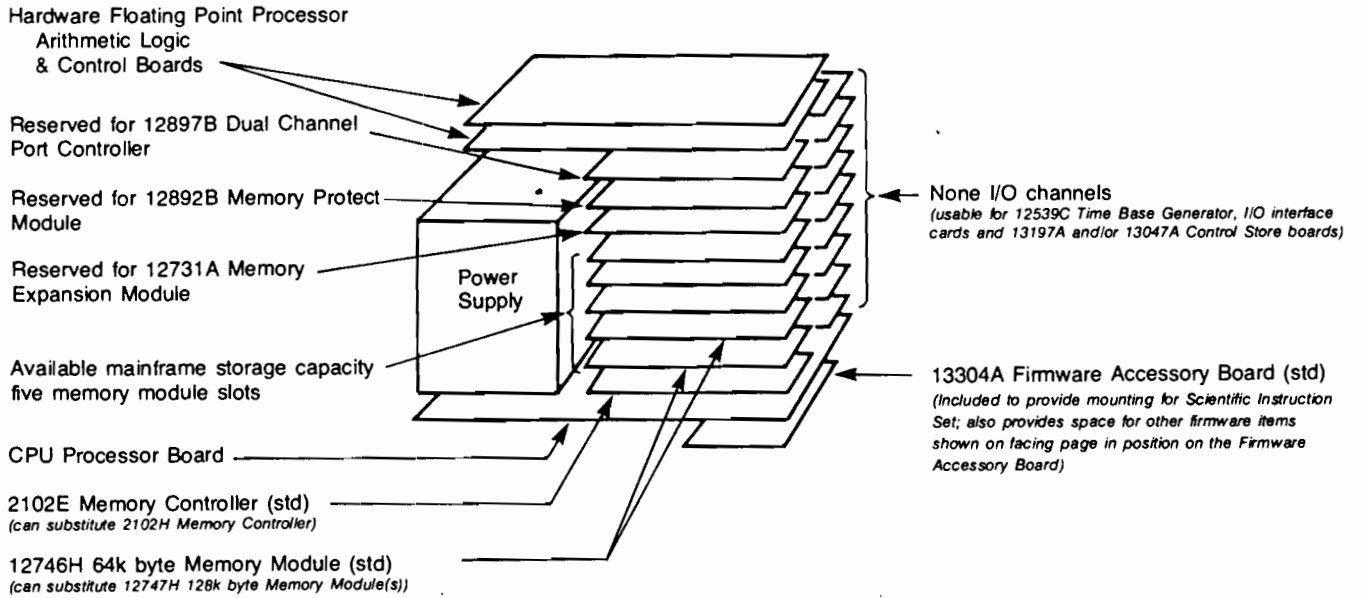
§ Fully loaded; base requirement is 1.2A plus 0.525A for each set of 3 ROMs installed on the module (max. of 8 sets).

* Option 015 provides operation from 176-264V, 50/60 Hz power at no increase in cost.

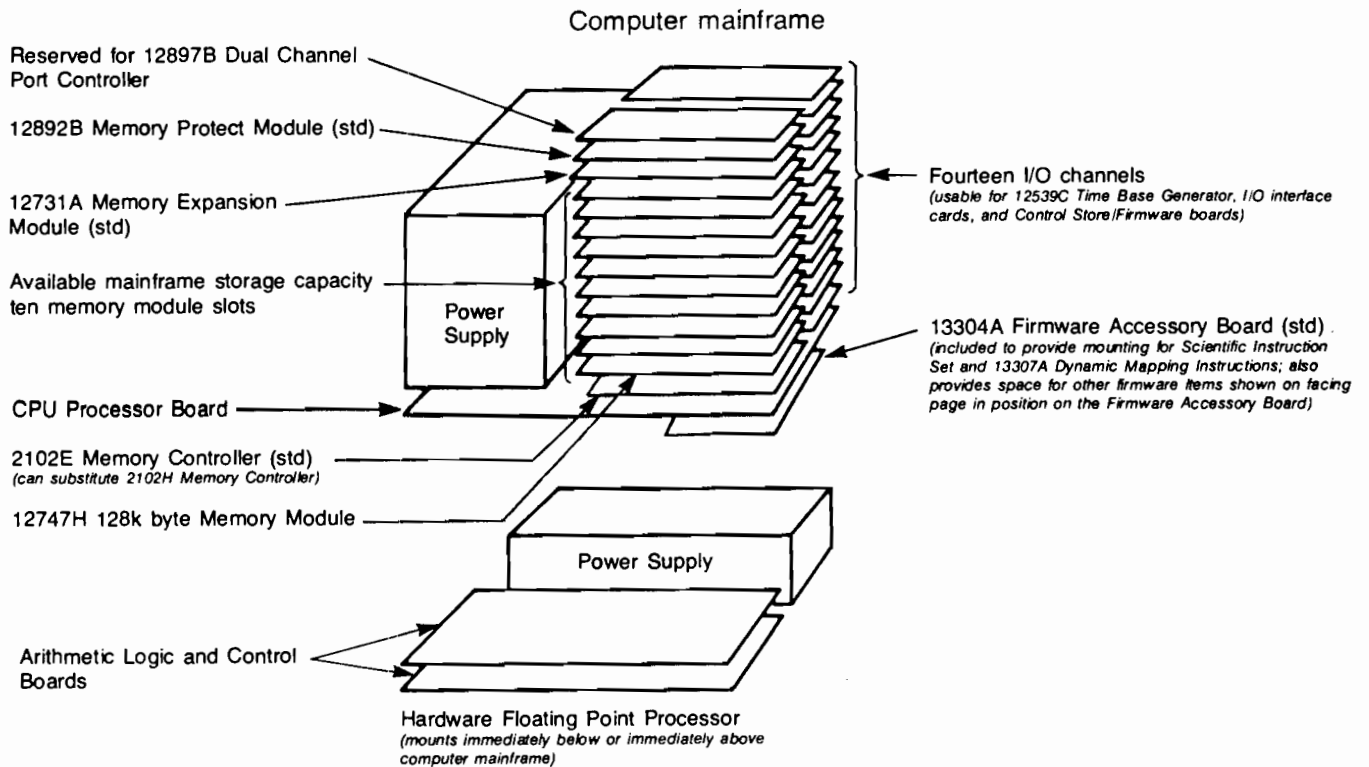


HP 1000 F-Series Computers

2111F Computer configuration (front view)



2117F Computer configuration (front view)



HP 1000 F-Series Computers, Memory Systems, and Accessories

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V †Current
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1. HP 1000 F-SERIES COMPUTERS AND FIRMWARE SUBSCRIPTION SERVICE

HP 1000 F-Series Computers are microprogrammed machines with 162 standard instructions, including single, extended, and double precision floating point, nine transcendental functions, and FORTRAN accelerator instructions of the Fast FORTRAN Processor. The added speed, power, and accuracy of its hardware-based Floating Point Processor, Scientific Instruction Set, polynomial instruction, and Fast FORTRAN Processor makes the F-Series the most capable HP 1000 Computer. EAU, full microprogramming capability, 211 control processor instructions, power fail interrupts, memory parity check, and multilevel interrupt structure are shared with the rest of the HP 1000 Computer family. Faster components, variable microcycle timing, and 16k word control store address space are design features shared with the HP 1000 E-Series.

2111F* Computer with memory controller and 64k bytes of High performance memory, using 1 module of a total capacity of 5 memory modules and supporting 9 powered I/O channels in 311 mm (12-1/4 in) panel height. Also includes firmware accessory board.	\$11,750d*	\$102	S+T	+9	+4	+22.4A†
-014 Deletes memory controller and 64k bytes of memory. If option 014 is selected, at least 64k bytes of high performance memory must be ordered in its place.	-3,350	-27	Must order alternate memory system (pages 14 or 15-17)		+1	+3.1A
-300 Computer installed in low profile cabinet	850	3				
2117F* Computer with memory controller, 128k bytes of High performance memory, and dynamic mapping system, using 1 module of a total capacity of 10 memory modules and supporting 14 powered I/O channels in 445 mm (17-1/2 in) panel height. Also includes firmware accessory board.	15,000d*	130	S+T	+14	+9	+28.8A†
-014 Deletes memory controller, 128k bytes of memory, and dynamic mapping system. If option 014 is selected, at least 128k bytes of high performance memory must be ordered in its place.	-5,500	-50	Must order alternate memory system page 14		+1	+8.2A
-301 Computer installed in low profile cabinet with 115V power module.	1,000	3				
-302 Computer installed in low profile cabinet with 230V power module.	1,000	3				
12823S Firmware Subscription Service for HP 1000 F-Series Dynamic Mapping Instructions, Scientific Instruction Set, and Fast FORTRAN Processor		32‡	2111F/2117F			

2. HP 1000 F-SERIES MEMORY SYSTEMS

A. HIGH PERFORMANCE MEMORY PACKAGES

12788A 128k byte Memory package	\$ 5,500d*	\$ 50	F	-1	-8.2A
12788B 256k byte Memory package	7,500d*	76	F/G	-2	-8.7A
12788C 512k byte Memory package	13,000d*	128	F/G	-4	-9.7A
12788D 1024k byte Memory package	22,000d*	232	F+J or G	-8	-11.6A

‡ Identifies Monthly Software Support Charge (MSSC).

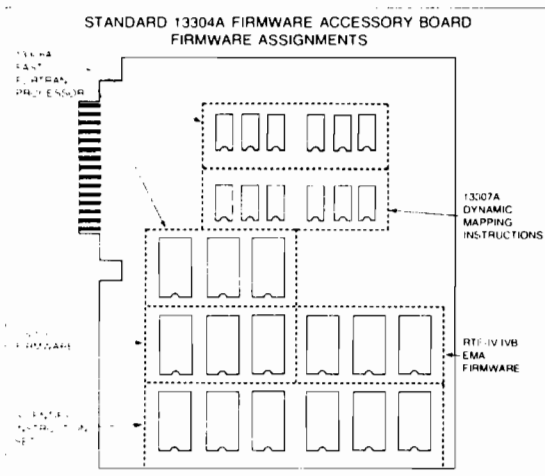
† +5V current requirements listed assume operation in 2111F, or 2117F Computer with power fail recovery system; requirements will be greater for use in those computers without power fail recovery system. For more information, see the Power Specifications tables in the rear of the HP 1000 Computers Hardware Data book.

* Option 015 provides operation from 198-264V 50/60 Hz power at no increase in cost.

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

S+T = Software operating system, selected from those listed on page 38 or 41, or written by the user, and terminal and standard input unit (pages 18 and 19) are minimum required for operation; F = 2111F+014; G = 2117F+014; J = 12990B.

† Available +5V current is 5A less at low line voltage (88-95 Vac).



HP 1000 F-Series Computers, Memory Systems, and Accessories, continued

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	I/O Slots Mem	CPU +5V Current
2. HP 1000 F-SERIES MEMORY SYSTEMS continued						
B. HIGH PERFORMANCE FAULT CONTROL MEMORY PACKAGES						
12789A	128k byte Memory package	\$ 6,500d*	\$ 66	F/G	-2	-9.2A
12789B	256k byte Memory package	9,000d*	92	F/G	-3	-9.7A
12789C	512k byte Memory package	16,000d*	156	F/G	-5	-10.7A
12789D	1024k byte Memory package	26,000d*	288	F+J or G	-10	-12.9A
3. HP 1000 F-SERIES ACCESSORIES						
A. MAINFRAME PLUG-INS						
12539C	Time Base Generator	\$ 350d*	\$ 3	F/G	-1	-0.8A
12777A	Priority Jumper card	60d*		F/G	-1	
12892B	Memory Protect‡	500d*	9	F	Ded.	-1.3A
12897B	Dual Channel Port Controller	750d*	8	F/G	Ded.	-2.4A
12992B	Disc Loader ROM (7905/7906/7920) for RPL compatibility.	100d*		F/G		-0.2A
12992C	Terminal Loader ROM	100d*		F/G		-0.2A
12992D	Mag Tape Loader ROM	100d*		F/G		-0.2A
12992E	(9885M) Flexible disc loader ROM	100d*		F/G		-0.2A
12992F	Disc Loader ROM (7900A) for RPL compatibility	100d*				-0.2A
12791A	Firmware Expansion Module	500d*	3		-1	-5.4A§
13197A	Writable Control Store 1KW (max. of three)	2,000d*	12	F/G	-1	-2.2A
B. FIRMWARE AND SUBSCRIPTION SERVICE PRODUCTS						
12824A	Vector Instruction Set (uses 1KW of control store)	\$ 1,500	\$ 5	F/G & 12791A		
12824S	Firmware Subscription Service for 12824A Vector Instruction Set		20‡	12824A		
C. POWER FAIL RECOVERY SYSTEMS						
12991B	Power Fail Recovery System for 2111F/2117F/12990B	\$ 800d*	\$ 5	F/G		
D. RACK MOUNTING HARDWARE						
12903B	Rack Slides for 12979B/12990B	\$ 150d*		I/J		
12903C	Rack Slides for 2111F/2117F	150d*		F/G		
E. EXTENDERS						
12979B*	Dual-Port I/O Extender, adds 16 fully-powered I/O slots. 222 mm, (8-3/4 in) panel height. Up to two I/O Extenders may be added.	\$ 4,500d*	\$ 12	F/G	+16	-2.0A
12898A	DCPC for I/O Extender	350d*	11	12979B & 12897B		
12781A	Dual CPU Kit, provides for connection of second HP 1000 F-Series Computer to 12979B.	700d*		F/G & I		-2.0A
12990B*	Memory Extender, adds 9 fully-powered Memory Module slots. 222 mm (8-3/4 in) panel height.	4,500d*	6	F or 13305A or 12788/9D	+9	

‡ Identifies Monthly Software Support Charge (MSSC).

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

F = 2111F; G = 2117F; I = 12979B; J = 12990B.

‡ 12731A and 12892B modules are included in the 13305A Dynamic Mapping System, which is itself included in the 2117F Computer and in the 12788A/B/C/D and 12789A/B/C/D Memory packages.

§ Fully loaded; base requirement is 1.2A plus 0.525A for each set of 3 ROMs installed on the module (max. of 8 sets).

* Option 015 provides operation from 176-264V, 50/60 Hz power at no increase in cost.

Memory additions and configuration changes



Additions and changes involving no more than 64k bytes of memory

New memory for HP 2105A Computer

The HP 2105A Computer has slots for a memory controller and two memory modules, which can provide up to 64k bytes of parity memory, as summarized below.

Controller model	2102B
32k byte memory module	13187B*
64k byte memory module	12746A*

*The 13187B and 12746A as listed here are alternatives; order 13187B if only 32k bytes is needed, 12746A to provide 64k bytes.

Change from standard performance memory to high performance memory in 2109A/B/E or 2113A/B/E

To make this change involves the replacement of the entire memory system (controller and memory modules). The new items are summarized as follows:

Controller model	2102E
32k byte memory module	12741A*
64k byte memory module	12746H*

*The 12741A and 12746H as listed here are alternatives; order 12741A if only 32k bytes is needed, 12746H to provide 64k bytes.

Additions to memory.

Within the 64k byte limitation, memory can be added in 32k byte increments, using the 13187B module for standard performance memory, the 12741A module for high performance memory.

Addition of memory protect

All Hewlett-Packard RTE software operating systems require the 12892B Memory protect module (except RTE-B and the RTE-MI configuration of RTE-M). The 12892B is included in all 1278xA/B/C/D memory packages and may also be ordered separately.

Memory components for additions or changes resulting in a maximum of 64k bytes of memory

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. STANDARD PERFORMANCE MEMORY COMPONENTS						
2102B	Memory controller for parity memory.	\$ 700d*	\$ 7	2105A	Ded.	-1.2A
13187B	32k byte memory module.	1,400d* →	7	2102A/B/C	-1	-0.5A
12746A	64k byte memory module.	2,000d*	7	2102B/C	-1	-0.5A
2. HIGH PERFORMANCE MEMORY COMPONENTS						
2102E	Memory controller for parity memory.	\$ 850d*	\$ 7	D/E	Ded.	-2.6A
12741A	32k byte memory module.	1,800d*	10	2102E/H	-1	-0.5A
12746H	64k byte memory module.	2,500d*	7	2102E/H	-1	-0.5A
3. MEMORY PROTECT						
12892B	Memory protect module.	\$ 500d*	\$ 9	B/C/D/E/F	Ded.	-1.3A

A = 2105A or 2108MK with 12728A card cage; B = 2108A/BIM or 2108K/IMK with 12728J card cage; C = 2112A/BIM; D = 2109A/B/E or 2109EK with 12728J card cage; E = 2113A/B/E; F = 2111F.

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

Additions and changes involving more than 64k bytes of total memory

Prerequisite for addressing more than 64k bytes of total memory

The Dynamic Mapping System (DMS) is required for addressing memory in excess of 64k bytes. The DMS used differs with computer models as follows:

	M-Series Computers Use	E/F-Series Computers Use
Dynamic Mapping System (DMS)	12976B	13305A
The DMS consists of:		
Dynamic Mapping Instructions	12778B	13307A
Memory Expansion Module	12731A	12731A
Memory Protect Module	12892B	12892B

If you don't already have the DMS, you can obtain it in any of these three ways:

1. Order the complete system directly, as the 12976B or 13305A product.
2. If you already have the 12892B Memory Protect module, order the remaining components needed to make up the DMS (12731A and 12778B or 13307A).
3. Order one of the 1278xA-D Memory Packages that are listed on pages 6, 10, 13, and 14, which all include the DMS that is appropriate to the computer models they're listed with, as well as the appropriate memory controller and memory module(s).

Memory additions and configuration changes, continued

Maximum computer memory capacities

The HP 1000 Computers that can use more than 64k bytes of memory have 5 or 10 memory module slots, which can be used for either memory modules or fault control check bit array boards. These capacities can be expanded by adding the 9 memory module slots provided by the 12990B Memory Extender. Maximum capacities, based on use of 128k byte memory modules, are listed by model numbers below.

Computer/card cage/extender models	Memory Module Slots	Maximum Parity Memory	Maximum Fault Control Memory
2108A/B/M, 2109A/B/E, 2111F, 12728J	5	640kb	512kb
2112A/B/M, 2113A/B/E, 2117F	10	1280kb	1024kb
12990B Memory Extender	9	1152kb*	768kb

*Dynamic mapping system addressing capacity limits total computer memory capacity to 2048k bytes, including memory in the extender.

Additions to parity memory

32k byte, 64k byte, and 128k byte memory modules can all be used together in the same computer to provide any specific 32k byte multiple of memory up to 480k bytes in a computer with 5 memory slots, 1120k bytes in a computer with 10 memory slots. However, because each memory module uses 1 memory slot regardless of its capacity, it is desirable to add memory in 128k byte increments to maximize use of the computer's memory module slot capacity, even if that might give you more memory than you need now.

Change from standard performance memory to high performance memory in 2109A/B/E or 2113A/B/E

To make this change involves the replacement of the memory controller and memory modules with the 2102E High Performance Memory Controller and 12747H (128k byte), 12746H (64k byte), or 12741A (32k byte) High Performance Memory Modules.

Change from parity memory to fault control memory

This change involves the replacement of the 2102B/E Memory controller with a 2102C (standard performance) or 2102H (high performance) fault control memory controller and the addition of appropriate fault control check bit array boards, 12779A and/or 12780A for standard performance fault control memory, 12779H and/or 12780H for high performance fault control memory. For determining the appropriate combination of 12747A (standard performance) or 12747H (high performance) 128k byte memory modules and 12789A/H and/or 12780A/H check bit array boards, refer to the fault control memory configurations and additions worksheet table, at right.

Fault control memory additions

Additions to fault control memory are most easily determined by reference to the fault control memory configurations and memory additions worksheet table, at right. As shown in the "sample memory additions calculation" section, you use the space for "your memory additions calculation" to:

1. Note the memory size you want to expand to (A. Memory desired).
2. Note the amount of fault control memory you now have (B. Memory on hand).
3. For each of these memory sizes, A and B, transcribe the 12747A/H memory module and 12779A/H and/or 12780A/H check bit board quantities required.
4. Subtract the memory on hand requirements from the memory desired requirements (A-B) to determine the number of each additional component that must be ordered.
5. Order these along with the 12990B Memory extender if it will be needed to accommodate the desired amount of memory.

Fault control memory configurations and memory additions worksheet

Fault control memory sizes and description	12747A/H 128kb Memory Module*	12779A/H 256kb Check bit Bd	12780A/H 512kb Check bit Bd
128k bytes (orderable as 12785A/87A/89A)	1	1	
256k bytes (orderable as 12785B/87B/89B)	2	1	
384k bytes	3	2	0
512k bytes (orderable as 12785C/87C/89C)	4		1
640k bytes†	5	1	1
768k bytes†	6	1	1
896k bytes†	7	2	1
1024k bytes (orderable as 12785D/87D/89D)†	8	0	2
1152k bytes (12990B required)	9	1	2
1280k bytes (12990B required)	10	1	2
1408k bytes‡	11	2	2
1536k bytes‡	12	0	3
1664k bytes‡	13	1	3
1792k bytes‡	14	1	3

SAMPLE MEMORY ADDITIONS CALCULATION

A. Memory desired = 896 k bytes	7	2	1
B. Memory on hand = 512 k bytes	4		1
Quantities of each type of components to be added (A-B)	3	2	

YOUR MEMORY ADDITIONS CALCULATION

(Transcribe component quantities)

A. Memory desired = _____ k bytes	_____	_____	_____
B. Memory on hand = _____ k bytes	_____	_____	_____

Quantities of each type of components to be added (A-B) _____

*NOTE: Two 12746A/H 64k byte memory modules can be used in place of one of the 12747A/H 128k byte memory modules; however that will reduce the memory capacity of the computer because more memory slots are required for a given number of bytes of memory. HP 13187B or 12741A 32k byte Memory modules can also be used to form 128k byte blocks of memory, but at the cost of seriously reducing the maximum memory capacity available, since 128k bytes made up of 32k byte memory modules takes four memory module slots instead of one.

† 12990B is required with 2108, 2109, or 2111 Computer to accommodate this amount of fault control memory.

‡ This amount of fault control memory exceeds capacity of 2108, 2109, or 2111 Computer, even with the 12990B extender.

Memory components for additions or changes resulting in more than 64k bytes of memory

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. DYNAMIC MAPPING SYSTEM						
12976B	Dynamic Mapping System for HP 1000 M-Series Computers. -003 Adds Fast FORTRAN Processor	\$ 1,950d* 750	\$ 20 5	B/C	Ded.	-6.4A
13305A	Dynamic Mapping System for HP 1000 E/F-Series Computers.	1,650d*	17	D/E/F	Ded.	-5.2A
13307S	Firmware Subscription Service for 13307A Dynamic Mapping Instructions in HP 1000 E-Series Computer.		5‡	D/E and 13305A/07A		
2. DYNAMIC MAPPING SYSTEM COMPONENTS (If you already have 12892B)						
12731A	Memory Expansion Module.	\$ 1,000d*	\$ 6	B/C/D/E/F	Ded.	-3.9A
12778B	Dynamic Mapping Instructions for HP 1000 M-Series Computers.	500d*	10	B/C		-1.2A
13307A	Dynamic Mapping Instructions for HP 1000 E/F-Series Computers.	500d*	2	D/E/F		
13307S	Firmware Subscription Service for 13307A Dynamic Mapping Instructions in HP 1000 E-Series Computer.		5‡	D/E and 13305A/07A		
3. STANDARD PERFORMANCE MEMORY MODULES						
12747A	128k byte Memory Module.	\$ 2,800d*	\$ 26	B/C/D/E	-1	-0.5A
12746A	64k byte Memory Module.	2,000d*	7	B/C/D/E	-1	-0.5A
13187B	32K byte Memory Module.	1,400d*	7	B/C/D/E	-1	-0.5A
4. HIGH PERFORMANCE MEMORY COMPONENTS						
2102E	High performance memory controller.	\$ 850d*	\$ 7	D/E	Ded.	-2.6A
12747H	128k byte Memory Module.	3,500d*	26	D/E/F/G	-1	-0.5A
12746H	64k byte Memory Module.	2,500d*	7	D/E/F/G	-1	-0.5A
12741A	32k byte Memory Module.	1,800d*	10	D/E/F/G	-1	-0.5A
5. STANDARD PERFORMANCE FAULT CONTROL MEMORY COMPONENTS						
2102C	Fault control memory controller.	\$ 1,000d*	\$ 7	B/C/D/E	Ded.	-3.3A
12779A	256k byte Check bit array board (can support 64k, 128k, or 256k bytes).	1,500d*	16	B/C/D/E	-1	-0.3A
12780A	512k byte Check bit array board (can support 64k, 128k, 256k, or 512k bytes).	2,600d*	28	B/C/D/E	-1	-0.3A
6. HIGH PERFORMANCE FAULT CONTROL MEMORY COMPONENTS						
2102H	Fault control memory controller.	\$ 1,000d*	\$ 7	D/E/F/G	Ded.	-3.3A
12779H	256k byte Check bit array board (can support 64k, 128k, or 256k bytes).	1,700d*	16	D/E/F/G	-1	-0.3A
12780H	512k byte Check bit array board (can support 64k, 128k, 256k, or 512k bytes).	3,000d*	28	D/E/F/G	-1	-0.3A
7. MEMORY EXPANSION REPLACEMENT CABLE						

The cable that connects your memory controller to your memory modules and check bit array boards may not provide enough connectors to accommodate memory expansion within the computer beyond the amount of memory you have now. If the total number of memory modules, check bit array boards, and memory controller that you will have after memory expansion exceeds the number of connectors on your present memory system interconnect cable (the maximum number is 11 connectors), you will also have to purchase the following memory expansion replacement cable.

02112-60016 Memory Expansion Cable with 11 connectors. \$ 195 B/C/D/E/F/G and no 12990B

B = 2108A/BIM or 2108K/IMK with 12728J card cage; C = 2112A/BIM; D = 2109A/BIE or 2109MK with 12728J card cage; E = 2113A/BIE; F = 2111F; G = 2117F.

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

Interface-per-terminal interfaces, terminals, and accessories

MODEL #	DESCRIPTION	List Price	BMMC/MSSC:	Pre-requisites	I/O Slots Mem	CPU +5V Current
1. INTERFACE-PER-TERMINAL INTERFACES						
12966A	Buffered Async Communications Interface with std EIA terminal cable (provides block mode or char mode oper).	\$ 600d*	\$ 4	A→G	-1	-2A
-001	Substitutes 2635A+051/264x/B cable for std EIA cable.	N/C				
-002	Substitutes data set (modem) cable for std EIA cable.	N/C				
-004	Substitutes cable to 7221A Plotter and from 7221 Plotter to 264x/B Display Terminal or 2635A+051 printing terminal for std EIA cable.	100				
-005	Substitutes cable to 2621A/P Interactive Terminal for std EIA cable.	N/C				
12531D	Current Loop Terminal Interface 150, 300, 1200, or 2400 bps (operates in character mode only).	350d*	4	A→G	-1	-0.8A
-001	Local Terminal Interface, EIA compatible	55				
-002	Remote Terminal Interface, for conn. to Bell type 103A Data Set or Vadic VA3400 modem.	55				
-004	Cable to 264x/B terminal.	55				
12880A	Interface for local Terminal with 7.6m (25 ft) cable (for conn. to 2621A/P Terminal via 13222C cable).	350d*	4	A→G	-1	-0.8A
-001	Substitutes 15.2m (25 ft) cable for conn. to 264x/B Display terminal.	N/C				
2. PRINTING TERMINAL AND ACCESSORY PEDESTAL						
2635A*	Printing Terminal, 180 cps, 136 col, 128 char set, RS232C Interface, including 3.8m (12-1/2 ft) modem cable.	\$ 3,650d	\$ 31	See facing Table		
-051	Replaces std connector with 264x/B type edge connector	25				
26097A	Pedestal for 2635A Printing Terminal	275d		2635A		
-001	Casters	15				
-002	Paper catcher	50				
3. DISPLAY TERMINALS AND ACCESSORIES						
2621A*	Interactive Terminal, up to 960 cps, 80 char/line, 24 lines/page, two-page memory, 128 character set.	\$ 1,450d	\$ 15	See facing Table		
2621P*	Interactive Terminal with Printer, all capabilities of 2621A plus 120 char/sec thermal printer.	2,550d	25	See facing Table		
13222C	2m (6.5 ft) Cable for connection to local 12880A/12531C Interface.	50d	0	2621A/P		
13222N	5m (16 ft) Cable for conn. to Bell Type 103 Data Set or Vadic VA3400 Modem.	75d	0	2621A/P		
13222M	5m (16 ft) Cable for connection to European Modems.	75d	0	2621A/P		
2640B*	CRT Display Terminal, up to 240 cps, 80 char/line, 24 lines/page, 1.5 page memory, 128 character set, full editing capability. Accepts alternate character sets.	2,600d	18	See facing Table		
2645A*	Display Station, all capabilities of 2640B plus soft key functions, up to 960 cps and ability to operate with Mini cartridge I/O, and/or auxiliary printer.	3,500d	20	See facing Table		
-007	Integrated dual Mini cartridge tape, 200-350 cps data rate to/from tape	1,600				
-013	Five Mini cartridges	90				
-032	Provides extended asynchronous communications card.	150				
2648A*	Graphics Terminal, up to 960 cps, or 100 vectors/sec, 80 char/line, 24 lines/page, 1.5 page text memory, 720 dots x 360 rows of graphics memory, plus all 2645A capabilities.	5,500d	22	See facing Table		
2648A options are same as 2645A options, listed above.						
13231A	Display Enhancements (blinking, half-bright, underline, line drawing set, and space for 2 more char. sets (uses 1 option slot).	250d	0	264x/B		
-201	Math symbol character set	100				
-203	Large character set	150				
13232N	4.5m (15 ft) Cable for conn. to Bell Type 103 Data Set or Vadic VA3400 Modem.	75d	0	264x/B		
13232M	4.5m (15 ft) Cable for connection to European Modems.	75d	0	264x/B		
13234A	4K byte terminal Memory module (uses 1 option slot)	300d	0	264x/B		

NOTE: For accessories usable only on the 2645A/2648A, such as device support firmware, minicartridge upgrade, HP-IB interface, and auxiliary printers and raster dump plotters, see page 21.

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; A→G denotes that any computer whose letter is included in the range A through G is a valid prerequisite.

* No-charge options are available that provide operation from line voltages other than 115V; see the data sheets in the HP 1000 Distributed Systems and Communications Data book for more information.

d Identifies discountable price for product that is not eligible for Component OEM schedule.

Multipoint interface, software and update services, terminals, and accessories

MODEL #	DESCRIPTION	List Price	BMMC/ MSSC†	Pre- requisites	Slots I/O Mem	CPU +5V Current
1. MULTIPOINT INTERFACE AND FIRMWARE SUBSCRIPTION SERVICE						
12790A	Multipoint terminal interface with 10.6m (35 ft) cable for hardwire connection to nearest multipoint terminal.	\$ 1,500d*	\$ 8	B→G & 91730A+020	-1	-2.5A
-001	7.6m (25 ft) Modem cable instead of std hardwire cable.	N/C				
12790S	Firmware Subscription Service for firmware on 12790A interface.		10‡	12790A		
2. MULTIPOINT SOFTWARE AND UPDATE SERVICES						
91730A+020	Multipoint terminal subsystem software on Mini cartridge.	\$ 250d*		B→G, H, & 12790A		
91730Q	Manual Update Service		\$ 4‡	Latest 91730A		
91730S+020	Software Subscription Service for 91730A software with software updates on Mini cartridges.		10‡	Latest 91730A		
91730T	Customer Support Service (CSS) for 91730A software.		30‡	Latest 91730A		
-020	Software updates on Mini cartridges.		N/C	91730T		
91730V	Central Support for additional copy of 91730A software		10‡	91730T		
3. MULTIPOINT TERMINALS						
2645A*	Display Station, 960 cps, 80 char/line, 24 lines/page 1.5-page memory, 128 character set.	\$ 3,500d	\$ 20	Opt. 033/034 & 13234A		
-007	Integrated dual Mini cartridge tape, 200-350 cps.	1,600	6			
-013	Five Mini cartridges	90				
-033	Provides async multipoint comm. with monitor mode.	250d				
-034	Provides blsync multipoint comm. with monitor mode.	275d				
2648A*	Graphics Terminal, 960 cps, 100 vectors/sec, 80 char/line, 24 lines/page, 1.5 page text memory, 720 dots x 360 rows of graphics memory, 128 character set.	5,500d	22	Opt. 033/034 & 13234A		
2648A options are same as 2645A options, listed above.						
4. MULTIPOINT ACCESSORIES						
13232P	4.5m (15 ft) Modem multipoint cable.	\$ 115d		2645A/48A+033/034		
13232Q	4.5m (15 ft) Multipoint line continuation cable.	90d		See diagram		
13232R	30.4m (100 ft) Multipoint extension cable.	75d		See diagram		
13232T	9m (30 ft) Power protect multipoint cable for continuity around "down" terminal.	185d		See diagram		
30037A	Asynchronous Repeater for extending multipoint communication distances by 610m (2,000 ft) via multiple 13232R cables or user fabricated cables. Max. extension of 1,220m (4,000 ft) requires multiple 30037As.	700d	\$ 5	12790A		
5. OTHER ACCESSORIES FOR 2645A & 2648A TERMINALS						
13234A	4k byte terminal Memory module (uses 1 option slot).	\$ 300d	\$ 0	2645A/48A		
13236B	Mini cartridge field upgrade kit for 2645A/2648A.	1,550d	6	13261A		
13261A	Device support firmware for Mini cartridge add-on or auxiliary printer on 2645A/2648A without option 007.	170d	0	2645A/48A without option 007		
-003	Support for raster dump from 2648A Graphics Terminal.	N/C				
13296A	HP-IB Interface for 2648A, including 2m (6.57 ft) HP-IB cable.	500d		2648A & opt. 007 or 13261A		
-048	Firmware for raster dump from 2648A with option 007 or 13261A ordered before September 1978.	N/C				
6. AUXILIARY PRINTER FOR 2645A & 2648A TERMINALS						
2631A+240	Printer subsystem, 180 cps, 136 col, 128 char set.	\$ 4,000d \$ 3,455	\$ 31	2645A/48A w/opt. 007 or 13261A		
7. 2648A RASTER DUMP DEVICES						
2631G	Graphics Printer, 180 cps with raster data format and HP-IB interface plus all capabilities of 2631A Printer.	\$ 4,250d	\$ 34	2648A w/opt. 007 or 13261A, & 13296A+048		
7245A+001	Plotter/Printer with 2648A raster dump compatibility.	4,850d*				

B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; B→G denotes that any computer whose letter is included in the range B through G is a valid prerequisite.

H = requires latest revision of 92064A RTE-M memory-based oper. system or 92067A/92068A RTE-IV/IVB disc-based oper. system, with at least 128k bytes of memory; all other software in the system must also be up-to-date.

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details. d Identifies discountable price for product that is not eligible for Component OEM schedule.

‡ Identifies Monthly Software Support Charge (MSSC).

* No-charge options are available that provide operation from line voltages other than 115V; see the data sheets in the HP 1000 Distributed Systems and Communications Data book for more information.

Async multiplexer interface, software and update services, terminals, and accessories

MODEL #	DESCRIPTION	List Price	BMMC/MSSC†	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. MULTIPLEXER INTERFACE AND DATA SET AND EXTENDER CABLES						
12920B	16-Channel Asynchronous Multiplexer for Bell type 103A2 or 212A Data Sets, Vadic VA3400 modems, or any of the hardwire-connected terminals listed below.	\$ 2,000d*	\$ 16	B→G	-3	-5.3A
-001	Adds hardware support for Bell type 202 Data Sets. This option is not supported by any Hewlett-Packard software, so software support is the user's responsibility.	800	4		-1	-1.4A
30062B	7.6m (25 ft) Data set cable.	65d	n/a	12920B		
-001	Increases cable length to 15.2m (50 ft)	30				
30062C	7.6m (25 ft) Extender cable.	105d	n/a	30062B		
-001	Increases cable length to 15.2m (50 ft)	40				
-002	Increases cable length to 30.4m (100 ft)	95				

2. MULTIPLEXER SOFTWARE AND UPDATE SERVICES

91731A+020	Asynchronous multiplexer subsystem software package for support of communication via Bell type 103A2 or 212A Data Sets or Vadic VA3400 Modems, or with any of the hardwire-connected terminals listed below, software on Mini cartridge.	\$ 250d*		B→G, H, 12920B, & 12620A		
91731Q	Manual update service.		\$ 2‡	Latest 91731A		
91731S+020	Software Subscription Service for 91731A software, updates on Mini cartridges.		10‡	Latest 91731A		
91731T	Customer Support Service (CSS) for 91731A software.		30‡	Latest 91731A		
-020	Software updates on Mini cartridges		N/C	91731T		
91731V	Central Support for additional copy of 91731A software		10‡	91731T		

3. TERMINALS AND CABLES REQUIRED FOR CONNECTION TO 12920B

2621A*	Interactive Terminal.	\$ 1,450d	\$ 15	13222N		
2621P*	Interactive Terminal with printer.	2,550d	25	13222N		
13222N	5m (16 ft) Cable for connection to 12920B or U.S. Modems.	75d	n/a	2621A/P		
2631A	Printer.	3,350d	31	2631A Opt. 040		
-040	RS232C interface and modem cable	40		12920B		
2635A	Printing terminal, including 3.8m (12-1/2 ft) cable.	3,450d	31	12920B		
<i>(See page 19 for accessory pedestal for 2635A.)</i>						
2640B	CRT Display Terminal.	2,600d	18	13232A†		
13232A	4.5m (15 ft) Cable for connection to 12920B or U.S. Modems.	50d	n/a	12920B		
<i>(See page 19 for other accessories usable on 2640B.)</i>						
2645A*	Display Station.	3,500d	20	13232A		
-007	Integrated dual Mini cartridge tape	1,600	6	13232A		
-013	Five Mini cartridges	90				
<i>(See pages 19 and 21 for accessories usable on 2645A.)</i>						
2648A	Graphics Terminal.	5,500d	22	13232A		
<i>(2648A options are same as 2645A options, listed above; see pages 19 and 21 for accessories usable on 2648A.)</i>						

‡ Identifies Monthly Software Support Charge (MSSC).

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details. d Identifies discountable price for product that is not eligible for Component OEM schedule.

B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; B→G denotes that any computer whose letter is included in the range B through G is a valid prerequisite.

H = Requires latest revision of 92064A RTE-M memory-based oper. system or 92067A/92068A RTE-IV/IVB disc-based oper. system, with at least 128k bytes of memory; all other software in the system must also be up-to-date.

* No-charge options are available that provide operation from line voltages other than 115V; see the data sheets in the HP 1000 Distributed Systems and Communications Data book for more information.

† WARNING: The HP 13232A is the only cable that should be used for connection from 264xA/B terminals to the 12920B interface; use of other cables, such as 13232N, can damage the 264xA/B terminal.

* Note: 2640A upgrade kit to 2640B # 93983A @ ~\$270⁰⁰

Data capture software and update services, terminals, and accessories

MODEL #	DESCRIPTION	List Price	BMMC/ MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. DATA CAPTURE SOFTWARE AND UPDATE SERVICES						
92080A+020	DATA CAP/1000 software on Mini cartridges.	\$ 3,000d*		B→G, K, & Data capture terminal(s)		
-001	Discount for upgrade from previous revision of 92080A to latest revision for customers without 92080S/T.	-1,500				
92080R	License to make one copy of Software for use on an additional system	1,200d*		92080A without upgrade discount		
-001	Update discount for license to make one copy of 92080A Software Update for use on an additional system.	-600		92080A+001 or current 92080S/T and prior purchase of 92080R		
92080Q	Manual Update Service.		\$ 3‡	Latest 92080A		
92080S	Software Subscription Service (SSS) for 92080A software.		60‡	Latest 92080A		
-020	Updates on Mini cartridges		N/C	92080S		
92080W	Right to reproduce 92080S updates once.		10‡	92080S		
92080T	Customer Support Service (CSS) for 92080A software.		80‡	Latest 92080A		
-020	Updates on Mini cartridges		N/C	92080T		
92080V	Central Support for additional copy of 92080A software.		10‡	92080T		

2. MULTIPOINT/MULTIDROP DATA CAPTURE TERMINALS AND ACCESSORIES

3075A	Data Capture Terminal (desktop configuration).	\$ 2,090d	\$ 8	See facing diagram		
-004	Alphanumeric keyboard	110				
-005	Alphanumeric display	490				
-007	Multifunction reader	715	3	Max. of two opts.		
-008	Type V badge reader	360	3	selected from		
-009	Alphanumeric printer	440	3	007, 008, & 009		
-030	Installation and programming kit (one per data capture site)	55				
3076A	Data Capture Terminal (wall-mount configuration w/mounting cradle).	2,475d*	8	See facing diagram		
-020	Delete wall-mounting cradle	-385				
<i>Other 3076A options are the same as 3075A options, listed above.</i>						
3077A	Time Reporting Terminal with Type V badge reader and wall-mounting cradle.	2,530d	8	See facing diagram		
-001	Replace Type V badge reader with Multifunction reader	350				
-005	Alphanumeric display	605	2.5			
-020	Delete wall mounting cradle	-385				
-030	Installation and programming kit (one per data capture site)	55				
92904A	Wall Mounting Cradle.	385	6	3076A or 3077A		
92905A	3074A/3075A to data link cable.	90		3074A		

3. MULTIPOINT INTERFACE, CABLES, AND MULTIDROP LINK ADAPTER

12790A+001	Multipoint Interface with 7.6m (25 ft) cable for hardwire connection to 3074A Link adapter, modem, or nearest multipoint data capture terminal via 13232U Modem bypass cable.	\$ 1,500d*	\$ 8	B→G, K, 91730A, & 3075A/6A/7A	-1	-2.5A
12790S	Firmware Subscription Service for firmware on 12790A interface.		10‡	12790A		
13232P	4.5m (15 ft) Modem multipoint cable.	115d	n/a	3074A/13232U		
13232Q	4.5m (15 ft) Multipoint line continuation cable.	90d	n/a	13232P		
13232R	30.4m (100 ft) Multipoint extension cable.	75d	n/a	13232P or 30037A		
13232U	1.5 metre (5 ft) Modem bypass cable for connection between 12790A+001 interface and 13232P multipoint cable.	50d	n/a	12790A+001		
92906A	Multipoint cable without connectors for interconnection of wall-mounting cradles (must order option 001 or 002).			12790A &		
-001	100m (328 ft) cable	190d		3075A/6A/7A		
-002	300m (984 ft) cable	550d				
3074A	Data Link Adapter for interfacing 12790A multipoint line to multidrop line that offers greater flexibility and lower cost hardwired connection. It is usable only with 3075A, 3076A, and 3077A Terminals.	400d	1	See facing diagram		

NOTE: DATA CAPTURE SECTION IS CONTINUED ON NEXT PAGE

‡ Identifies Monthly Software Support Charge (MSSC).

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B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; B→G denotes that any computer whose letter is included in the range B through G is a valid prerequisite.

K = Requires latest revision of 92068A RTE-IVB disc-based operating system with at least 256k bytes of memory; all other software in the system must also be up-to-date.

Data capture software, terminals, and accessories, continued

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	I/O Slots Mem	CPU +5V Current
4. SERIAL LINK DATA CAPTURE TERMINALS						
92900B	Data Capture Terminal Subsystem , including one multidrop-only 3070B terminal with alphanumeric printer and multifunction reader.	\$ 4,400d	\$ 16	B→G	-1	-2.6A
-002	Delete multifunction reader from 3070B terminal.	-600				
-003	Delete multifunction reader & alphanumeric printer from 3070B terminal.	-1,200				
3070B	additional Serial Link Data Capture Terminal with alphanumeric printer, multifunction reader, and link cable.	3,200d	6	92900B or 40280A		
<i>3070B options are same as 92900B options, listed above.</i>						
40280A	Serial link Data capture terminal interface kit.	1,200d*	10	B→G & 3070B	-1	-2.6A
5. MULTIDROP DATA LINK CONNECTION ACCESSORIES						
92901A	set of five Serial link junctions.	30	n/a	3074A or 92900B or 40280A		
92902A	Data link/Serial link cable. <i>Must order Option 001 or 002.</i>					
-001	100m (328 ft) reel of cable.	165	n/a	3074A or 92900B or 40280A		
-002	300m (984 ft) reel of cable.	490	n/a			

Cabinets and Accessories

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	I/O Slots Mem	CPU +5V Current
1. UPRIGHT RACK CABINETS						
29402B	Single-bay, 142 cm (56 in) Upright rack cabinet , including pull-out extender feet and removable side panels (requires one of power options 200, 210, 400, or 410).	\$ 1,400d*	\$ 5	A→G & Opt. 200/210/400/410		
-050	Hinged, locking front door; must be ordered with 29402B+200/210/400/410.	400				
-051	Snap-on front door; must be ordered with 29402B+200/210/400/410.	400				
-200	115V, 20A power control unit, fan, and 9-outlet power service strip for master cabinet.	650				
-210	230V, 210V, 10A power control unit, fan, and 12-outlet power service strip for master cabinet.	650				
-400	115V power distribution unit, fan, 9-outlet power service strip, and cabinet tie-together hardware for add-on cabinet. <i>Max. of two 29402B+400 add-on cabinets per 29402B+200 master cabinet.</i>	300				
-410	230V power distribution unit, fan, 12-outlet power service strip, and cabinet tie-together hardware for add-on cabinet. <i>Max. of two 29402B/410 add-on cabinets per 29402B+210 master cabinet.</i>	300				
2. ACCESSORIES FOR UPRIGHT RACK CABINETS						
12680B	4.5 cm (1.75 in) blank panel.	\$ 35d*		29402B		
12681B	8.9 cm (3.5 in) blank panel.	35d*		29402B		
12682B	13.3 cm (5.25 in) blank panel.	35d*		29402B		
12683B	17.8 cm (7 in) blank panel.	35d*		29402B		
12684B	22.2 cm (8.75 in) blank panel.	35d*		29402B		
12685B	26.7 cm (10.5 in) blank panel.	35d*		29402B		
40010A	Cabinet lifting fixture.	100		29402B		
40017A	Heavy duty rear and side stabilizer.	450		29402B		

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A = 2105A; B = 2108M; C = 2112M; D = 2109E; E = 2113E; F = 2111F; G = 2117F; A→G denotes that any computer whose letter is included in the range A through G is a valid prerequisite.

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PRINTERS / Paper Tape
Card Reader

Line printers, punched tape peripherals, and card reader

MODEL #	DESCRIPTION	List Price	BMMC/MSSC†	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. LINE PRINTERS						
2608A*	Line Printer, 320-400 LPM, 132 col, 128 char set, and graphics capability.	\$ 9,900d	\$ 59	Opt. 210 or 26099A		
-001	Adds Arabic, Cyrillic, Katakana, and drawing character sets.	150		No Opt. 002		
-002	Adds APL, French, German, Swedish/Finnish, Norwegian/Danish, Spanish, British, Japanese ASCII, and Roman extension character sets.			No Opt. 001		
-090	Replaces 11 in ROM VFC with 12 in. ROM VFC.	N/C				
-106	Package of six ribbon cartridges.	135				
-110	Adds sound cover/static eliminator.	150				
-210	Interface to computer for standard 2608A.	650	3	B→G	-1	-0.8A
26099A	Interface to computer for standard 2608A.	650d	3	B→G	-1	-0.8A
2613A*	Line Printer, 300 LPM, 136 col, 64 char set.	11,600	133	Opt. 100 or 12845A		
-001	96 char set, 240 LPM.	1,675				
-002	64 char set, OCR-B font, 300 LPM.	N/C				
-003	96 char set, OCR-B font, 240 LPM.	1,675				
-100	Interface to computer.	650	3	A→G	-1	-1.2A
2617A*	Line Printer, 600 LPM, 136 col, 64 char set.	15,700	147	Opt. 100 or 12845A		
-001	96 char set, 436 LPM.	1,675				
-002	64 char set, OCR-B font, 600 LPM.	N/C				
-003	96 char set, OCR-B font, 436 LPM.	1,675				
-100	Interface to computer.	650	3	A→G		
2631A*	Printer, 180 char/sec, 136 col, 128 char set.	3,350d	31	Opt. 210 or 12845A or Opt. 046 & 59310B		
-001	Adds Swedish/Finnish character set.	150		Only one of character set options 001 through 010 may be ordered per 2631A		
-002	Adds Norwegian/Danish character set.	150				
-003	Adds French character set.	150				
-004	Adds German character set.	150				
-005	Adds British character set.	150				
-006	Adds Spanish character set.	150				
-007	Adds Cyrillic character set.	150				
-008	Replaces std character set with USASCII/Katakana char set.	150				
-009	Adds extended Roman character set.	150				
-010	Adds math character set.	150				
-046	Replaces std I/O with HP-IB I/O.	50		59310B		
-051	Replaces std I/O with RS232C I/O via 264xA/B edge conn.	65				
-210	Interface to computer.	650	3	No Opt. 046 & A→G	-1	-1.2A
-240	Interface package for conn. to 264xA Display terminal with Mini cartridge I/O as auxiliary printer.	205				
26098A	Stand for 2631A.	275d*		2631A		
-001	Adds casters.	15				
-002	Adds paper catcher.	50				
12845B	Interface for 2613A, 2617A, and 2631A.	650d*	3	A→G	-1	-1.2A
9876A	Thermal Graphics Printer, up to 480 LPM, 80 col, software selectable character sets, including 128 ASCII, French, German, Katakana, British, Spanish, Swedish/Finnish, and Danish/Norwegian.	3,500d	24	59310B		
59310B	Interface for 9876A.	675d*	4	A→G	-1	-1.1A
2. PUNCHED TAPE PERIPHERALS						
12925A* (2748B)	Punched Tape Reader Subsystem, up to 500 bytes/sec.	4,300 ^{4,349d}	\$ 22	A→G	-1	-0.8A
2748B*	Punched Tape Reader.	3,850	20	12597A+002		
12597A+002	Interface card and cable for 2748B.	450d*	2	A→G	-1	-0.8A
12926A (2895B)	Tape Punch Subsystem, up to 75 bytes/sec.	5,000	51	A→G	-1	-0.8A
2895B	Tape Punch.	4,750	49	12597A+005		
12597A+005	Interface card and cable for 2895B.	450d*	2	A→G	-1	-0.8A
12575C	Tape Winder (included in 12925A Subsystem).	150				
3. PUNCHED CARD READER						
12985A* (2892)	Card Reader Subsystem, 600 cpm, w/interface and cable.	\$ 6,375	\$ 67	A→G	-1	-1.0A
2892A*	Card Reader.	5,800	64	12924A		
12924A	Interface for 2892A.	575d*	3	A→G	-1	-1.0A

4,349d (includes duty) duty not discountable

* Option 015 provides operation from 230V/50 Hz power to no increase in cost; other options may provide operation from other line voltages also at no increase in cost (see the respective data sheet in the HP 1000 Computers and Systems Peripherals Data book).
 A = 2105A or 2108M with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; A→G or B→G denotes that any computer whose letter is included in the specified range is a valid prerequisite.
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Disc memory products

Disc

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. 4.9M BYTE CARTRIDGE DISC SUBSYSTEM AND COMPONENTS						
12960A*	Cartridge Disc Subsystem, including 7900 Disc Drive, Power Supply Controller Interface, and Cartridge.	\$10,000d*	\$103	A→G	-2	-3.8A
12960A and option 010*	Additional 4.9M byte disc drive for subsystem as 2nd, 3rd, or 4th drive. Includes 7900A Disc Drive, Power Supply, Cables, and Cartridge.	9,300d*	89	12960A		
7900A*	4.9M byte Disc Drive, dual disc with one removable cartridge, and one fixed disc, front loading.	7,975	81	13210A, 13212A, & 13215A		
13215A*	Power Supply for 7900A	1,400d*	8	7900A		
12869A	2.5M byte Disc Cartridge for 7900A Disc Drive	125		7900A		
13210A	7900 Disc Drive Interface to HP 1000 Computers	1,000d*	14	7900A, A→G & 12897B	-2	-3.8A
13211A	Rack Mounting Kit for 7900A Disc Drive and 13215A Disc Power Supply	210d*	n/a	7900A		
13212A	Multi-unit cable for 7900A Disc Drives	285d*	n/a	7900A		
13216A	Customer Spares/Service Kit for 7900A	3,400d*	n/a	7900A		
-001	Adds Spares/Service Kit for 13210A Interface Controller	875				
13219A	Disc Service Unit for 7900A or 7901A Disc Drive	875d*	n/a	7900A/01A		
2. 19.6M BYTE CARTRIDGE DISC DRIVES AND ACCESSORIES						
7906MR	Master 19.6M byte cartridge disc drive, including cartridge, disc controller, and rack slides	\$13,000d*	\$ 79	13175B		
-020	Rack slide compatibility with 29402B cabinet	N/C				
7906M	Master 19.6M byte cartridge disc drive, as above, but in low-profile cabinet without rack slides	14,000d*	82	13175B		
7906SR	Additional cartridge disc drive, including cartridge, rack slides, and cables, 2nd to 8th drive.	9,500d*	52	7906M/MR, 7920M, or 7925M		
-020	Rack slide compatibility with 29402B cabinet	N/C				
7906S	Additional cartridge disc drive in low-profile cabinet without rack slides, 2nd to 8th drive.	10,500d*	55	7906M/MR, 7920M, or 7925M		
12940A	9.8M byte Formatted Disc Cartridge for 7906M/MR/S/SR.	180	n/a	7906M/MR		
13359C	Servo reformatter for 7906 Disc Drive	2,700d*	n/a	7906M/MR		

‡ Identifies Monthly Software Support Charge (MSSC).

* Option 015 provides operation from 230V/50 Hz power at no increase in cost.

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; A→G denotes that any computer whose letter is included in the range A through G is a valid prerequisite.

Disc

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
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3. 50M BYTE TOP-LOADING DISC DRIVES AND ACCESSORIES

7920M*	Master 50M byte Top Loading Disc Drive, including disc controller, cabinet, and 13394A Disc Pack.	\$17,000d*	\$ 81	13175B ✓		
7920S*	Slave 50M byte Top Loading Disc Drive, including 2.4m (8 ft) multi-unit cable, 15.2m (50 ft) data cable, cabinet, and 13394A Disc Pack, 2nd to 8th drive.	13,000d*	54	7906M/MR, 7920M, or 7925M		
-001	Substitutes 5.4m (18 ft) multi-unit cable and 7.6m (25 ft) data cable for cables normally supplied.	N/C				
13394A	50M byte Formatted Disc Pack for 7920	600 525	n/a	7920		
13398A	7920 Alignment Pack.	2,400d*	n/a	7920		

→ P1-5

4. 120M BYTE TOP-LOADING DISC DRIVES AND ACCESSORIES

7925M*	Master 120M byte Top Loading Disc Drive, including disc controller, cabinet, and 13356A Disc Pack.	\$21,000d*	\$ 89	13175B		
7925S*	Slave 120M byte Top Loading Disc Drive, including 2.4m (8 ft) multi-unit cable, 15.2m (50 ft) data cable, cabinet, and 13356A Disc Pack, 2nd to 8th drive.	17,000d*	62	7925M or 7906M/MR or 7920M and 7925S opt. 250		
-001	Substitutes 5.4m (18 ft) multi-unit cable and 7.6m (25 ft) data cable for cables normally supplied.	N/C				
-250	Upgrade kit to support 7925S added to existing 7906M/MR or 7920M Master disc drive.	500				
13356A	120M byte Formatted Disc Pack for 7925	850	n/a	7925M/S		
13357A	7925 Alignment Pack.	2,500d*	n/a	7925M/S		

5. INTERFACES AND MULTI-UNIT CABLES FOR 7906M/MR/S/SR, 7920M/S, & 7925M/S

* 13175B	HP 1000 Interface to 7906M/MR, 7920M, or 7925M.	\$ 900d* 780	\$ 6	A→G, 12879B, & 7906M/MR, 7920M, or 7925M	-1	-2.3A
13178C	Multi-CPU Interface for connecting from two to eight HP 1000 Computers to disc controller (one 13178C in each computer).	1,200d*	6	Same as for 13175B, above	-1	-2.3A
13013B	3.65m (12 ft) Multi-unit Cable. (Daisy)	250d*	n/a	7906M/MR, 7920M, or 7925M		
-001	Reduce cable length to 1.5m (5 ft).	N/C				
-002	Increase cable length to 5.48m (18 ft).	N/C				
-003	Increase cable length to 2.4m (8 ft).	N/C				
13213B	3.048m (10 ft) Data Cable. — Cont to Drive	75d*		7906M/MR, 7920M, or 7925M		
-001	Increase cable length to 7.62m (25 ft).	N/C				
-002	Increase cable length to 15.24m (50 ft).	N/C				
-003	Increase cable length to 22.86m (75 ft).	N/C				

6. FLEXIBLE DISC MEMORIES

12732A*	Flexible Disc Subsystem, 514k bytes.	\$4,200d	\$ 36	A→G & 12879B ⁹⁷	-2	-2.2A
-001	Desk mounting modifications.	N/C				
12733A*	Additional Flexible Disc Drive, 514k bytes. (Maximum of three per 12732A subsystem.)	2,600d	18	12732A		
-001	Desk mounting modification.					

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 * Option 015 provides operation from 230V/50 Hz power at no increase in cost.
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 A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117G; A→G denotes that any computer whose letter is included in the range A through G is a valid prerequisite.

Magnetic tape products

Tape

MODEL #	DESCRIPTION	List Price	BMMC/MSSC†	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. NRZI MAGNETIC TAPE SUBSYSTEMS, COMPONENTS, AND ACCESSORIES						
7970B+226	Magnetic Tape Subsystem in low-profile cabinet, including 7970B Tape Drive, 13181A Controller Interface, head cleaner, and 2400 ft reel of tape, IBM-compatible, 9-track NRZI, Read-After-Write, 800 bpi, 45 ips, 115/230 VAC switch selectable.	\$10,750d	\$ 75	A→G	-2	-2.9A
7970B+220	additional 800 bpi, 45 ips Magnetic Tape Drive in low-profile cabinet. Same as 7970B+226, but with 13194A multi-unit cable in place of 13181A controller interface (usable as 2nd through 4th drive).	8,700d	65	7970B+226 or 7970B+236		
7970B+236	Magnetic Tape Subsystem. Same as 7970B+226, but without low-profile cabinet.	9,500d	71	A→G	-2	-2.9A
7970B+230	additional 800 bpi, 45 ips Magnetic Tape Drive, same as 7970B+226, but without low-profile cabinet and with 13194A multi-unit cable in place of 13181A controller interface for 2nd, 3rd, and 4th drive(s).	7,450d	61	7970B+236		
7970B	Nine-Track NRZI Digital Magnetic Tape Unit (MTU), 800 bpi, 45 ips	6,870d	61	13181A		
-001	37.5 ips	N/C				
-002	25 ips	N/C				
-007	Add Unit Select Switch	155				
-048	Add Operation from 48V DC Power Source	800				
-127	Read-After-Write Digital MTU. Includes Transport, Motion Control Electronics, 115/230V Switch, Local Control, 37.5 to 45 ips, 800 bpi	N/C				
13181A	Interface for 7970B, nine-track NRZI, 37.5 ips	3,500d*	11	A→G & 7970B	-2	-2.9A
-001	Same as 13181A, 25 ips	N/C				
-003	Same as 13181A, 45 ips	N/C				
13012B	Read Parity, seven or nine-track, 7970B	310d*				
13014A	Write Parity, nine-track, 7970B	360d*				
-001	Write Parity, seven-track, 7970B	N/C				
13190A	Multi-unit Cable, 3.8m (12.5 ft) for 7970B	375d*				
13194A	Multi-unit Cable, 6.1m (20 ft) for 7970B	450d*				
13191A	Control and Status Test Board for 7970B	285d*				
13192A	Write Test Board for 7970B	285d*				
13193A	Read Test Board for 7970B	285d*				
13251A	48V DC Power Conversion for 7970 Series Mag Tape Drives	1,250d*	5			
13251B	60V DC Power Conversion for 7970 Series Mag Tape Drives	1,250d*	5			

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A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; A→G denotes that any computer whose letter is included in the range A through G is a valid prerequisite.

MODEL #	DESCRIPTION	List Price	BMMC/MSSC†	Pre-requisites	I/O Slots Mem	CPU +5V Current
2. PHASE ENCODED MAGNETIC TAPE SUBSYSTEMS, COMPONENTS, AND ACCESSORIES						
7970E+226	Magnetic Tape Subsystem in low-profile cabinet, including 7970E Tape Drive, 13183A Controller Interface, head cleaner, and 2400 ft reel of tape, IBM-compatible, 9-track Phase-Encoded, 1600 bpi, 45 ips, 115/230 Vac switch selectable.	\$12,150d	\$ 92	A→G	-2	-2.6A
7970E+220	additional 1600 bpi, 45 ips Magnetic Tape Drive in low-profile cabinet. Same as 7970E+226, but with 13194A multi-unit cable in place of 13183A controller interface (usable as 2nd through 4th drive).	10,625d	72	7970E+226 or 7970E+236		
7970E+221	additional 1600 bpi, 45 ips slave Magnetic Tape Drive in low-profile cabinet. Same as 7970E+226, but with 13194A multi-unit cable in place of 13183A controller interface and slave drive in place of master drive (usable as 2nd through 4th drive).	8,780d	65	7970E+226 or 7970E+236		
7970E+236	Magnetic Tape Subsystem. Same as 7970E+226, but without low-profile cabinet.	10,900d	90	A→G	-2	-2.6A
7970E+230	additional 1600 bpi, 45 ips Magnetic Tape Drive. Same as 7970E+226, but without low-profile cabinet and with 13194A multi-unit cable in place of 13183A controller interface for 2nd, 3rd, and 4th drive(s).	9,375d	70	7970E+226 or 7970E+236		
7970E+231	additional 1600 bpi, 45 ips Magnetic Tape Drive. Same as 7970E+236, but without low-profile cabinet and with 13194A multi-unit cable in place of 13183A controller interface and slave drive in place of master drive for 2nd, 3rd, and 4th drive(s).	7,530d	61	7970E+226 or 7970E+236		
7970E	Nine-Track Phase Encoded Magnetic Tape Unit, 45 ips	8,885d	70	13183A		
-001	37.5 ips	N/C				
-002	25 ips	N/C				
-003	22.5 ips	N/C				
-007	Add Unit Select Switch	155				
-020	Add Parity Select Switch, (options 164, 165 only)	80				
-021	Add Dual Speed Selection (option 162 through 165 only)	105				
-048	Add Operation from 48V DC Power Source	800	5			
-150	Read-After-Write Digital Magnetic Tape Unit, including Transport, Motion Control Electronics, 115/230V Switch, Local Control, 1600 bpi, 45 ips, Slave Drive	-1,805				
-151	Master Unit, 45 ips	N/C				
-152	Read-Only, 45 ips, Slave Drive	-2,925	-7			
-153	Read-Only, Master Unit, 45 ips Nine-Track Phase-Encoded/NRZI Magnetic Tape Unit	-635				
-162	Read-Only NRZI and PE, Slave Drive, 45 ips	-2,010	-7			
-163	Read-Only NRZI and PE, Master Unit, 45 ips Seven and Nine-Track	-380				
-164	Read-Only NRZI (seven and nine-track) and Read-Only Phase-Encoded (nine-track) Slave Drive, 1600/800/556/220 bpi, 45 ips	-1,100	-7	7970E+165		
-165	Read-Only NRZI (seven and nine-track) and Read-Only Phase-Encoded (nine-track) Master Unit, 1600/800/556/200 bpi, 45 ips	395		13184A		
13183A	Interface for 7970E, nine-track Phase-Encoded, 37.5 ips	3,500d*	20	A→G	-2	-2.6A
-001	Same as 13183A, 25 ips	N/C		& 7970E w/out opt. 165		
-003	Same as 13183A, 45 ips	N/C				
13184A	Interface for 7970E, Multi-Format, Read-Only NRZI and Phase-Encoded, 45 ips	3,500d*	14	A→G	-2	-2.6A
				& 7970E+165		
13012B	Read Parity, seven or nine-track, 7970E	310d*				
13191A	Control and Status Test Board for 7970E	285d*				
13194A	Multi-unit Cable, 6.1m (20 ft) long for 7970E	450d*				
13195A	Write Card (Preamble Postamble, IB Burst, Tape Mark) for 7970E	455d*				
13196A	Add Phase-Encoded Read, Display Data Test Kit for 7970E	285d*				
-001	Phase-Encoded Write Formatter Test Card for 7970E	285				
13251A	48V DC Power Conversion for 7970 Series Mag Tape Drives	1,250d*	5			
13251B	60V DC Power Conversion for 7970 Series Mag Tape Drives	1,250d*	5			

† Identifies Monthly Software Support Charge (MSSC).

d Identifies discountable price for product that is not eligible for Component OEM schedule. d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; A→G denotes that any computer whose letter is included in the range A through G is a valid prerequisite.

HP 1000 Computer interfaces

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. HP 1000 DATA COMMUNICATIONS INTERFACES						
12531C Current Loop Teleprinter Interface		\$ 350d*	\$ 4	A→G	-1	-0.8A
-001 Local Terminal Interface EIA compatible, 110, 220, 440, 880, or 1760 bps		55				
-002 Remote Terminal Interface, same as -001 via data modem		55				
12531D Current Loop Terminal Interface 150, 300, 1200, or 2400 bps (operates in character mode only).		350d*	4	A→G	-1	-0.8A
-004 Cable to 264xA/B terminal.		55				
12567B Asynchronous Data Set Interface		550d*	6	A/B/C	-1	-1.6A
12589A Automatic Calling Unit Interface to Bell 801 Automatic Calling Unit		450d*	3	A/B/C	-1	-0.7A
12618A Transmit-Receive Synchronous Data Set Interface		700d*	10	B→G	-2	-2.3A
12790A Multipoint Terminal Interface		1,500d*	8	B→G	-1	-2.5A
-001 Modem cable instead of hardwire cable		N/C				
12790S Firmware Subscription Service for firmware on 12790A interface			10‡	12790A		
12880A interface for local CRT terminal with std EIA cable.		350d*	4	A→G	-1	-0.8A
12889A Hardwired Serial Interface , 2.5M bits/sec, 304 metres (1000 ft)		750d*	10	A→G	-1	-2.3A
-001 1.25M bits/sec, 608 metres (2000 ft)		N/C				
12920B Asynchronous 16-chan Multiplexer for type 103A Modems or		2,000d*	16	A→G	-3	-5.4A
-001 Adds hardware support for type 202 Modems		800	4		-1	-1.5A
12966A Buffered Asynchronous Communications Interface with std EIA terminal cable.		600d*	4	A→G		-2.0A
12967A Synchronous Communications Interface		650d*	5	A→G	-1	-1.8A
12968A Asynchronous Communications Interface		750d*	5	A→G	-1	-1.8A
2. HP 1000 GENERAL PURPOSE INTERFACES						
12551B Relay Output Register , providing 16 form-A contacts and 48-pin mating connector for operating external devices		\$ 515d*	\$ 2	A→G	-1	-0.6A
-001 Adds read-back to 12551B		25	2	A→G		-1.1A
12554A 16-Bit Duplex Register , dual 16-bit register and 48-pin mating connector for bi-directional data transfer between computer and external device (positive true)		350d*	3	A→G	-1	-1.1A
-001 Negative true output from 12554A		N/C				
12566B Microcircuit Duplex Register , dual 16-bit register, 48-pin connector and cable for bi-directional data transfer between computer and external device at DTL/TTL voltage levels (ground true)		350d*	4	A→G	-1	-1.1A
-001 Same as 12566B but with 24-pin connector and I/O tied to form a single 16-bit bi-directional data bus.		N/C				
-002 Same as 12566B, positive true		N/C				
12597A 8-Bit Duplex Register , dual 8-bit register and 48-pin mating connector for bi-directional data transfer between computer and external device (positive true)		350d*	2	A→G	-1	-0.8A
-001 Same as 12597A, negative true		N/C				
12620A I/O Breadboard Kit (Usable as max. of one privileged interrupt fence for RTE)		130d*	3	A→G	-1	-0.4A
12930A Universal Interface Card , providing high speed 16-bit duplex data and control transmission with differential line drivers and receivers		850d*	3	A→G	-1	-1.8A
-001 Same as 12930A, ground true, positive false, TTL compatible logic		N/C				
-002 Same as 12930A, positive true, ground false, TTL compatible logic		N/C				
91200B Video Display Monitor Interface.		1,700d*	15	A→G	-1	-1.2A
-001 7.6m (25 ft) cable to B & W monitor		150	0			
-003 7.6m (25 ft) cable to color monitor		350	0	3 x 91200B		

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A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; A→G or B→G denotes that any computer whose letter is included in the range A through G or B through G is a valid prerequisite.



Graphics software and update services, devices, and interfaces

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. GRAPHICS SOFTWARE AND UPDATE SERVICES						
92840A+020	Graphics Plotting Software on Mini cartridge.	\$ 500d*		B→G, L & graphics device		
92840Q	Manual Update Service.		\$ 5‡	Latest 92840A		
92840S+020	Software Subscription Service for 92840A software with software updates on Mini cartridges.		35‡	Latest 92840A		
92840T	Customer Support Service (CSS) for 92840A software		50‡	Latest 92840A		
-020	Software updates on Mini cartridges		N/C	92840T		
92840V	Central Support for additional copy of 92840A software.		10‡	92840T		
2. GRAPHICS DEVICES						
2608A+210	Line Printer Subsystem with raster graphics capability when supported by 92840A Graphics Plotting Software, 924 dots per horizontal line, 70 dots/inch x 72 rows/inch.	\$ 9,900	\$ 62	B→G and 92840A+020	-1	-0.8A
2648A*	Graphics Terminal, up to 100 vectors/sec, 720 dots x 360 rows of graphics memory.	\$ 5,500d	\$ 22	See Table and diagrams on pages 18 & 20		
-007	Integrated dual Mini cartridge tape I/O.	1,600d	6			
-013	Five Mini cartridges.	90d				
-030	Delete standard asynchronous communications.	-160		13260B/C/D		
7221A	Graphics Plotter, four-color with RS232C/CCITT V.24 ASCII interface, 1150 byte input buffer, rates to 2400 baud.	5,000d	30	264xA/B or 2635A+051 & 12966A+002/004		
-001	Adds 2048 bytes to input buffer capacity.					
7225A+17601A	Graphics Plotter.	2,600d	17	59310B		
7245A	Plotter/Printer with very long-axis plotting.	4,600d	30	59310B		
9872A	Graphics Plotter, four color.	4,750d	30	59310B		
9874A	Digitizer.	6,200d	30	59310B		
3. 2648A RASTER DUMP DEVICES						
2631G	Graphics Printer, 180 cps with raster data format and HP-IB interface plus all capabilities of 2631A Printer.	\$ 4,250d	\$ 34	2648A w/opt. 007 or 13261A, and 13296A+048		
7245A+001	Plotter/Printer with 2648A raster dump compatibility.	4,850d	30			
9876A	Thermal graphics printer (prints 580 of 720 dots across the page).	3,500d	24			
4. GRAPHICS INTERFACES						
59310B	HP-IB interface for connecting up to 14 HP-IB graphics devices to the system.	\$ 675d*	\$ 5	B→G	-1	-3A
10631A	HP-IB cable, 1 metre (3.28 ft)	60		59310B		
10631B	HP-IB cable, 2 metres (6.56 ft)	65		59310B		
10631C	HP-IB cable, 4 metres (13.12 ft)	75		59310B		
10631D	HP-IB cable, 0.5 metre (1.64 ft)	60		59310B		
91200B	Video display monitor interface.	1,700d*	15	A→G	-1	-1.2A
-001	7.6m (25 ft) cable to black & white TV monitor.	150	n/a			
-003	7.6m (25 ft) cable to color TV monitor.	350	n/a	3 x 91200B		

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A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; A→G or B→G denotes that any computer whose letter is included in the range A through G or B through G is a valid prerequisite.

L = Requires latest revision of 92064A RTE-M memory-based operating system (RTE-MII or MIII configuration with at least 64k bytes of memory) or 92067A/92068A RTE-IV disc based operating system with at least 128k bytes of memory; all other software in the system must also be up to date.

* No-charge options are available that provide operation from line voltage other than 115V; see the 2648A data sheet in the HP 1000 Distributed Systems and Communications Data book.

HP 1000 Active software and update services products

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. ACTIVE SOFTWARE OPERATING SYSTEMS AND UPDATE SERVICES						
The operating systems listed below will receive periodic software updates and are recommended for new applications.						
92064A	RTE-M Memory-Based Real-Time operating system (must specify media option 020 or 040).	\$ 1,750d*		A→G & AB		
-001	Discount for upgrade from 20885A BCS, 2300B RTE-B, or 2300C RTE-C operating system to RTE-M system.	-1,500				
-020	Software on Mini cartridges.	N/C		2645A/48A+007		
-040	Software on flexible discs for 12732A Subsystem, including FORTRAN compiler.	250		12732A		
92064Q	Manual Update Service.		\$ 14‡	Latest 92064A		
92064S	Software Subscription Service (SSS) for 92064A software (must specify one of options 020 or 040).		65‡	Latest 92064A		
-020	Software updates on Mini cartridges.		N/C	2645A/48A+007		
-040	Software updates on flexible discs for 12732A Subsystem.		N/C	12732A		
92064T	Customer Support Service (CSS) for 92064A software (must specify option 020 or 040 listed under 92064S).		215‡	Latest 92064A		
92064P	Additional phone-in consulting caller.		100‡	92064T		
92064V	Central Support for additional copy of 92064A software.		25‡	92064T		
92068A	RTE-IVB Disc-Based Real-Time Operating System with Session Monitor, incl. EMA firmware for E/F-Series Computers and EMA software for M-Series Computers (must specify one of options 030 through 055).	5,000d*	5	B→G & AB		
-001	Discount for upgrade from 92064A RTE-M, 92001B RTE-II, or 92060A RTE-III system or for upgrade from a previous revision of 92068A RTE-IVB to the latest revision, for customers without 92068S/T.	-2,000		92064A or 92001B or 92060B or 92068A and no 92068S/T		
-030	Software on 2.5M byte (7900) disc cartridge.	200		12960A		
-031	Software on 10M byte (7905/7906) disc cartridge.	200		7906W/MR		
-032	Software on 50M byte (7920) disc pack.	500		7920M		
-033	Software on 120M byte (7925) disc pack.	800		7925M		
-050	Software on 800 bpi, 9-track mag tape in image format for disc cartridge plus off-line disc backup utilities on Mini cartridge and on paper tape for copying the software onto the 7900 disc cartridge.	N/C		7970B+226/236		
-051	Similar to 050, above, but with software on 1600 bpi mag tape.	N/C		7970E+226/236		
-052	Similar to 050, above, but with software on 800 bpi, mag tape in image format for 7905/7906/7920 disc.	N/C		7970B+226/236		
-053	Similar to 052, above, but with software on 1600 bpi mag tape.	N/C		7970E+226/236		
-054	Similar to 050, above, but with software on 800 bpi, mag tape in image format for 7925 disc.	N/C		7970B+226/236		
-055	Similar to 054, above, but with software on 1600 bpi mag tape.	N/C		7970E+226/236		
92068R	RTE-IVB EMA firmware, manuals, and license to make one copy of 92068A software for use on an additional system.	2,000d*		92068A or 92067A w/o upgrade discount & B→G & AB		
-001	Update discount for RTE-IVB EMA firmware, manuals, and license to make one copy of 92068A software update for use on an add'l system.	-800		92068A+001 or current 92068S/T & prior purchase of 92068R		
92068Q	Manual Update Service.		13‡	Latest 92068A		
92068S	Software Subscription Service (SSS) for 92068A Software-Firmware (must specify one of options 020 through 055).		100‡	Latest 92068A		
-020	Software updates on Mini cartridges.		30‡	2645A/48A+007		
-050	Updates on 800 bpi, 9-track mag tape for 7900 Grandfather disc.		N/C	7970B+226/236		
-051	Updates on 1600 bpi, 9-track mag tape for 7900 Grandfather disc.		N/C	7970E+226/236		
-052	Updates on 800 bpi, 9-track mag tape for 7906/7920 Grandfather disc.		N/C	7970B+226/236		
-053	Updates on 1600 bpi, 9-track mag tape for 7906/7920 Grandfather disc.		N/C	7970E+226/236		
-054	Updates on 800 bpi, 9-track mag tape for 7925 Grandfather disc.		N/C	7970B+226/236		
-055	Updates on 1600 bpi, 9-track mag tape for 7925 Grandfather disc.		N/C	7970E+226/236		
92068W	Right to reproduce 92068S updates once.		30‡	92068S		
92068T	Customer Support Service (CSS) for 92068A Software-Firmware (must specify one of options 020 through 055, listed under 92068S).		250‡	Latest 92068A		
92068P	Additional phone-in consulting caller.		100‡	92068T		
92068V	Central Support for additional copy of 92068A.		50‡	92068T		

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A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; A→G or B→G denotes that any computer whose letter is in the range A through G or B through G is a valid prerequisite.

AB Minimum hardware requirements for HP 1000 operating systems are given in the table on page 43.

HP 1000 Active software and update services products, continued

MODEL #	DESCRIPTION	List Price	MSSC	Pre-requisites	Slots I/O Mem	CPU +5V Current
2. ACTIVE SOFTWARE SUBSYSTEMS AND SUPPORTING LIBRARIES AND UPDATE SERVICES						
92061A	RTE Microprogramming package, software on paper tapes. -020 Software on Mini cartridge instead of paper tapes.	\$ 1,000d* N/C		Latest 92001B, 92067A, or 92068A*		
92061Q	Manual Update Service.		2	Latest 92061A		
92061S	Software Subscription Service for 92061A Software (must specify one of the following options). -010 Software updates on paper tapes. -020 Software updates on Mini cartridges.		10 N/C N/C	Latest 92061A 12925A 2645A/48A+007		
92061T	Customer Support Service (CSS) for 92061A (must specify one of the options 010 or 020 listed under 92061S)		30	Latest 92061A		
92061V	Central Support for additional copy of 92061A software.		10	92061T		
92065A	BASIC/1000M (must specify one of options 020 or 040). -001 Discount for upgrade from 2300B RTE-B system to BASIC/1000M. -020 Software on Mini cartridges -040 Software on Flexible disc for 12732A Subsystem	500d* -250 N/C N/C		Latest 92064A* 2645A/48A+007 12732A		
92065Q	Manual Update Service.		5	Latest 92065A		
92065S	Software Subscription Service for 92065A software (must specify options 020 or 040). -020 Software updates on Mini cartridges -040 Software updates on Flexible discs for 12732A Subsystem		20 N/C N/C	Latest 92065A 2645A/48A+007 12732A		
92065T	Customer Support Service (CSS) for 92065A Software (must specify options 020 or 040 listed under 92065S).		40	Latest 92065A		
92065V	Central Support for additional copy of 92065A software.		10	92065T		
92066A	RTE Measurement and Control Software package on paper tapes. -020 Software on Mini cartridges instead of paper tapes.	250d* N/C		Latest 92001B, 92064A, 92067A, or 92068A*		
92066Q	Manual Update Service.		4	Latest 92066A		
92066S	Software Subscription Service for Measurement and Control software package (must specify one of the following options) -010 Software updates on paper tapes. -020 Software updates on Mini cartridges.		10 N/C N/C	Latest 92066A 12925A 2645A/48A+007		
92066T	Customer Support Service (CSS) for 92066A software (must specify options 010 or 020 listed under 92066S)		30	Latest 92066A		
92066V	Central Support for additional copy of 92066A software.		10	92066T		
92069A+020	IMAGE/1000 Data Base Management System, software on Mini cartridges. -001 Discount for upgrade from 92063A IMAGE/1000 to 92069A IMAGE/1000 or from previous revision to latest revision for customers without 92063S/T or 92069S/T	3,000d* 1,500		Latest 92068A* 92063A no 92063S/T or 92069A no 92069S/T		
92069R	License to make one copy of 92069A software once for use on an additional system. -001 Update discount for license to make one copy of 92069A Software Upgrade for use on an additional system.	1,500d* -750		92069A without upgrade discount 92069A+001 or cur- rent 92069S/T & prior purchase of 92069R		
92069Q	Manual Update Service.		3	Latest 92069A		
92069S+020	Software Subscription Service (SSS) for 92069A software, updates on Mini cartridges.		20	Latest 92069A		
92069W	Right to reproduce 92069S updates once.		10	92069S		
92069T+020	Customer Support Service (CSS) for 92069A Software, updates on Mini cartridges.		40	Latest 92069A		
92069V	Central Support for additional copy of 92069A Software.		10	92069T		

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

* All other software in the system must also be up-to-date.

HP 1000 Active software and update services products, continued

MODEL #	DESCRIPTION	List Price	MSSC	Pre-requisites	I/O	Slots Mem	CPU +5V Current
2. ACTIVE SOFTWARE SUBSYSTEMS AND SUPPORTING LIBRARIES AND UPDATE SERVICES, continued							
92101A	BASIC/1000D, software on paper tapes. -020 Software on Mini cartridges instead of paper tapes.	\$ 1,000		latest 92001B, 92067A, or 92068A*			
92101Q	Manual Update Service.		\$ 5	Latest 92101A			
92101S	Software Subscription Service for 92101A Software (must specify options 010 or 020) -010 Software updates on paper tapes. -020 Software updates on Mini cartridges.		20 N/C N/C	Latest 92101A 12925A 2645A/48A+007			
92101T	Customer Support Service (CSS) for 92101A Software (must specify option 010 or 020 listed under 92101S).		40	Latest 92101A			
92101V	Central Support for additional copy of 92101A Software.		10	92101T			
92400A	Sensor-Based DAS Utility Library, software on paper tapes. -020 Software on Mini cartridges instead of paper tapes.	1,135d* N/C		Any active or mature HP operating system*			
92400Q	Manual Update Service.		2	Latest 92400A			
92400S	Software Subscription Service for 92400A Software (must specify option 010 or 020). -010 Software updates on paper tapes. -020 Software updates on Mini cartridges.		10 N/C N/C	Latest 92400A 12925A 2645A/48A+007			
92400T	Customer Support Service (CSS) for 92400A Software (must specify option 010 or 020 listed under 92400S).		30	Latest 92400A			
92400V	Central Support for additional copy of 92400A Software.		10	92400T			
92840A+020	GRAPHICS/1000 Graphics Plotting Software, software on Mini cartridges.	500d*		Latest 92064A, 92067A, or 92068A*			
92840Q	Manual Update Service.		5	Latest 92840A			
92840S+020	Software Subscription Service for 92840A Software, software updates on Mini cartridges.		35	Latest 92840A			
92840T+020	Customer Support Service (CSS) for 92840A Software, software updates on Mini cartridges.		50	Latest 92840A			
92840V	Central Support for additional copy of 92840A Software.		10	92840T			

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

*All other software in the system must also be up-to-date.

HP 1000 Mature software and update services products

MODEL #	DESCRIPTION	List Price	BMMC/MSSC‡	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. MATURE SOFTWARE OPERATING SYSTEMS AND UPDATE SERVICES						
The operating systems listed below are older products for which enhancements are no longer being considered and should not be selected for new applications for that reason.						
92001B	RTE-II Disc-Based Real-Time System , including Batch-Spool Monitor (must specify one of media options 010 through 031).	\$ 5,000d*		B→E & AB		
-001	Upgrade from earlier disc-based HP RTE or DOS system.	-4,250		92001B or earlier RTE system		
-002	Upgrade from BCS, RTE-B, or RTE-C system.	-2,500		12925A		
-010	Software on paper tapes.	N/C		12960A		
-030	Software on 7900 disc cartridge.	N/C		7906M/MR or 7905A		
-031	Software on 7905/7906 disc cartridge.	N/C				
92001S	Software Subscription Service (must specify option 010 or 020).		\$115‡	Latest 92001B		
-010	Software updates on paper tapes.		N/C	12925A		
-020	Software updates on Mini cartridges.		N/C	2645A/48A+007		
92001T	Customer Support Service (CSS) for 92001B Software (must specify one of options 010 or 020 listed under 92001S).		265‡	Latest 92001B		
92001V	Central Support for additional copy of 92001B Software.		25‡	92001T		
92067A	RTE-IV Disc-Based Real-Time Operating System , including EMA firmware for E- and F-Series Computers and EMA software for M-Series Computers (must specify one of media options 030 through 053).	5,000d*	5	B→G & AB		
-001	Discount for upgrade from 92064A RTE-M, 92001B RTE-II, or 92060B RTE-III system.	-2,000		92064A or 92001B or 92060B		
-030	Software on 2.5M byte (7900) disc cartridge.	N/C		12960A		
-031	Software on 10M byte (7905/7906) disc cartridge.	N/C		7906H/M/MR		
-032	Software on 50M byte (7920) disc pack.	500		7920H/M		
-050	Software on 800 bpi, 9-track mag tape in image format for 7900 disc cartridge plus off-line disc backup utilities on Mini cartridge and paper tapes for copying the software onto the 7900 disc cartridge.	N/C		7970B+226/236 & 12960A		
-051	Similar to 050, above, but with software on 1600 bpi mag tape.	N/C		7970E+226/236		
-052	Similar to 050, above, but in image format for 7905/7906 disc cartridge or 7920 disc pack.	N/C		7970B+226/236		
-053	Similar to 050, above, but with software on 1600 bpi mag tape and in image format for 7905/7906 disc cartridge or 7920 disc pack.	N/C		7970E+226/236		
92067R	RTE-IV EMA firmware, manuals, and license to make one copy of 92067A software for use on an additional system.	2,000d*		Any prior purchase of 92067A without upgrade discount		
				B→G & AB		
92067S	Software Subscription Service (SSS) for 92067A Software-Firmware (must specify one of options 020 through 053).		85‡	Latest 92067A		
-020	Software updates on Mini cartridges.		30‡	2645A/48A+007		
-050	Software updates on 800 bpi, 9-track magnetic tapes for 7900 Grandfather disc.		N/C	7970B+226/236		
-051	Software updates on 1600 bpi, 9-track magnetic tapes for 7900 Grandfather disc.		N/C	7970E+226/236		
-052	Software updates on 800 bpi, 9-track magnetic tapes for 7905/7906/7920 Grandfather disc.		N/C	7970B+226/236		
-053	Software updates on 1600 bpi, 9-track magnetic tapes for 7905/7906/7920 Grandfather disc.		N/C	7970E+226/236		
92067W	Right to reproduce 92067S updates once.		25‡	92067S		
92067T	Customer Support Service (CSS) for 92067A Software-Firmware (must specify one of options 020 through 053 listed under 92067S).		235‡	Latest 92067A		
92067V	Central Support for additional copy of 92067A Software.		45‡	92067T		

‡ Identifies Monthly Software Support Charge (MSSC).

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; B→E or B→G denotes that any computer whose letter is in the range B through E or B through G is a valid prerequisite.

AB Minimum hardware requirements for HP 1000 operating systems are given in the table on page 43.



HP 1000 Mature software and update services products, continued

MODEL #	DESCRIPTION	List Price	MSSC	Pre-requisites	Slots I/O Mem	CPU +5V Current
2. MATURE SOFTWARE SUBSYSTEMS, LIBRARY PACKAGES AND UPDATE SERVICES						
92063A	IMAGE/1000 Data Base Mgt. System, software on paper tapes.	\$ 2,500d*		Latest 92001B/92067A*		
-020	Software on Mini cartridges instead of paper tapes.	N/C				
92063S	Software Subscription Service for 92063A IMAGE/1000 (must specify option 010 or 020).		\$ 15	Latest 92063A		
-010	Software updates on paper tapes.		N/C	12925A		
-020	Software updates on Mini cartridges.		N/C	2645A/48A+007		
92063T	Customer Support Service (CSS) for 92063A Software (must specify options 010 or 020 listed under 92063S).		35	Latest 92063A		
92063V	Central Support for additional copy of 92063A Software.		10	92063T		
92903A+020	DATACAP/1000 software on Mini cartridges (supports the 92900B (3070B) Data capture terminal subsystem and the 3075A and 3076A multipoint/multidrop Data capture terminals, but not the 3077A Time reporting terminal).	2,500d*		B→G, Latest 92067A* & Data capture terminal(s)		
92903R	License to make one copy of 92903A Software for use on an additional system.	1,000d*		92903A without discount		
92903S+020	Software Subscription Service for 92903A software, updates on Mini cartridges.		15	Latest 92903A		
92903W	Right to reproduce 92903S updates once.		10	92903S		
92903T	Customer Support Service (CSS) for 92903A software.		50	Latest 92903A		
-020	Updates on Mini cartridges		N/C	92903T		
92903V	Central Support for additional copy of 92903A software.		10	92903T		

HP 1000 Diagnostics libraries and subscription service

MODEL #	DESCRIPTION	List Price	MSSC	Pre-requisites	Slots I/O Mem	CPU +5V Current
DIAGNOSTICS LIBRARIES AND SUBSCRIPTION SERVICE						
24396A	Diagnostics Library on paper tapes.	\$ 50d*		A→G & 12925A		
24396B	Diagnostics Library on 2.5M byte disc cartridge.	250d*		A→G & 12960A		
24396C	Diagnostics Library on 10M byte disc cartridge.	360d*		A→G & 7906H/M/MR		
24396D	Diagnostics Library on 9-track, 800 bpi Magnetic Tape.	90d*		A→G & 7970B+226/236		
24396E	Diagnostics Library on 9-track, 1600 bpi Magnetic Tape.	90d*		A→G & 7970E+226/236		
24396F	Diagnostics Library on Mini cartridges.	450d*		A→G & 2645A+007 or 2648A+007		
24396S	Diagnostics Subscription Service (must specify one of the following media options).		\$ 10	Latest 24396A/B/C/D/E/F		
-010	Diagnostic updates on paper tapes for 24396A.		8	12925A		
-020	Diagnostic updates on Mini cartridges for 24396F.		36	2645A/48A+007		
-050	Diagnostic updates on 800 bpi, 9-track magnetic tape.		8	7970B+226/236		
-051	Diagnostic updates on 1600 bpi, 9-track magnetic tape.		8	7970E+226/236		

d* Identifies discountable price for product that is eligible for Component OEM schedule; see Hewlett-Packard Computer Systems Group Purchase Agreement for details.

A = 2105A or 2108MK with 12728A card cage; B = 2108M or 2108MK with 12728J card cage; C = 2112M; D = 2109E or 2109EK with 12728J card cage; E = 2113E; F = 2111F; G = 2117F; A→G denotes that any computer whose letter is in the range A through G is a valid prerequisite.

*All other software in the system must also be up-to-date.

Other software and hardware support products

MODEL #	DESCRIPTION	List Price	MSSC	Pre-requisites	Slots I/O Mem	CPU +5V Current
1. SOFTWARE NOTIFICATION SERVICE						
92830A	Software Notification Service (provides information on changes to HP 1000 Computer System operating systems and software subsystems). <i>This service is included with Software Subscription Service or Customer Support Service for any HP 1000 Operating System; for description see the HP 1000 Computers and Systems Active Software Data book.</i>	\$ 20				
2. SOFTWARE CONSULTING						
22976B	One day's on-site software consultation with a trained HP Systems Engineer (multiple days are available by ordering multiple units of 22976B).	\$ 500				
3. HARDWARE NOTIFICATION PRODUCTS						
92851A	Hardware history library. Provides Engineering Reference Documentation, the HP 1000 Hardware and manual index log of hardware update and enhancement histories, and the current Service Notes microfiche cards, which contain all previously-issued Service Notes on HP 1000 products.	\$ 200				
92851Q	Hardware notification service. Provides updates on the 92851A Hardware history library, including updates to the HP 1000 Hardware and manual index log and the engineering reference documentation as well as the latest printed Service Notes as they are released and the latest Service Notes microfiche cards when they are issued (every six months).		6	92851A		

MSSC identifies Monthly Support Services Charge.

Minimum hardware requirements for HP 1000 operating systems

Operating System	Computer	Minimum Memory (bytes)	Disc Subsystem	System Console	System Input Device	Other Hardware
RTE-MI	2105A, 2108, 2109, 2111, 2112, 2113, or 2117	Execute only 16k (32k recom.) Prog. Dev. 48k	None	2645A/2648A+007,032, & 12966A+001 or when PREREQUISITE (below) is satisfied 2621A/P & 12966A+005 or 2635A+051 & 12966A+001	2645A or 2548A	None required
RTE-MII	2108, 2109, 2111, 2112, 2113, or 2117	Execute only 32k Prog. Dev. 64k	12732A req'd for Program Dev.	Same as RTE-MI	2645A or 2648A	12892B; 12539C req'd for Time Sched. or I/O timeout; 12897B with 12732A Flex Disc
RTE-MIII	Same as RTE-MII	96k	Same as RTE-MII; 12732A Flex disc drive recom. for multi-user Program Dev.	Same as RTE-MI	2645A or 2648A	Same as RTE-MII plus 12976B or 13305A or 1278xA/B/C/D Mem. package*
RTE-IV	Same as RTE-MII	96k; 128k strongly recommended	7906M/MR+020 or 7920M with 13175 interface or 12962A/B/C/D	Same as RTE-MI	2645A or 2648A or 7970B/E +226/236	12976B or 13305A or 1278xA/B/C/D package*, 12539C, and 12897B (and 13304A with 2109/13A/B)
RTE-IVB	Same as RTE-MII	128k	Same as RTE-IV, plus 7925M with 13175 interface	Same as RTE-MI	Same as RTE-IV	Same as RTE-IV
RTE-II	Same as RTE-MII	48k; 64k recom.	12960A or 7906M/MR+020 + 13175 or 12962A/B/C/D	Same as RTE-MI or 2640A/B and 12880A+001 interface 12925A	2645A, 2648A, or	12539C, 12892B, and 12897B

PREREQUISITE to use of 2621A/P or 2635A+051 as system console is availability at the system site of a means for loading software updates and diagnostics into the system, such as a 2645A/2648A+007,032 terminal and 12966A+001 interface shared by several systems for update and diagnostic loading.

* Memory package may be included in computer; if memory included in computer is not sufficient, purchaser should order 21xxMIE/F option 014 and memory package that provides the correct amount of memory.

Installation planning information

The customer is responsible for installation of HP 1000 computers and peripherals. This section is provided to assist your installation planning.

Hazardous location restrictions

HP 1000 computers and peripherals may not be legally usable in areas where volatile flammable gases or vapors or airborne combustible dust or fibers present a potential explosion or fire hazard. If there is any doubt about the safety of your operating site, check with the nearest OSHA office.

Space requirements

Space provided should leave your system cabinetry readily accessible from all sides. Table 2 provides overall dimensions for all computers and peripherals as well as approximate floor space recommended for stand-alone peripherals.

Floor requirements

The floor must be capable of supporting the maximum concentrated load of your most heavily loaded equipment cabinet. Moreover, the floor must also be strong enough to support any lifting equipment used to assist with installation. Tile, concrete, and other industrial floors, or raised floors, are usually suitable. Because of static discharge problems, carpeted floors should be avoided, but copper filament carpet can be used.

Illumination

For best visibility of lighted displays and indicators, an average illumination of 538 to 807 lumens per square metre (50 to 75 foot-candles) measured 76 cm (30 in) above the floor is recommended for your system's operating area.

Environmental conditions

Ventilation, air conditioning, heating, etc., of the operating site must be adequate to maintain ambient conditions of computer and peripherals within the specifications given below, after allowance for heat rise inside your equipment cabinet(s). In determining what environmental provisions will be needed, the maximum heat dissipation of the computers

and peripherals given in Table 3 and additional heat from lights, people, and other equipment working in the area should be considered.

Power requirements

It is advisable to provide proper power separately to the lighting circuits and to your computer system and peripherals, in accordance with local electrical codes. The computer and other system components must be powered from a single main source that is stable and noise free to assure uninterrupted operation.

Naturally, the dedicated receptacles used to supply power to your system and its accessories should be checked by a qualified electrician to confirm that they provide the proper line voltage and frequency for which the system and accessories are configured, within the limits specified.

Power and frequency tolerance for HP 1000 Computers

The steady state voltage must be maintained within plus 5% or minus 10% of the normal rated voltage measured at the receptacle when the system is operating. A transient voltage condition must not exceed plus or minus 15% of normal and must return to the steady state condition within 1/2 second (30 cycles for a 60 Hz system). The maximum total harmonic content of the system voltage on the feeder shall not exceed 5%. The line frequency variation must not exceed 1/2 cycle. In multi-phase installations the value of any line-to-line voltage shall not differ by more than 2.5% from the mean (arithmetic average) voltage.

Grounding

An uninterruptible safety earth ground connection of no more than 6 ohms resistance should be provided to your system and accessories via the power cables from the service entrance ground bus in accordance with local electrical code requirements. In addition, the voltage differential between neutral and earth ground should not exceed 1-volt when measured at your computer system's power line input terminals.

Environmental specifications summary for HP 1000 Computers and Peripherals

Item	Temperature Range		Rel. Hum.*	Maximum Altitude	
	Operating °C and (°F)	Non-Operating °C and (°F)		Operating m & (ft)	Non-Operating m & (ft)
HP 1000 Computers	0 to 55 (32 to 131)	-40 to 75 (-40 to 167)	20% to 95%	4572 (15,000)	15240 (50,000)
2621A Terminal	0 to 55 (32 to 131)	-40 to 75 (-40 to 167)	5% to 95%	4572 (15,000)	15240 (50,000)
2621P Terminal	5 to 40 (41 to 104)	-40 to 75 (-40 to 167)	5% to 80%	4572 (15,000)	15240 (50,000)
2635A Terminal	0 to 55 (32 to 131)	-40 to 75 (-40 to 167)	5% to 80%	3048 (10,000)	7620 (25,000)
2640B Terminal	0 to 55 (32 to 131)	-40 to 75 (-40 to 167)	5% to 95%	4572 (15,000)	7620 (25,000)
2645A/2648A Terminal	5 to 40 (41 to 104)	-10 to 60 (-14 to 140)	5% to 95%	4572 (15,000)	7620 (25,000)
Opt. 007 Mini cartridge I/O	No change	No change	20% to 80%	No change	No change
307x A/B Terminals	0 to 55 (32 to 131)	-40 to 70 (-40 to 158)	5% to 95%	3048 (10,000)	7620 (25,000)
Multifunction reader	No change	No change	20% to 75%	No change	No change
12960A Disc Subsystem	10 to 40 (50 to 104)	-40 to 75 (-40 to 167)	20% to 80%	3048 (10,000)	7620 (25,000)
79xxM Disc Memories	10 to 40 (50 to 104)	-40 to 65 (-40 to 149)	8% to 80%	4572 (15,000)	15240 (50,000)
12732A Flexible Disc Subsystem	10 to 45 (50 to 113)	-40 to 60 (-40 to 140)	20% to 80%	4572 (15,000)	7620 (25,000)
Other peripherals†	10 to 40 (50 to 104)	-10 to 57 (-40 to 134)	20% to 80%	3048 (10,000)	7620 (25,000)

*Relative humidity assumes no condensation; wet bulb temperature must not exceed 25.6°C (78°F).

†2613A and 2617A Line Printers require a minimum relative humidity of 30%.

Table 2. HP 1000 Computers and peripherals site planning information

Product	Height cm & (in)	Width cm & (in)	Depth cm & (in)	Approximate Floor Space Recommended m & (ft)	Net Weight kg & (lb)	Max. Heat Dissipation kg-cal/hr & (BTU/hr)
2105A Computer	13.3(5.25)	Rack width	62.2(24.5)	Rack mtg	17.7(39)	344(1365)
2108M/2109E Computer	22.2(8.75)	Rack width	62.2(24.5)	Rack mtg	20.4(45)	580(2303)
2108M+300/2109E+300 Computer	71.8(28.25)	55.2(21.75)	79(31.13)	1 x 3 (3 x 9)	84.5(186)	580(2302)
2111F Computer	31.1(12.25)	Rack width	62.2(24.5)	Rack mtg	30(66)	580(2302)
2111F+300 Computer	71.8(28.25)	55.2(21.75)	79(31.13)	1 x 3 (3 x 9)	94.1(207)	580(2302)
2112M/2113E Computer	31.1(12.25)	Rack width	62.2(24.5)	Rack mtg	29.5(65)	580(2303)
2112M+300/2113E+300 Computer	71.8(28.25)	55.2(21.75)	79(31.13)	1 x 3 (3 x 9)	93.6(206)	580(2303)
2117F Computer	44.5(17.5)	Rack width	62.2(24.5)	Rack mtg	50(110)	752(2986)
2117F+301/302 Computer	71.8(28.25)	55.2(21.75)	79(31.13)	1 x 3 (3 x 9)	114(251)	752(2986)
Upright cabinet	163.1(64.25)	53.3(21)	76.2(30)†	1 x 3 (3 x 9)	77.3(170)	43(171)
12732A Flexible Disc Subsystem	13.3(5.25)	Rack width	42.5(16.75)‡	Rack/table mtg	14.8(32.5)	138(546)
12733A add-on Flexible Disc Drive	13.3(5.25)	Rack width	42.5(16.75)‡	Rack/table mtg	14.8(32.5)	112(444)
12764A/12765A Analog I/O Expander	44.5(17.5)	Rack width	38.1(15)	Rack mtg	22(48.5)	344(1365)
12925A Tape Reader Subsystem	17.8(7)	Rack width	40.6(16)	Rack mtg	19.1(42)	580(2303)
12926A Tape Punch Subsystem	26.7(10.5)	Rack width	53.8(21.2)	Rack mtg	15.9(35)	198(785)
12960A (7900A) Cartridge Disc Subsystem	44.5(17.5)	Rack width	58.4(23)‡	Rack mtg	78.2(172)	351(1393)
12979B Dual-Port I/O Extender	22.2(8.75)	Rack width	59.6(23.5)	Rack mtg	16(35)	537(2133)
12985A Card Reader Subsystem	41.3(16.25)	58.6(23.06)	45.7(18)	Table mtg	34(75)	396(1570)
12990B Memory Extender	22.2(8.75)	Rack width	70.8(27.88)‡	Rack mtg	25.5(56)‡	258(1024)
2240A Meas. & Control Processor	22.2(8.75)	Rack width	35.6(14)	Bench/rack mtg	13.8(30.4)	112(444)
2241A Extender	22.2(8.75)	Rack width	35.6(14)	Bench/rack mtg	13.1(28.8)	112(444)
22920A Signal conditioning tray	4.45(1.75)	Rack width	35.6(14.0)	Rack mtg	1.7(3.7)	n/a
22922A Screw termination tray	4.45(1.75)	Rack width	35.6(14.0)	Rack mtg	1.4(3.1)	n/a
2313B Analog I/O Subsystem	44.5(17.5)	Rack width	42.5(16.75)	Rack mtg	22(48.5)	344(1365)
2608A Line Printer	104.2(41)	68(26.5)	55.5(21.8)	1 x 3 (3 x 9)	97(215)	593(2355)
2613A Line Printer	114.5(45)	83.8(33)	55.9(22)	1 x 3 (3 x 9)	154.5(340)	451(1792)
2617A Line Printer	114.5(45)	83.8(33)	66(26)	1 x 3 (3 x 9)	168.2(370)	585(2321)
2621A Interactive Terminal	44(17.3)	38(15)	66.5(26.2)	Table mtg	16.1(35.5)	43(171)
2621P Interactive Terminal	44(17.3)	38(15)	66.5(26.2)	Table mtg	18(39.5)	86(341)
2631A Printer	21.5(8.5)†	64(25.2)	46.9(18.5)	1 x 2 (3 x 6)	23.2(51)†	228(904)
2635A Printing Terminal	21.5(8.5)†	64(25.2)	59.5(23.1)	1 x 2 (3 x 6)	25.5(56)†	189(751)
2640B Display Terminal	34.3(13.5)	44.5(17.5)	64.8(25.5)	Table mtg	20(44)	107(426)
2645A Display Station	34.3(13.5)	44.5(17.5)	64.8(25.5)	Table mtg	22.7(50)	120(478)
2648A Graphics Terminal	34.3(13.5)	44.5(17.5)	64.8(25.5)	Table mtg	22.7(50)	120(478)
3070B Data Capture Terminal	11.7(4.6)	27.7(10.9)	40.0(15.7)	Table mtg	4.7(10.3)	43(171)
3074A Data Link Adapter	5.0(1.97)	25.0(9.84)	11.0(4.33)	Table mtg	1.0(2.2)	9.4(37.5)
3075A Data Capture Terminal	15.7(6.2)	22.7(10.9)	40.0(15.7)	Table mtg	6.6(14.4)	77.4(307)
3076A Data Capture Terminal	55.0(21.7)	29.0(11.4)	13.0(5.1)	Wall mtg	10.6(23.5)	77.4(307)
3077A Time Reporting Terminal	55.0(21.7)	29.0(11.4)	13.0(5.1)	Wall mtg	10.6(23.5)	77.4(307)
7221A Graphics Plotter	18.9(7.5)	49.5(19.5)	45.7(18)	Table mtg	18.2(40)	206(819)
7225A Graphics Plotter	14.0(5.5)	41.3(16.3)	37.9(14.9)	Table mtg	8.0(17.6)	60.1(239)
7245A Plotter/Printer	20.3(8)	44.1(17.38)	53.3(21)	Table mtg	19(40)	258(1024)
7906M Master Disc in low-profile cabinet	71.8(28.25)	55.2(21.75)	79(31.13)	1 x 3 (3 x 9)	154(340)	619(2457)
7906S Disc in low-profile cabinet	71.8(28.25)	55.2(21.75)	79(31.13)	1 x 3 (3 x 9)	138.8(303)	456(1809)
7906MR rack mounting Master Disc	53.3(21)	Rack width	71.1(28)	Rack mtg	87.2(192)	593(2355)
7906SR rack mounting Disc Drive	40.0(15.75)	Rack width	71.1(28)	Rack mtg	73.6(162)	430(1706)
7920M Master Disc	82.6(32.5)	49.9(19.65)	81.2(32)	1 x 3 (3 x 9)	159(350)	672(2669)
7920S Disc Drive	82.6(32.5)	49.9(19.65)	81.3(32)	1 x 3 (3 x 9)	143.2(315)	396(1570)
7925M Master Disc	82.6(32.5)	49.9(19.65)	81.3(32)	1 x 3 (3 x 9)	161(355)	516(2048)
7925S Disc Drive	82.6(32.5)	49.9(19.7)	81.3(32)	1 x 3 (3 x 9)	145(320)	344(1366)
7970B+226 Mag Tape Drive in cabinet	118.4(46.6)	69.9(27.5)	76.3(30.1)	2 x 3 (6 x 9)	181(400)	344(1366)
7970B+236 Mag Tape Drive	66.7(26.3)	Rack width	30.4(12)	Rack mtg	59.1(130)	344(1366)
7970E+226 Mag Tape Drive in cabinet	118.4(46.6)	69.9(27.5)	76.3(30.1)	2 x 3 (6 x 9)	186(410)	344(1366)
7970E+236 Mag Tape Drive	66.7(26.3)	Rack width	30.4(12)	Rack mtg	63.6(140)	344(1366)
9872A Graphics Plotter	18.8(7.4)	49.5(19.5)	45.5(17.9)	Table mtg	18.2(40)	189(751)
9874A Digitizer	54.6(21.5)	85.1(33.5)	52.1(20.5)	Table mtg	27.5(60.5)	151(600)
9876A Thermal Graphics Printer	15.2(6)	34.9(13.75)	44.5(17.5)	Table mtg	13.5(29.7)	133(529)

* Not including space required for system console and table or pedestal (not supplied) used to support the system console.

‡ Not including extender feet, which pull out of the cabinet 16.5 cm (6.5 in) at the operating site to prevent tip-over in the event units are pulled out on slides for servicing.

‡ Not including 2.5 to 7.5 cm (1 to 3 in) for cable clearance behind the rear panel.

‡ Including 12991B Power Fail Recovery battery pack.

† Not including optional pedestal.

Table 3. HP 1000 Computers and peripherals power planning information

Product	Max. AC Power†	Voltage Limits (V)		Frequency Limits (Hz)		Power Cable Length m & (ft)	Signal Cable Length m & (ft)	NEMA Power Plug(s) Supplied
		120V	(230V)	120V	(230V)			
2105A Computer	400W	88-132	(176-264)	48-66	48-66	2.1(7)		5-15P(D)
2108M/2109E Computer	625W	88-132	(176-264)	48-66	48-66	2.1(7)		5-15P(D)
2111F Computer	625W	88-132	(176-264)	48-66	48-66	2.1(7)		5-15P(D)
2112M/2113E Computer	625W	88-132	(176-264)	48-66	48-66	2.1(7)		5-15P(D)
2117F Computer	825W	90-126‡	(198-252)*	48-66	48-66	2.1(7)		5-15P(D)
Upright cabinet	50W		(B)		(B)		(C)	
12732A Flexible disc subsystem	160W	90-126‡	(198-252)*	57.9-62.1	(48.3-51.7)	2.1(7)	1.8(6)	5-15P(D)
12733A add-on Flexible disc drive	130W	90-126‡	(198-252)*	57.9-62.1	(48.3-51.7)	2.1(7)	1.8(6)	5-15P(D)
12764A/12765A Analog I/O Expander	400VA	104-126	(207-253)	50-60	(50-60)	1.8(6)		5-15P(D)
12925A Tape Reader Subsystem	240W	104-126	(207-253)	57-63	(47.5-52.5)	1.8(6)	3.6(12)	5-15P(D)
12926A Tape Punch Subsystem	300VA	104-126	(198-275)*	47.5-100	(47.5-100)	1.8(6)	3.6(12)	5-15P(D)
12960A (7900A) Cartridge disc subsystem	408W	99-132	(198-252)*	58.8-61.2	(49-51)	1.8(6)	4.5(15)	5-15P(D)
12979B Dual-Port I/O Extender	625W	88-132	(176-264)*	47.5-66	(47.5-66)	1.8(6)		5-15P(D)
12985A Card Reader Subsystem	(E)	104-126	(207-253)	58.8-61.2	(49-51)	1.8(6)	4.5(15)	5-15P(D)
12990B Memory Extender	300W	88-132	(176-264)	47.5-66	(47.5-66)	1.8(6)		5-15P(D)
2240A Meas. & Control Processor	130W	87-127	(172-254)	48-66	(48-66)	1.8(6)		5-15P(D)
2241A Extender	130W	87-127	(172-254)	48-66	(48-66)	1.8(6)		5-15P(D)
2313B Analog I/O Subsystem	400VA	104-126	(207-253)	50-60	(50-60)	1.8(6)		5-15P(D)
2608A Line Printer	(F)	90-126‡	(198-252)*	48-66	(48-66)	1.8(6)	7.6(25)	5-15P(D)
2613A Line Printer	525W	104-126	(198-264)	58.8-61.2	(49-51)	3.6(12)	7.6(25)	5-15P(D)
2617A Line Printer	680W	104-126	(198-264)	58.8-61.2	(49-51)	3.6(12)	7.6(25)	5-15P(D)
2621A Interactive Terminal	50W	90-126‡	(198-252)*	57-63	(47.5-52.5)	1.8(6)		5-15P(D)
2621P Interactive Terminal	100W	87-126	(196-253)	57-63	(47.5-52.5)	1.8(6)		5-15P(D)
2631A Printer	265VA	88-132‡	(194-264)*	48-62	(48-66)	4.8(16)	3.8(12.5)	5-15P(D)
2635A Printing Terminal	220VA	88-132‡	(194-264)*	48-62	(48-66)	4.8(16)	3.8(12.5)	5-15P(D)
2640B Display Terminal	125W	92-126	(184-253)	58.8-61.2	(49-51)	1.5(5)	5-15P(D)	
2645A Display Station	140W	88-126	(177-253)	58.8-61.2	(49-51)	2.8(7.5)	1.5(5)	5-15P(D)
2648A Graphics Terminal	140W	88-126	(177-253)	58.8-61.2	(49-51)	2.8(7.5)	1.5(5)	5-15P(D)
3070B Data Capture Terminal	50W	90-126‡	(198-252)*	47.5-66	(47.5-66)	2.1(7)	(G)	5-15P(D)
3074A Data Link Adapter	11W	87-126	(173-253)	47.5-66	(47.5-66)	2.1(7)	(G)	5-15P(D)
3075A Data Capture Terminal	90W(t)	87-126	(173-253)	47.5-66	(47.5-66)	2.1(7)	(G)	5-15P(D)
3076A Data Capture Terminal	90W(t)	87-126	(173-253)	47.5-66	(47.5-66)	N/A	(G)	N/A
3077A Time Reporting Terminal	90W(t)	87-126	(173-253)	47.5-66	(47.5-66)	N/A	(G)	N/A
7221A Graphics Plotter	240W	90-126‡	(196-252)*	48-66	(48-66)	2.1(7)		5-15P(D)
7225A Graphics Plotter	70W	90-126‡	(198-252)*	48-66	(48-66)	2.1(7)		5-15P(D)
7245A Plotter/Printer	300W	90-126‡	(198-252)*	48-66	(48-66)	2.8(7.5)		5-15P(D)
7906M Master disc in low-profile cabinet	720W	90-126‡	(198-252)*	48-66	48-66	3.6(12)		5-15P(D)
7906S Disc in low-profile cabinet	510W	90-126‡	(198-252)*	47-66	(47-66)	3.6(12)		5-15P(D)
7906MR rack mounting Master Disc	690W	90-126‡	(198-252)*	48-66	48-66	1.8(6)	3(10)	5-15P(D)
7906SR rack mounting Disc Drive	480W	90-126‡	(198-252)*	47-66	(47-66)	1.8(6)	3(10)	5-15P(D)
7920M Master Disc	782W	90-126‡	(198-252)*	48-66	48-66	3.6(12)		5-15P(D)
7920S Disc Drive	530W	90-126‡	(198-252)*	48-62	(48-62)	3.6(12)	(H)	5-15P(D)
7925M Master Disc	600W	90-126‡	(198-252)*	48-66	48-66	3.6(12)		5-15P(D)
7925S Disc Drive	400W	90-126	(198-252)*	47.5-66	(47.5-66)	3.6(12)	(H)	5-15P(D)
7970B/E Magnetic Tape Drive	400VA	104-126	(207-253)	48-60	(48-60)	1.8(6)	4.5(15)	5-15P(D)
9872A Graphics Plotter	220VA	90-126‡	(198-252)*	48-66	(48-66)	2.1(7)		5-15P(D)
9874A Digitizer	176W	90-126‡	(198-252)*	48-66	(48-66)	2.1(7)		5-15P(D)
9876A Thermal Graphics Printer	155VA	90-126‡	(198-252)*	48-66	(48-66)	1.8(6)	4.5(15)	5-15P(D)

† Power specifications for 217xA/B/C/D Computer Systems include power for system console.

‡ Range shown for 115V here includes user-selectable choice of 100V or 120V input; there is a gap between 105V and 108V.

* Range shown for 230V here includes user-selectable choice of 220V or 240V input plus the voltage tolerance.

(A) Power cable is not supplied for 230V or multi-bay upright cabinet systems operation; it must be furnished by the user.

(B) Voltage limits and frequency here depends upon items in the additional cabinet bay.

(C) Power cable is not supplied for additional cabinet bays; it must be furnished by the user.

(D) Outside of U.S., power cord supplied depends on country of origin of the sale.

(E) 12985A Card Reader starting load is 1426VA, operating load is 460VA.

(F) 2608A non-printing power is 225VA, typical printing power is 690VA, maximum printing power is 1350VA.

(G) For 3070-3077 signal cable length information, see the data sheets in the HP 1000 Distributed Systems & Comm. Data book.

(H) The 7906S/7920S/7925S multi-unit cable used for daisy-chain connection of multiple drives is 1.5m (5 ft) or 2.4m (8 ft) long; the data cable, which must reach back to the disc controller, is 15.2m (50 ft) long.

(t) Denotes typical power requirement, not maximum.