HP 3000 Computer Systems

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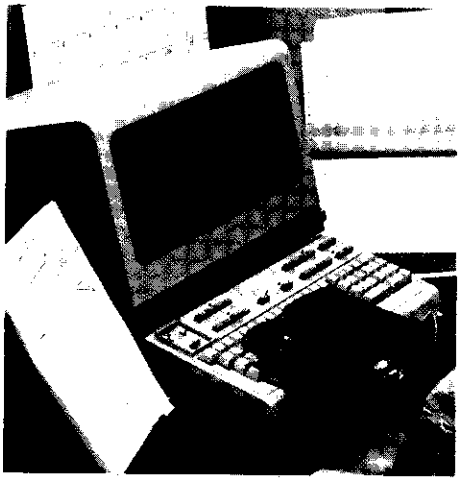
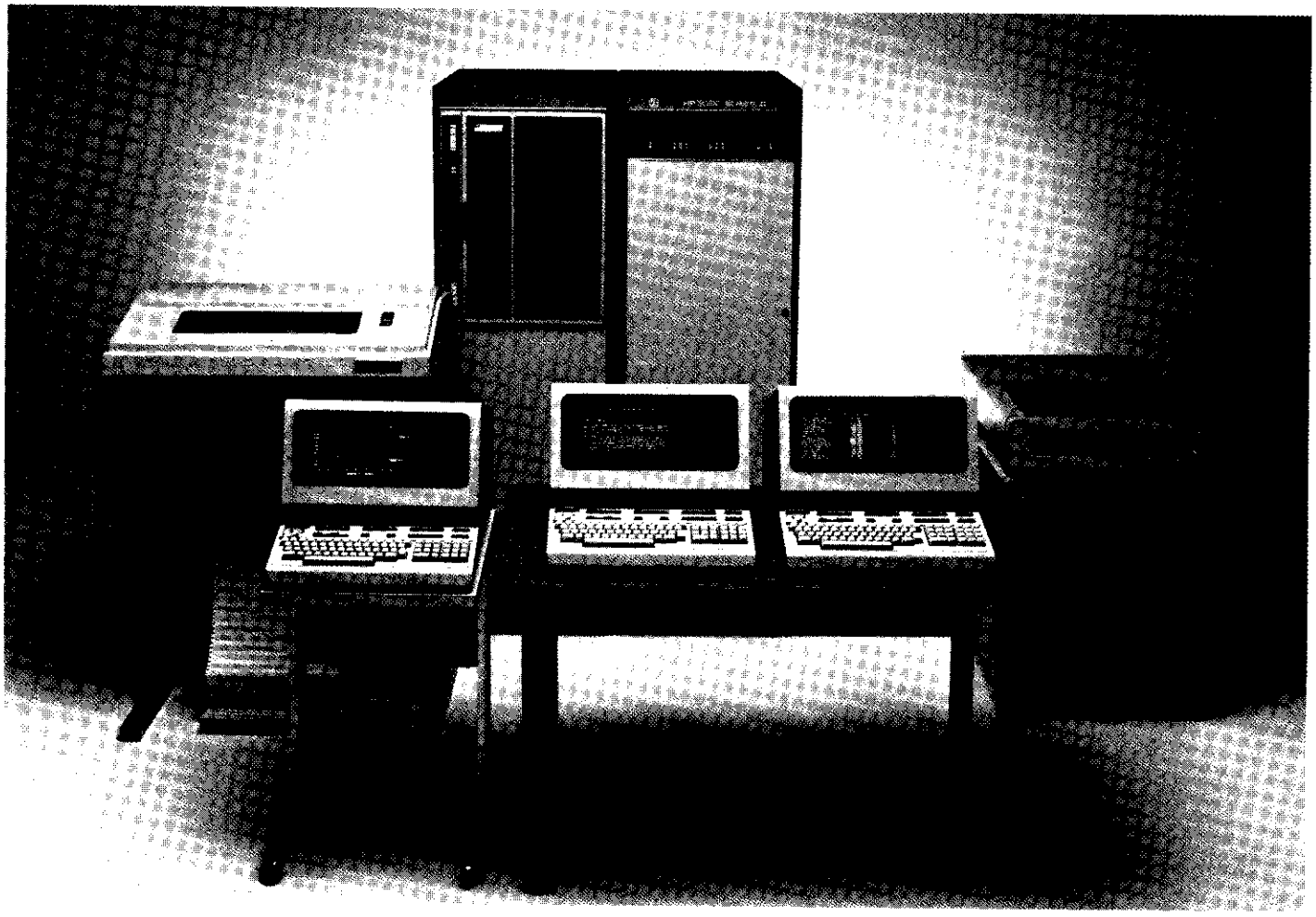
Computer advances in information processing

Price/configuration guide





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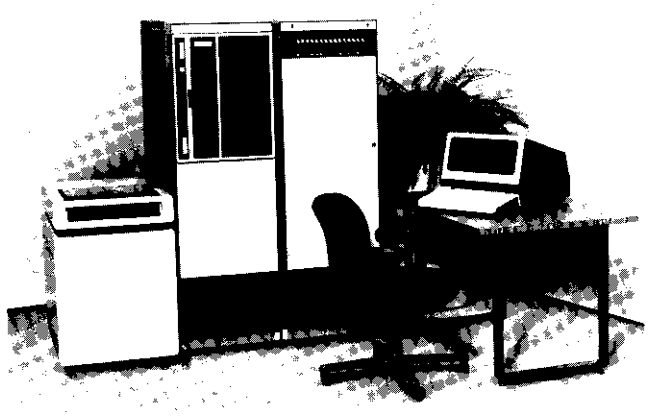
The HP 3000 Systems at a Glance

The HP 3000 family of computers, comprised of both Series I and Series II systems, offers you a broad range of capabilities and performance. The expandable hardware configurations and upward software compatibility of all the models allow you to choose the system that best fits your current needs, while protecting your investment for the future. A full range of peripherals, programming languages, data base management packages, and hardware/software options for data communications exist for additional system enhancement. To simplify a comparison of the Series I and Series II systems, the following discussion and chart outline the features of each.

HP 3000 Series I Systems

To satisfy the data processing needs of many organizations for a powerful yet low cost general purpose computer, Hewlett-Packard offers the HP 3000 Series I. By integrating new CPU backplanes, card cages, peripherals, and peripheral controllers with previously employed mainframe components, Hewlett-Packard is able to produce a system that represents a truly exceptional value. Approximately 85% of the cost of the standard system is new. The system is fully warranted and supported.

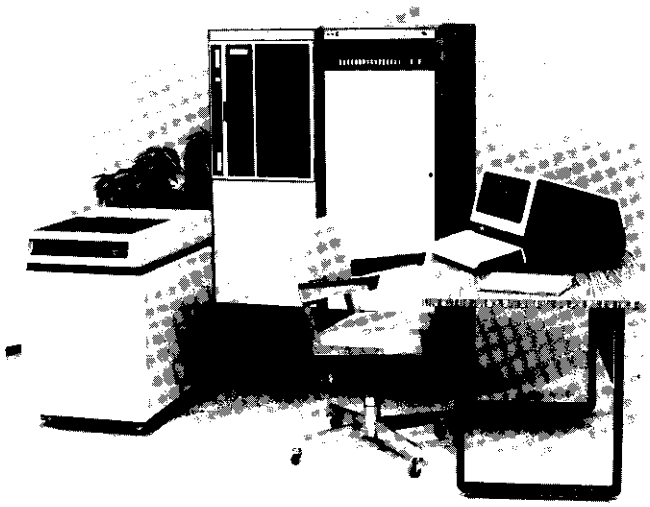


HP 3000 Series I System

The standard Series I configuration incorporates a CPU bay with a 128 kilobyte core memory, magnetic tape bay with a 1600 bpi tape unit, 50 megabyte disc drive, interactive system console, system desk, the MPE-C operating system, and the fundamental operating software. Optional line printers, card readers, terminals, and other peripherals and software can be added to the system to meet your applications requirements.

HP 3000 Series II Systems

The HP 3000 Series II Computer Systems are the result of a continuing development program incorporating the state-of-the-art in computer architecture, sophisticated software systems, and advanced system devices. All these elements have been considered concurrently in the design process to produce a significant advance in data processing price/performance.



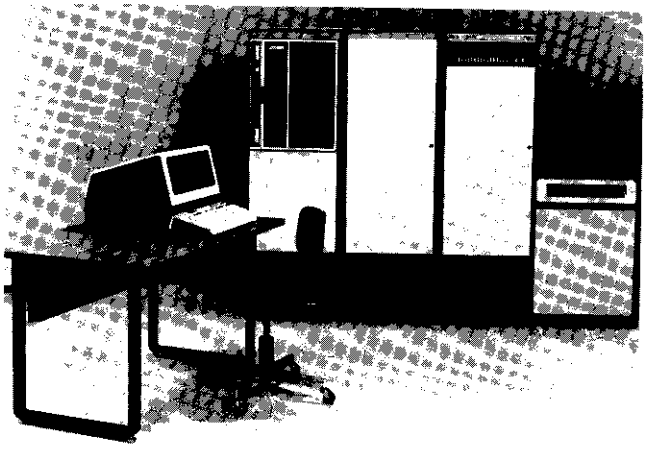
HP 3000 Series II System, Model 6

The HP 3000 Series II Model 6 is a general purpose, entry level Series II computer system. Supporting up to 32 interactive terminals, the standard Model 6 incorporates 128 kilobytes of fault control memory (expandable to 512kb), a 50 megabyte disc drive connected to a high-speed selector channel, a 1600 bpi industry-compatible magnetic tape drive, a 16-port asynchronous terminal controller, and an HP 2640B Interactive Display Terminal as the system console. Also included as part of all Model 6 systems are the MPE II operating system and the fundamental operating software.

Due to its greater I/O capacity, the HP 3000 Series II Model 8 is suited for larger system configurations requiring more peripherals and controllers. The standard Model 8 comes equipped with 320k bytes of fault control memory (expandable to 512kb). It also has all of the hardware and software features of the Model 6, as well as an additional bay which accommodates greater peripheral expansion, permitting support of up to 64 interactive terminals. As with the Model 6, all Model 8 systems include the MPE II operating system and the fundamental operating software,

which consists of the SPL/3000 (Systems Programming Language) compiler, and a package of utilities for file copying, sorting, and merging, and text editing.

All peripheral devices described in this configuration guide can be connected to either a Model 6 or 8. In addition, all software products will run on either model, provided the system has a minimum of 192k bytes of memory.



HP 3000 Series II System, Model 8

Series I—Series II Comparison Chart

Series I

Hardware

128 kb core memory with parity

Up to 16 terminals
48-bit floating point precision
192 firmware instructions
One asynchronous terminal controller
One or two printers and controllers
103 modem control – optional
880 kb/second multiplexer channel
1.9 Mb/second selector channel & central data bus
5 standard I/O slots (additional 10 slot option)

Up to 7 additional 7920s
Up to 3 additional mag tapes
Card reader/punch
Read 175 cards/minute
Punch/print 27 to 40 cards/minute

Software

MPE-C

Languages

- COBOL
- FORTRAN
- SPL
- RPG
- BASIC (compiler & interpreter)

File access and organization
Sequential
Direct (Random)
IMAGE/QUERY
Up to 16 data extents.
Data set cannot cross volume boundry.
INDEX/3000
1 key.
Single user update.
Multiple user inquiry.

Communications
2780/3780 Emulation

Additional application software
DEL/3000
Scientific Library
SIS/3000

Terminal type recognition user specifiable.
Power fail/manual restart.
Up to 96 open files per program.
Spoolfile size unlimited.
Up to 16 file extents.
File cannot cross volume boundry.

Series II

Hardware

128 kb to 512 kb fault control semiconductor memory
Up to 63 terminals
64-bit floating point precision
209 firmware instructions
Up to 4 asynchronous terminal controllers
Up to 4 printers and controllers
103 modem control included
990 kb/second multiplexer channel
2.86 Mb/second selector channel & central data bus
10 standard I/O slots (model 6), 23 standard I/O slots (model 8)
Up to 7 additional 7920s
Up to 7 additional mag tapes
Card reader/punch
Read 200 cards/minute
Punch/print 45 to 75 cards/minute

Software

MPE-II is a larger, enhanced version of MPE-C with additional terminal handling capability.

Externally, to the user, MPE-II is very similar to MPE-C but internally it is different.

Languages

- COBOL
- FORTRAN
- SPL
- RPG
- BASIC (compiler & interpreter)
- APL

File access and organization
Sequential
Direct (Random)
IMAGE/QUERY
Up to 32 data extents.
Data set can cross volume boundry.
KSAM/3000
16 keys.
Concurrent update and inquiry capability.

Communications
2780/3780 Emulation
DS/3000

Additional application software
DEL/3000
Scientific Library
SIS/3000

Terminal type recognition automatic.
Power fail/auto restart.
Up to 255 open files per program.
Spoolfile size is limited to 32 configurable extents.
Up to 32 file extents.
File can cross volume boundry on extent boundry.

HP 3000 Series I Configuration Guide

Features

- **128-kilobyte core memory**
- **Multiprogrammed operating system**
- **Concurrent CPU and I/O operation**
- **Integrated terminal access**
- **50 megabytes of disc storage**
- **Software compatible with other HP 3000 models**

Series I is a general purpose computer system designed for educational, commercial, and scientific applications. The system features concurrent batch and terminal access, and can be adapted to a dedicated application, yet retains its flexibility and performance for adaptation to a variety of tasks.

Hardware supplied

The HP 3000 Series I hardware includes:

- Central processing unit (CPU)
- 128-kilobyte core memory
- 192 firmware instructions
- System clock
- 16-port asynchronous terminal controller
- System I/O Multiplexer
- System desk, two cabinet bays, card cages, and power supplies
- 30030A high-speed selector channel
- 2640B CRT console with the HP 13234A additional 4-kilobyte memory
- 30229A Disc controller with 7920A 50-megabyte disc unit
- 30215A Magnetic tape controller with 7970E 1600 bpi magnetic tape unit
- 5 spare I/O slots
- 60 Hz, 12.6 KVA Isolation transformer

Software supplied

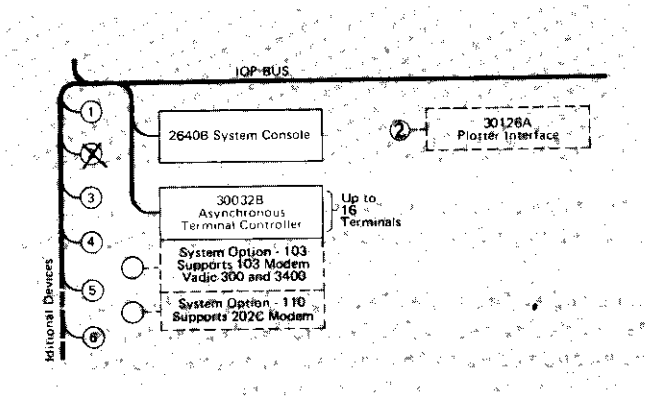
- Multiprogramming Executive operating system (MPE-C)

HP 3000 Series I Fundamental Operating Software, including:

- System Programming Language (SPL)
- Text editor (EDIT)
- Program debugging aids (DEBUG and TRACE)
- File-copying utilities (FCOPY)
- Sort and merge package (SORT)
- Compiler library

How to configure a system

When choosing options denoted by "circles", be certain to write the number of the interface slot which the option will occupy in the open circle beside the selected option; then, cross out the numbered circle connected to the IOP Bus to show that the interface slot is no longer available. For example:



As a result, the options that have been chosen and the interface slots they occupy will be evident at a glance. DO NOT EXCEED THE TOTAL NUMBER OF AVAILABLE INTERFACE SLOTS ON THE IOP BUS. If more than five interface slots for additional devices are selected, then the expanded I/O option 300 or product number 30413A must be ordered. This option provides ten additional I/O slots on the IOP bus.

Site preparation data

	HP 7920A 50 Mb DISC DRIVE		TWO SYSTEM BAYS		HP 2640B CRT CONSOLE AND DESK	
	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230	208 phase/phase	230	115	230
PHASES	1	1	3	1	1	1
CURRENT PER PHASE	4.5A	2.3A	* †	* 12A	1.3	0.7
CONNECTION CODE	C	E	M	M	F	F
HEAT OUTPUT (per hour)	2200 btu	554 kcal	14000 btu	3500 kcal	483 btu	129 kcal
WEIGHT	240 lb	109 kg	790lb	358 kg	139 lb	64 kg
SIGNAL CABLE LENGTH	**	**	–	–	25 ft	7.6 m

* *Plan for 300% overcurrent turn-on surge.* † *A = 9.5A; B = 11A; C = 2A.*

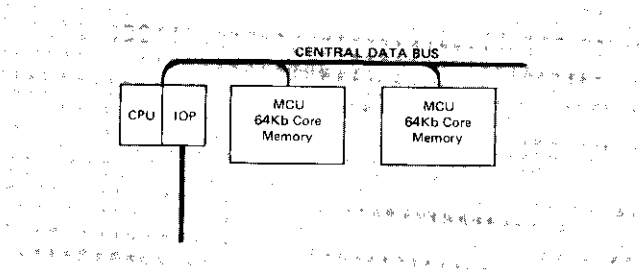
** *Up to eight disc drives may be daisy-chained to a controller. The cable length from the controller to the first drive is 18 ft. (5.5 m). The cable length between disc drives is 8 ft. (2.4 m).*

In addition, each drive also has a cable back to the controller. The length of this cable for each drive is 50 ft. (15.2 m).

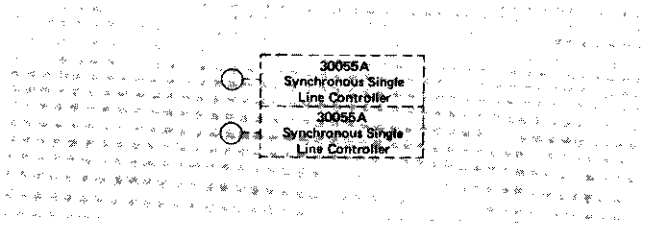
The maximum cumulative length of daisy-chained cable is 74 ft. (22.5 m).

Devices identified with triangles or squares will function only in the positions designated by matching geometric shapes.

Equipment Supplied (Standard Configuration). Products in "clear white" outlined by "solid lines".



Optional Equipment. Products in "gray screen" outlined by "interrupted lines".



The "Pricing Guide" at the rear of this publication may offer additional specific qualifications for selecting options.

Connecting Additional Terminals. One asynchronous terminal controller (ATC) is supplied. It permits the connection of up to 16 terminals. The system console does not count as one of these terminals.

Disc Drive. One 50 Mb Disc Subsystem with controller is supplied, connected directly to the Central Data Bus through a Selector Channel. The controller can handle a total of 8 drives, 400 Mb maximum capacity.

Magnetic Tape Units. One 1600 bpi magnetic tape drive is supplied and is connected through a controller to the system. An 800 bpi drive may be selected as an alternative. The supplied controller can also handle up to three extra drives of mixed densities (up to a total of four).

Additionally, a second controller may be ordered which can also support up to four drives of mixed densities. A maximum of two controllers and four drives can be attached to a system.

Each additional tape drive ordered will be supplied in a cabinet attached to the system bays. See the 7970 data sheet for further configuration details on extra drives.

Line Printers. Eight options are available; as many as two printers may be connected to any Series I System.

Modem Support. Modems supported for the HP 3000 Series I are:

Type	Half/Full Duplex	Speed (cps)
Bell 103A	Full	30
Bell 113A	Full	30
Bell 202C	Half	120
Vadic 300	Full	30
Vadic 3400	Full	120

Environmental specifications

The following specifications apply to any HP 3000 Series I configured with any combination of the peripheral devices listed in this data book. It is not necessary to consider each device separately.

Temperature (operating)

60° – 82°F (16° – 28°C)

Relative humidity

50 - 80% non-condensing. Maximum wet bulb temperature 78°F.

Line voltage

115V +5%, -10%. (For 3-phase inputs this is the neutral-to-phase specification for each phase).
230V +5%, -10%.

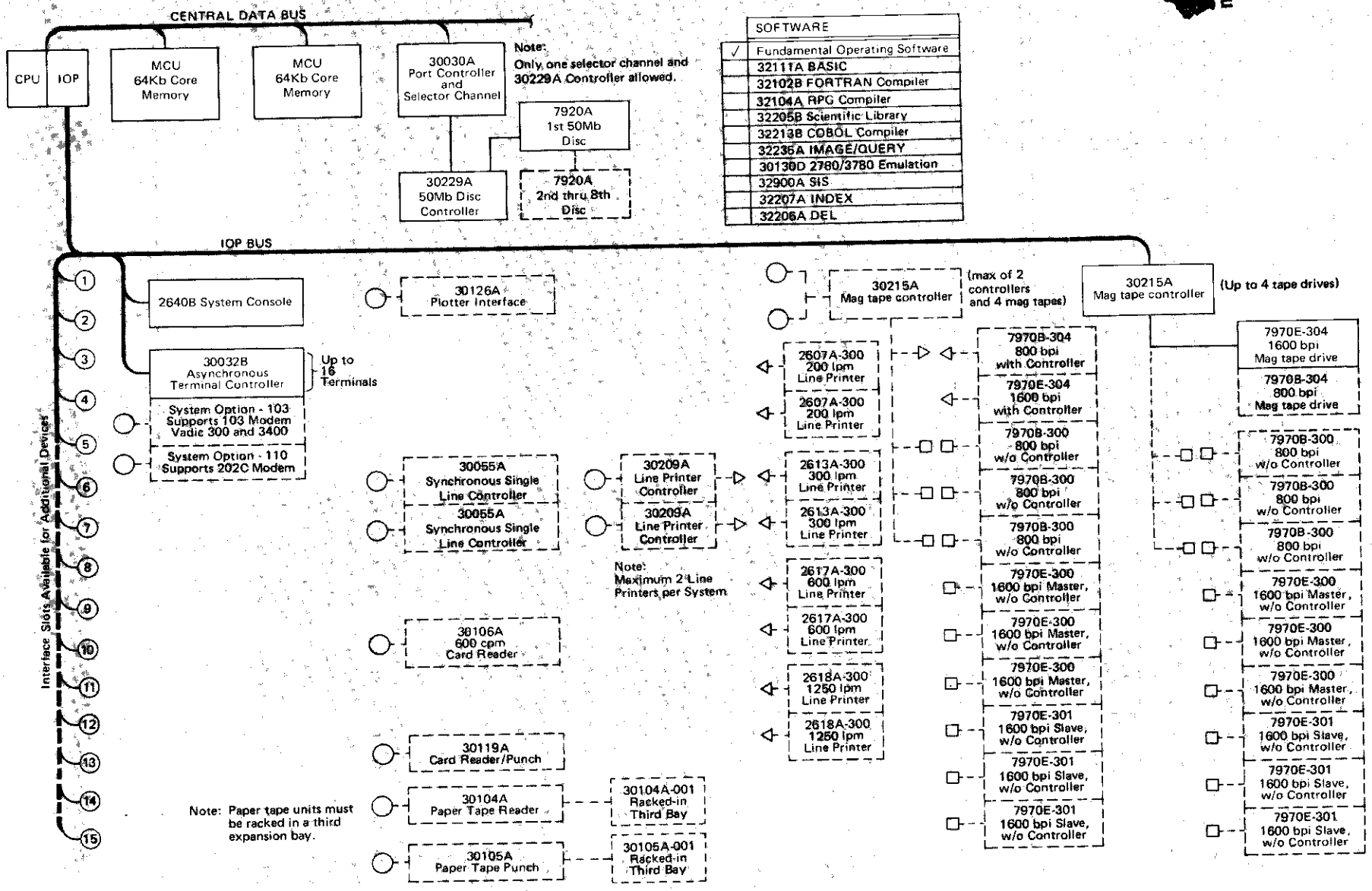
Line frequency

50 or 60 Hz, ±0.5 Hz.

Maximum rate of temperature change

10°F/Hr. (5.5°C/Hr.)

Configuration diagram for HP 3000 Series I Systems



	SOFTWARE
✓	Fundamental Operating Software
	32111A BASIC
	32102B FORTRAN Compiler
	32104A RPG Compiler
	32205B Scientific Library
	32213B COBOL Compiler
	32236A IMAGE/QUERY
	30130D 2780/3780 Emulation
	32900A SIS
	32207A INDEX
	32206A DEL

Note: If more than 5 interface slots for the additional devices are selected, then the expanded I/O option (system option 300) or product number 30413A must be ordered.

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HP 3000 Series I
Fundamental Operating Hardware

Features

- **Hardware-implemented stack**
- **192 unique instructions**
- **33 registers, 16 accessible to user programs**
- **175-nanosecond microinstruction time**
- **16- and 32-bit integer arithmetic**
- **32- and 48-bit floating point arithmetic**
- **28-digit packed decimal arithmetic**

The basic hardware of the HP 3000 Series I System consists of a Central Processing Unit (CPU), Input-Output Processor (IOP) and Core Memory, interconnected via a high speed central data bus. A separate Input-Output Processor bus connects external devices to the system. Additionally, the multiplexer channel contains a processor capable of simultaneous execution of up to 16 I/O programs. Terminals are interfaced to the IOP bus through an asynchronous terminal controller capable of connecting 16 terminals to the system. A selector channel provides high speed peripheral devices with a direct link to the central data bus.

Central processing unit (CPU)

The three major components of the CPU are instruction decoder, firmware storage and control, and hardware processor.

The Instruction Decoder unit converts an instruction in the Current Instruction Register (CIR) into a starting address for the microcode contained in a Read-Only Memory (ROM), and determines various initial conditions required for executing the instruction. As the current instruction is being executed, the next instruction is fetched and placed into the Next Instruction Register (NIR). Upon completion of the current instruction, the contents of NIR are loaded into CIR and the cycle is repeated. This "pipelining" of the current instruction execution with the next instruction-fetch improves throughput by overlapping operations.

The Hardware Processor consists of an arithmetic-logic unit, shifting network, 33 specific purpose registers and related data manipulating and testing logic. Table I lists the 33 registers and their associated functions.

The four top-of-stack registers are of special interest. In order to improve execution speed, up to four elements from the top of a user's data stack may be contained in these registers. This allows many functions to be treated as register-to-register operations rather than the slower-speed memory-to-register or register-to-memory type operations. These registers are manipulated by the CPU, and their use is fully transparent to the user.

Firmware Storage and Control consists of microcode, stored in read-only memory (ROM), and associated control logic. Microcode routines control the operation of the

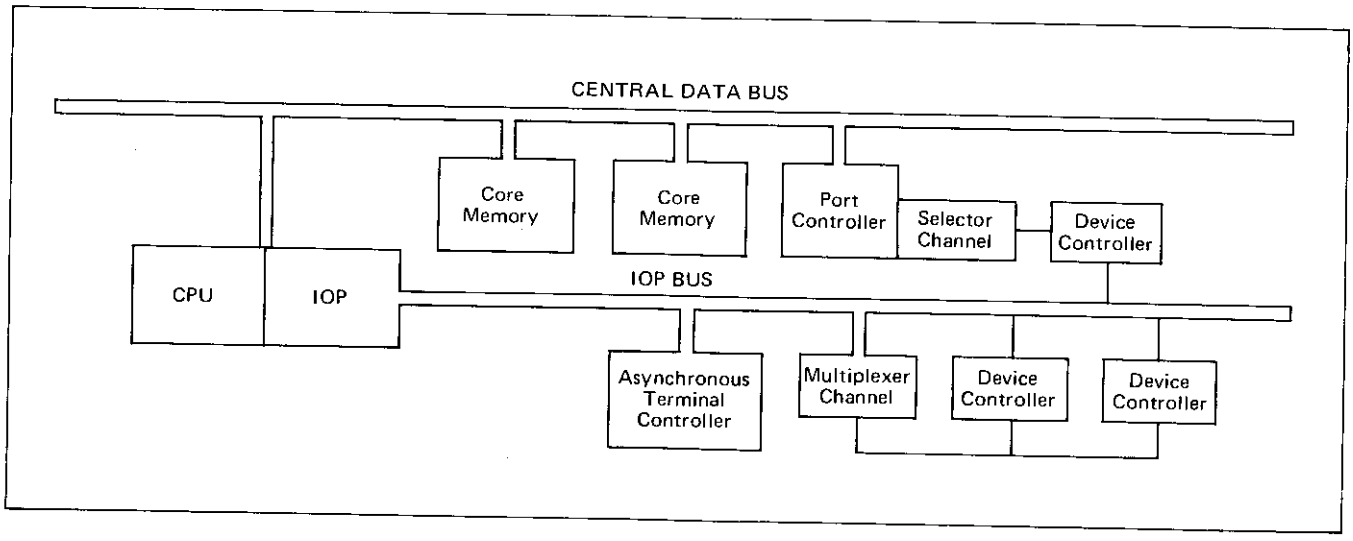

TABLE I

REGISTERS ACCESSIBLE TO THE PROGRAMMER	
REGISTER	**FUNCTION**
PB, P, PL	Code Segment Pointers
DL, DB, Q, SM, SR, Z	Stack Pointers
RA, RB, RC, RD	Top of Stack Registers
X	Index Register
STA	Status Register
SWCH	Switch Register
REGISTERS DEDICATED FOR SYSTEM USE	
CIR	Current Instruction Register
NIR	Next Instruction Register
SP0, SP1, SP2, SP3, CTR, CPX1, CPX2, MOD	Scratch Pad, Flag, and Interrupt Registers
IOA, IOD	I/O Registers
PCOR, UCOR, OPND	Memory Address and Data Registers
RAR, SAVE	Firmware Address Registers

Instruction Decoder and the Hardware Processor, in order to create the 3000 Series I operating environment – including the 192 instructions available to the programmer.

All instructions are 16 bits in length except stack operations, which are 8-bit instructions. These include a variety of memory reference, branch, arithmetic and data manipulation instructions that operate on integer, real, logical, packed decimal, character and string data. Floating point arithmetic can be performed in single precision (32 bits) or extended precision (48 bits), integer arithemtic in 16-bit and 32-bit lengths, and packed decimal instructions extend to 28 digits of precision. In addition, there are a number of instructions designed to aid in creating the multi-programming environment of the Series I. These include procedure call and exit instructions and others which implement various operating system functions previously done in software.

Input output processor (IOP)

The Input/Output Processor controls the IOP bus and interrupt lines, providing the communications and data path between the CPU and I/O devices for direct I/O operations and interrupt processing, and also provides a data path between memory and I/O devices for programmed I/O operations.

I/O operations are divided into three categories, Direct I/O, Programmed I/O, and Interrupt Processing. Direct I/O operations take place as a result of I/O instructions executed by the CPU; they result in transfer of a word of information between the CPU and an I/O device through the IOP or cause a control function to take place in the I/O system. Devices connected to a Multiplexer (see Peripheral I/O Hardware) may use programmed I/O, with the Fundamental Series I hardware. Once started, programmed I/O operations can (through the execution of I/O programs stored in memory) transfer block(s) of data between I/O devices and memory, and perform other device control functions without further CPU intervention or attention. The IOP also accepts interrupt requests from the device controllers, interrogates them by means of a poll line to find the highest priority request, sends an interrupt signal to the CPU and supplies it with the number of the interrupting device.

Peripheral I/O hardware

Features

- **Peripheral interfacing to the HP 3000 Series I**
- **16 port terminal-controller**
- **880 kilobyte/second IOP bus transfer rate**
- **Support for 14 device controllers on the multiplexer channel**
- **Options for Bell 103A, 113B and 202C and Vadic 300 and 3400 modem support**
- **System console**

The peripheral I/O hardware consists of the IOP bus, interrupt lines, and a multiplexer; these provide the basic peripheral interfacing capabilities. Additionally, an asynchronous terminal controller provides for the interfacing of log-on terminals.

IOP Bus

All devices are connected to the IOP bus, (some are also connected via a multiplexer). The maximum transmission rate of the IOP bus is 880 kilobytes per second.

30032B Asynchronous terminal controller

The Asynchronous Terminal Controller (ATC) is designed to interface user terminals to the HP 3000 Series I via the IOP bus. Up to 16 terminals can be interfaced. Terminals can be hardwired or connected through Bell 103A, 113B, and 202C and Vadic 300 and 3400 modems. The modems listed are for dial-up use. Hewlett-Packard does not support the use of leased lines with the Series I HP 3000 computers. The system console does not occupy a terminal port. Sixteen terminal ports are available.

Multiplexer

The multiplexer performs programmed I/O operations for up to 14 device controllers concurrently. All device controllers may be involved in programmed I/O operations simultaneously. The multiplexer is connected to the IOP bus, through which I/O program words are fetched from memory. A solid state memory in the multiplexer is divided into sections, one for each device controller. Typically, this memory contains the current I/O program word and related information for each device. When a device is selected for service, the multiplexer executes the indicated operation (or portion thereof) in conjunction with the device controller.

Selector channel

The Selector Channel interfaces high speed peripheral devices to the HP 3000 Series I, and connects to the central data bus through a port controller. High-speed peripherals access the selector channel through their device controllers; the selector channel is used in interfacing the 30229A disc controller which is supplied as part of the standard HP 3000 Series I.

System physical characteristics

	Height		Width		Depth		Ship. Weight	
UNIT	Inches	cm	Inches	cm	Inches	cm	lbs	kg
CPU BAY	64.5	163.2	21	53.3	33	83.8	559	254
PIO BAY	64.5	163.2	21	53.3	33	83.8	539	245
7920A DISC	32.5	82.5	19.65	50	32	81.3	345	157
TABLE	28.5	72.4	48	122	31	78.7	124	56.4
HP 2640B	13.5	34.3	17.5	44.5	25.5	64.8	44.1	17

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MPE-C Multiprogramming Executive

Features

- **Concurrent multi-lingual capability, FORTRAN, COBOL, RPG, BASIC, and SPL**
- **Multiprogramming**
- **Virtual memory**
- **Stack architecture**
- **Simple and powerful command language**
- **Complete accounting of resources**
- **File backup and security**
- **Relocatable program modules**
- **Recursivity/reentrancy**
- **Dynamic resource allocation**
- **Remote processing via terminals**
- **Spooling — input and output**
- **Power fail/manual restart**

MPE-C is a general purpose, disc-based software operating system that makes possible concurrent execution of many programs in a multi-lingual environment. When a user program enters execution, the instructions within it are executed on a multiprogramming basis. Should one job be temporarily suspended, perhaps to await the completion of an I/O operation, another can immediately employ the central processor. Thus, when many users are active in the system, uninterrupted processing and high user throughput can be maintained.

User programs are independent of the mode through which they are input; the user can run the same code from either traditional batch input devices or interactive terminals. In fact, the same system code is used to accomplish particular functions in either mode, resulting in storage economy and reduced overhead.

Stack architecture and virtual memory

The employment of stack architecture by MPE-C automatically provides the separation of code from a user's data. This separation of data from code provides for both recursivity and reentrancy of user programs. That is, one copy of a program can be shared by many users while each still operates in his own environment free from interference by the other users.

Storage for local data is allocated only as needed and is automatically freed when no longer required, allowing reuse of that area of memory by other parts of the program. Consequently, programs require less storage than conventional systems.

MPE-C virtual memory provides a total memory space that far exceeds the main memory of 128k bytes. Programs are logically divided into variable length segments of code and data which reside in disc memory. Only those code and data segments required at a particular time are required to be in main memory; when a code segment is no longer needed it can be overwritten by a new segment. Segments can contain the operating system, users' code and data areas. The management of the segments is automatically handled by MPE-C, transparent to the user.

Storage economy

MPE-C provides economized use of main memory and secondary mass storage, freeing the maximum storage possible for user programs and data. Priorities are used to control main-memory resources, eliminating the need for fixed or variable memory partitions to support MPE's unified multi-lingual, multiprogramming environment. Main memory is allocated for temporary and local variables only when needed, and is de-allocated when a procedure exits. Disc storage is automatically allocated as needed, and files on disc can be accessed simultaneously by many users, or protected by means of a flexible set of security measures.

Command language

The simplicity of the command language greatly enhances the MPE-C System's usability. The user interfaces with MPE-C through commands (for general functions external to his programs) and intrinsic calls (for specific functions invoked during program execution). Common system commands are used to initiate and terminate jobs and sessions, re-specify file characteristics, compile and execute programs, and call various utility subsystems. The programmer need learn only one set of conventions for using these facilities because they all use the same command formats, special characters, and error-diagnostic methods. Intrinsic calls implement such functions as reading, writing on, and updating files, skipping forward or backward on a file, or returning system table information to the user's program. These intrinsic calls are available not only to the SPL (Systems Programming Language) but also to the higher level languages, BASIC, FORTRAN, RPG, and COBOL.

File management capabilities

MPE file system provides user program interaction with I/O devices in a manner that is device independent. Thus, for example, any program can read data from either a card reader, tape, or disc without changing the program.

File commands allow programs to reference files without specific knowledge of their actual names or characteristics, and allow file specifications to be altered at runtime.

The file system simplifies I/O programming and provides a straightforward method to access data. Files can be accessed in any language. All I/O is handled by the file system; therefore programs become device independent.

The file system security and account/group/user structure provides many classes of security for user files. Access to files may be controlled at several levels which range from unrestricted access by anyone to controlled access available only to the creator of the file. For example, a user could make his data file available to any other user in a 'read-only' mode, while only members of his immediate account can append data to the file. The file and account/group/user structure provides the user with security and integrity.

Spooling

Jobs and job input/output are automatically buffered, if desired, thus removing the contention that would normally be encountered with non-shareable devices.

This spooling capability requires no modification to programs or data to implement, thus it is "transparent" to the HP 3000 user. For example, a simple STREAM command can be used to initiate a spooled job. After a spooled job is started a SHOWJOB Command will interactively display the status of the job.

Accounting

Accounting capability enables the HP 3000 system manager to set CPU time, connect time and disc space limits on individual accounts, and to obtain reports of the usage of these resources broken down by individual group. It also enables an account manager to set limits and obtain reports on groups within his account. Job/session data is also provided to individual users to enable the placement of limits on jobs.

Through the logging capability, the system supervisor can collect a record of system activity at the user level on a disc file. The collected data enables the writing of a billing program which takes into account use of significant system resources, or to analyze the manner in which the system is used. Examples of statistics collected are amounts of virtual memory used by a process, number of I/O transactions to a file, number of processes created, use of files by name, etc.

Debugging facilities

Extensive system tools are provided for indepth debugging of System Programming Language (SPL) programs. These capabilities are especially useful when machine dependent routines are being developed.

System generation and maintenance

MPE-C consists of a single operating system which can be specifically tailored to the installation needs within minutes. Through the system generation facilities, file directories and files modified as of a specified date can be dumped to tape. This capability, along with the standard system reload procedure, provides for complete file backup. System generation is a simple, straightforward process.

Supporting software

Standard programming languages and software subsystems greatly enhance and complement the capabilities of MPE-C. These systems include the languages COBOL, RPG, FORTRAN, BASIC, and SPL, plus a text editor, file copier, sort/merge package, scientific library, utility functions, and system diagnostic software.

Diagnostics

Two levels of diagnostic software help identify and diagnose hardware problems in the HP 3000 system. The levels of diagnostics are:

- Stand-alone diagnostics
- Interactive diagnostics generator (SLEUTH)

HP 3000 Series II Model 6 Configuration Guide

Features

- **128-kilobyte fault control memory**
- **Multiprogrammed operating system**
- **Concurrent CPU and I/O operation**
- **Integrated terminal access**
- **50 megabytes of disc storage**
- **Software compatible with other Series II models**

Model 6 is a general purpose computer system designed for educational, commercial, and interactive scientific applications. The system features concurrent batch and terminal access, and can be adapted to a dedicated application, yet retains its flexibility and performance for adaptation to a variety of tasks.

Hardware supplied

The HP 3000 Series II, Model 6 hardware includes:

- Central processing unit (CPU)
- 128-kilobyte fault control memory
- 209 firmware instructions
- System clock
- 16-port asynchronous terminal controller
- Modem support (for type 103A or equivalent)
- 16-Channel System I/O Multiplexer
- System desk, two bays, card cages, and power supplies
- 30030B high-speed selector channel
- 2640B CRT console with 4-kilobyte memory
- 30229A Disc controller with 7920A 50-mb disc unit
- 7970E 1600 bpi magnetic tape unit with controller
- 10 spare I/O slots and space for 512k-byte memory
- 60 Hz, 12.6 KVA Isolation transformer

Software supplied

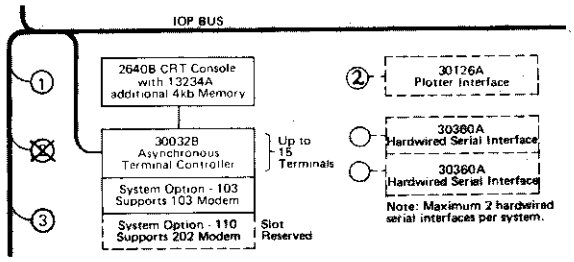
- Multiprogramming Executive II operating system (MPE II)

HP 3000 Series II Fundamental Operating Software (initial payment in system price) which includes:

- System Programming Language (SPL)
- Text editor (EDIT)
- Program debugging aids (DEBUG and TRACE)
- File-copying utilities (FCOPY)
- Sort and merge package (SORT)
- Compiler library

How to configure a system

When choosing options denoted by "circles," be certain to write the number of the interface slot which the option will occupy in the open circle beside the selected option; then, cross out the numbered circle connected to the IOP Bus to show that the interface slot is no longer available. For example:



As a result, the options that have been chosen and the interface slots they occupy, will be evident at a glance. DO NOT EXCEED THE TOTAL NUMBER OF AVAILABLE INTERFACE SLOTS ON THE IOP BUS.

Devices identified with triangles or squares will function only in the positions designated by matching geometric shapes.

Site preparation data

	HP 7920A 50 Mb DISC DRIVE		TWO SYSTEM BAYS		HP 2640B CRT CONSOLE AND DESK	
	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230	208 phase/phase	230	115	230
PHASES	1	1	3	1	1	1
CURRENT PER PHASE	4.5A	2.3A	* †	* 12A	1.3	0.7
CONNECTION CODE	C	E	M	M	F	F
HEAT OUTPUT (per hour)	2200 btu	554 kcal	14,000 btu	3500 kcal	483 btu	129 kcal
WEIGHT	240 lb	109 kg	790lb	358 kg	139 lb	64 kg
SIGNAL CABLE LENGTH	**	**	–	–	25 ft	7.6 m

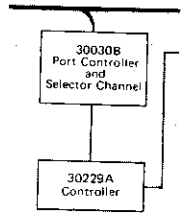
* *Plan for 300% overcurrent turn-on surge.* † *A = 9.5A; B = 11A; C = 2A.*

** *Up to eight disc drives may be daisy-chained to a controller. The cable length from the controller to the first drive is 18 ft. (5.5 m). The cable length between disc drives is 8 ft. (2.4 m).*

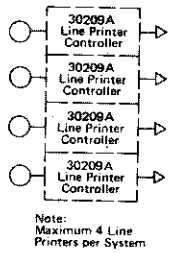
In addition, each drive also has a cable back to the controller. The length of this cable for each drive is 50 ft. (15.2 m).

The maximum cumulative length of daisy-chained cable is 74 ft. (22.5 m). Longer cables may be special ordered, but this is not advised.

Equipment Supplied (Standard Configuration). Products in "clear white" outlined by "solid lines."



Optional Equipment. Products in "gray screen" outlined by "interrupted lines."



The "Pricing Guide" at the rear of this publication may offer additional specific qualifications for selecting options.

Interfacing Optional Equipment Through Interface Slots. 10 interface slots (numbered "circles" connected to the IOP Bus) are available for additional products, and can be occupied by optional equipment identified with an attached "circle."

Connecting Additional Terminals. One asynchronous terminal controller (ATC) is supplied. It permits the connection of up to 16 terminals (one of the 16 ports of the ATC is occupied by the system console). One additional ATC with a capacity to interface 16 terminals, can be supported by the Model 6.

Disc Drive. One 50 Mb Disc Subsystem with controller is supplied, connected directly to the Central Data Bus through a Selector Channel. The controller can handle a total of 8 drives.

Magnetic Tape Units. One 1600 bpi magnetic tape drive is supplied and is connected through a controller to the system. An 800 bpi drive may be selected as an alternative. The supplied controller can also handle up to three extra drives of mixed densities (up to a total of four).

Additionally, a second controller may be ordered which can also support up to four drives of mixed densities.

Each additional tape drive ordered will be supplied in a cabinet attached to the system bays. See the 7970 data sheet for further configuration details on extra drives.

Line Printers. Eight options are available; as many as four line printers may be connected to any Series II System.

Environmental specifications

The following specifications apply to any HP 3000 Series II Model 6 or 8 configured with any combination of the peripheral devices listed in this data book. It is not necessary to consider each device separately.

Temperature (operating)
60° - 85° F (16° - 30° C)

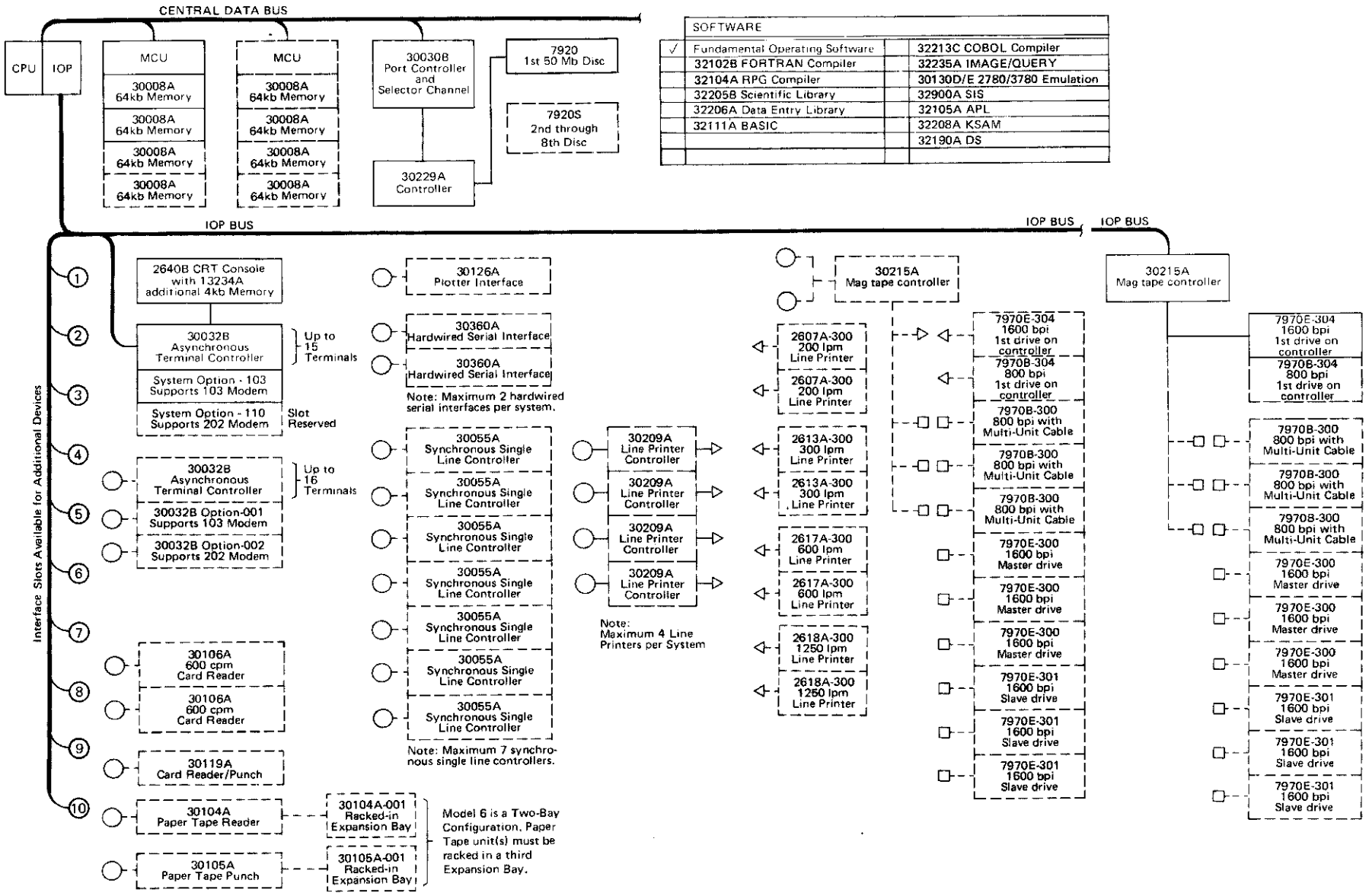
Relative humidity
50 - 80% non-condensing. Maximum wet bulb temperature 78° F.

Line voltage
115V +5%, -10%. (For 3-phase inputs this is the neutral-to-phase specification for each phase). 230V +5%, -10%.

Line frequency
50 or 60 Hz, ±0.5 Hz.

Maximum rate of temperature change
10° F/Hr. (5.5° C/Hr.)

Maximum configuration diagram, model 6



	SOFTWARE		
✓	Fundamental Operating Software		32213C COBOL Compiler
	32102B FORTRAN Compiler		32235A IMAGE/QUERY
	32104A RPG Compiler		30130D/E 2780/3780 Emulation
	32205B Scientific Library		32900A SIS
	32206A Data Entry Library		32105A APL
	32111A BASIC		32208A KSAM
			32190A DS

HP 3000 Series II
Model 8 Configuration Guide

Features

- **320-kilobyte fault control memory**
- **Multiprogrammed operating system**
- **Concurrent CPU and I/O operation**
- **Integrated terminal access**
- **50 megabytes of disc storage**
- **Software compatible with other Series II models**

Model 8 is a general purpose computer system designed to handle a larger number of terminals for commercial, industrial, educational, and scientific processing. The System supports a number of batch peripherals, and has the capacity for up to 63 interactive terminals. It is the most powerful Series II standard configuration, and is compatible with other Series II configurations.

Hardware supplied

The HP 3000 Series II, Model 8 hardware includes:

- Central processing unit (CPU)
- 320-kilobyte fault control memory
- 209 firmware instructions
- System clock
- 16-port asynchronous terminal controller
- Modem support (for type 103A or equivalent)
- 16-channel System I/O multiplexer
- System desk, three cabinet bays, card cages, and power supplies
- 30030B high-speed selector channel
- 2640B CRT console with the HP 13234A additional 4-kilobyte memory
- 7920A 50-megabyte disc unit with controller
- 30215A Magnetic tape controller with 7970E 1600 bpi magnetic tape unit
- 23 spare slots and space for 512k-byte memory
- 60 Hz, 12.6 KVA Isolation transformer

Software supplied

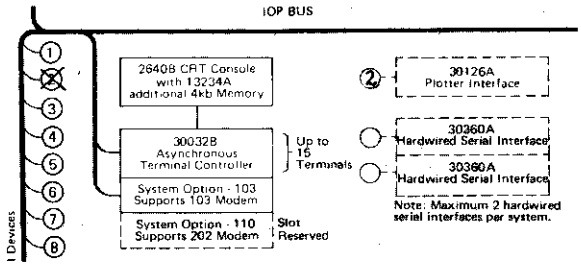
- Multiprogramming Executive II operating system (MPE II)

HP 3000 Series II Fundamental Operating Software (initial payment in system price) which includes:

- System Programming Language (SPL)
- Text editor (EDIT)
- Program debugging aids (DEBUG and TRACE)
- File copying utilities (FCOPY)
- Sort and merge package (SORT)
- Compiler library

How to configure a system

When choosing options dentoed by "circles," be certain to write the number of the interface slot which the option will occupy in the open circle beside the selected option; then, cross out the numbered circle connected to the IOP Bus to show that the interface slot is no longer available. For example:



As a result, the options that have been chosen and the interface slots they occupy, will be evident at a glance. DO NOT EXCEED THE TOTAL NUMBER OF AVAILABLE INTERFACE SLOTS ON THE IOP BUS.

There must be no more than 16 controllers on the system (not including 30229 and terminal controllers).

Devices identified with triangles or squares will function only in the positions designated by matching geometric shapes.

Site preparation data

	HP 7920A 50 Mb DISC DRIVE		THREE SYSTEM BAYS		HP 2640B CRT CONSOLE AND DESK	
	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230	208 phase/phase	230	115	230
PHASES	1	1	3	1	1	1
CURRENT PER PHASE	6A	3A	* †	* 15.5A	1.3	0.7
CONNECTION CODE	C	E	M	M	F	F
HEAT OUTPUT (per hour)	2200 btu	554 kcal	15,400 btu	3881 kcal	483 btu	129 kcal
WEIGHT	240 lb	109 kg	1010 lb	458 kg	139 lb	64 kg
SIGNAL CABLE LENGTH	**	**	–	–	25 ft	7.6 m

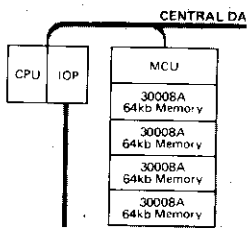
* *Plan for 300% overcurrent turn-on surge.* † *A = 11A; B = 13A; C = 7A.*

** *Up to eight disc drives may be daisy-chained to a controller. The cable length from the controller to the first drive is 18 ft. (5.5 m). The cable length between disc drives is 8 ft. (2.4 m).*

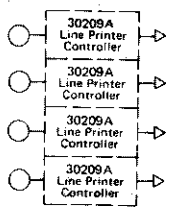
In addition, each drive also has a cable back to the controller. The length of this cable for each drive is 50 ft. (15.2 m).

The maximum cumulative length of daisy-chained cable is 74 ft. (22.5 m). Longer cables may be special ordered, but this is not advised.

Equipment Supplied (Standard Configuration). Products in "clear white" outlined by "solid lines."



Optional Equipment. Products in "gray screen" outlined by "interrupted lines."



The "Pricing Guide" at the rear of this publication may offer additional specific qualifications for selecting options.

Interfacing Optional Equipment Through Interface Slots. 23 interface slots (numbered "circles" connected to the IOP Bus) are available for additional products, and can be occupied by optional equipment identified with an attached "circle."

Connecting Additional Terminals. One asynchronous terminal controller (ATC) is supplied. It permits the connection of up to 16 terminals (one of the 16 ports of the ATC is occupied by the system console). Three additional ATCs with a capacity to interface 16 terminals each can be supported by the Model 8.

Disc Drive. One 50 Mb Disc Subsystem with controller is supplied, connected directly to the Central Data Bus through a Selector Channel. The controller can handle a total of 8 drives.

Magnetic Tape Units. One 1600 bpi magnetic tape drive is supplied and is connected through a controller to the system. An 800 bpi drive may be selected as an alternative. The supplied controller can also handle up to three extra drives of mixed densities (up to a total of four).

Additionally, a second controller may be ordered which can also support up to four drives of mixed densities.

Each additional tape drive ordered will be supplied in a cabinet attached to the system bays. See the 7970 data sheet for further configuration details on extra drives.

Line Printers. Eight options are available; as many as four line printers may be connected to any Series II System.

Environmental specifications

The following specifications apply to any HP 3000 Series II Model 6 or 8 configured with any combination of the peripheral devices listed in this data book. It is not necessary to consider each device separately.

Temperature (operating)
60° - 85° F (16° - 30° C)

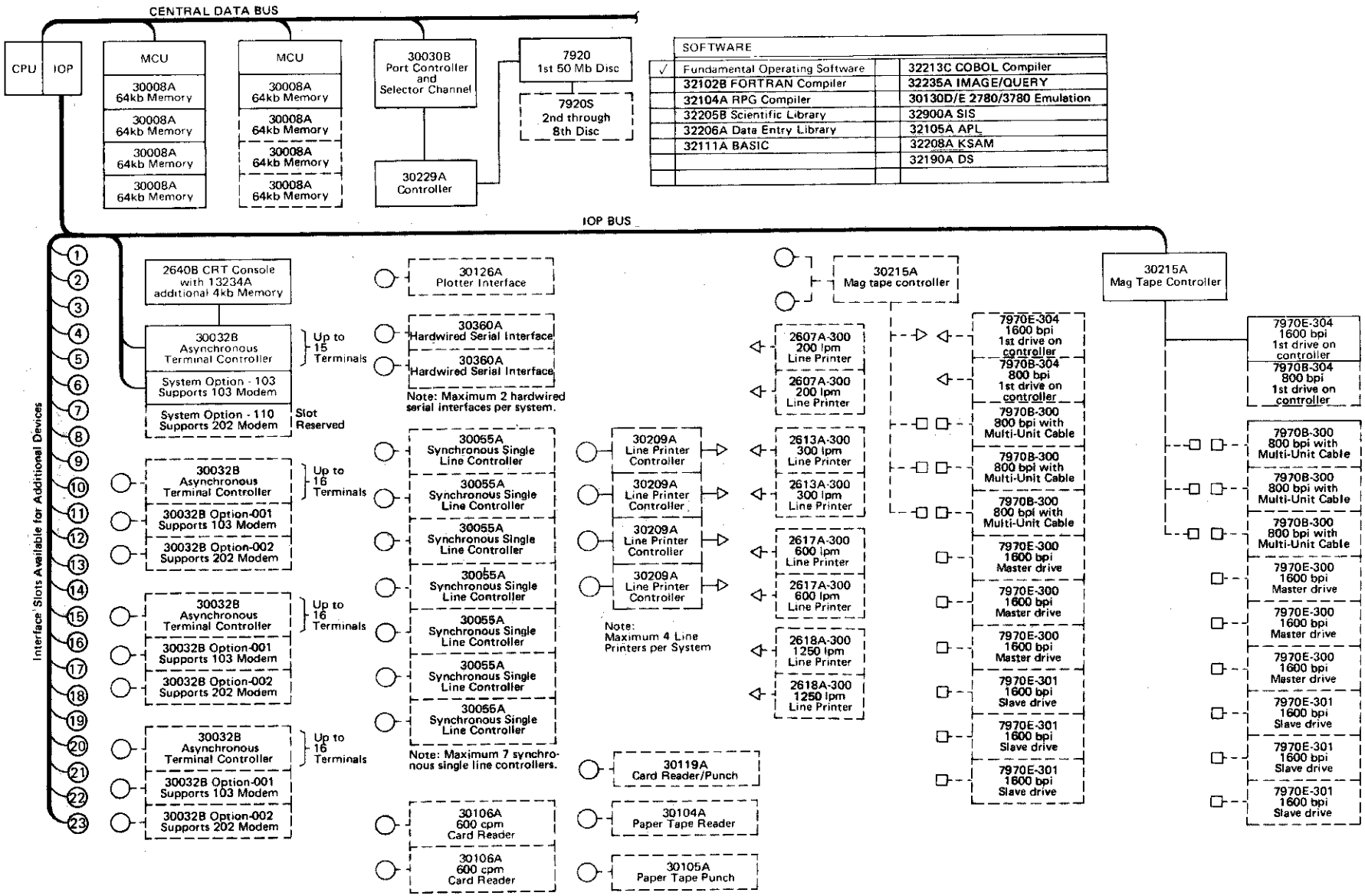
Relative humidity
50 - 80% non-condensing. Maximum wet bulb temperature 78° F.

Line voltage
115V +5%, -10%. (For 3-phase inputs this is the neutral-to-phase specification for each phase). 230V +5% -10%.

Line frequency
50 or 60 Hz, ±0.5 Hz.

Maximum rate of temperature change
10° F/Hr. (5.5° C/Hr.)

Maximum configuration diagram, model 8



HEWLETT hp PACKARD

HP 3000 Series II
Fundamental Operating Hardware

Features

- **Hardware-implemented stack**
- **209 unique instructions**
- **38 registers, 20 accessible to user programs**
- **175-nanosecond microinstruction time**
- **Automatic restart after power failure**
- **16- and 32-bit integer arithmetic**
- **32- and 64-bit floating point arithmetic**
- **28-digit packed decimal arithmetic**
- **Byte manipulation**
- **Built-in bounds checking**

The basic hardware of the HP 3000 Series II System consists of a CENTRAL PROCESSING UNIT (CPU), INPUT-OUTPUT PROCESSOR (IOP) and FAULT CONTROL MEMORY, interconnected via a high speed central data bus. A separate Input-Output Processor bus connects external devices to the system. Additionally, the multiplexer channel provided contains a processor capable of simultaneous execution of up to 16 I/O programs. Terminals are interfaced to the IOP bus through asynchronous terminal controllers, each capable of connecting 16 terminals to the system. A selector channel provides high speed peripheral devices with a direct link to the central data bus.

Central processing unit (CPU)

The three major components of the CPU are Instruction Decoder, Firmware Storage and Control, and Hardware Processor.

The Instruction Decoder unit converts an instruction in the Current Instruction Register (CIR) into a starting address for the microcode contained in a Read-Only Memory (ROM), and determines various initial conditions required for executing the instruction. As the current instruction is being executed, the next instruction is fetched and placed into the Next Instruction Register (NIR). Upon completion of the current instruction, the contents of NIR are loaded into CIR and the cycle is repeated. This "pipelining" of the current instruction execution with the next instruction-fetch improves throughput by overlapping operations.

The Hardware Processor consists of an arithmetic-logic unit, shifting network, 38 specific purpose registers and related data manipulating and testing logic. Table I lists the 38 registers and their associated functions.

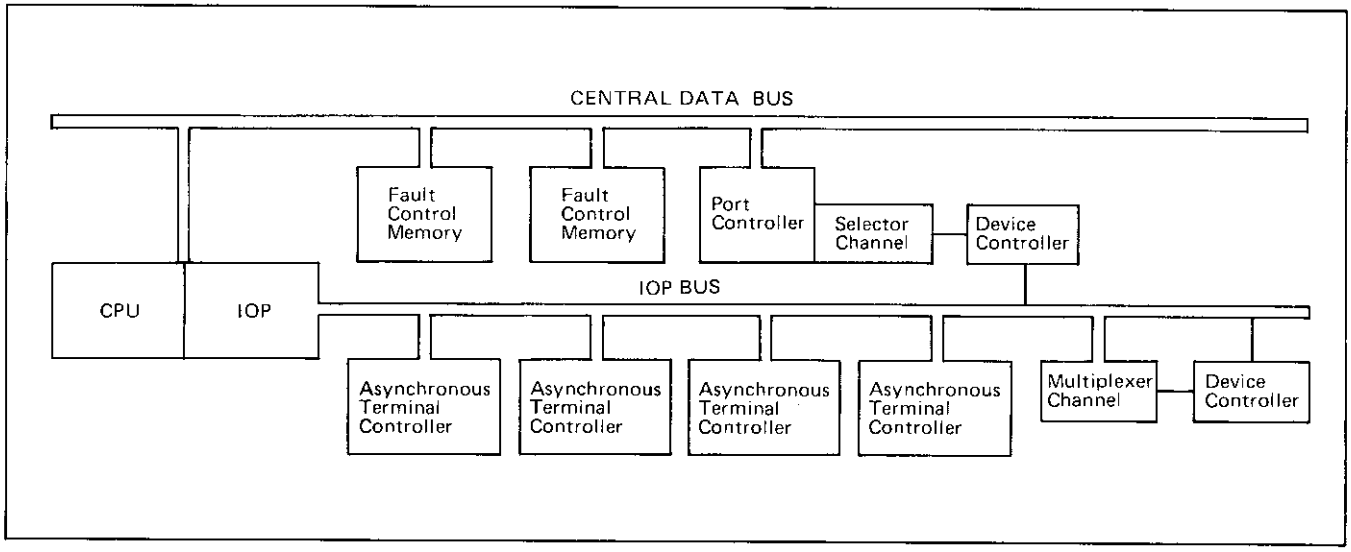
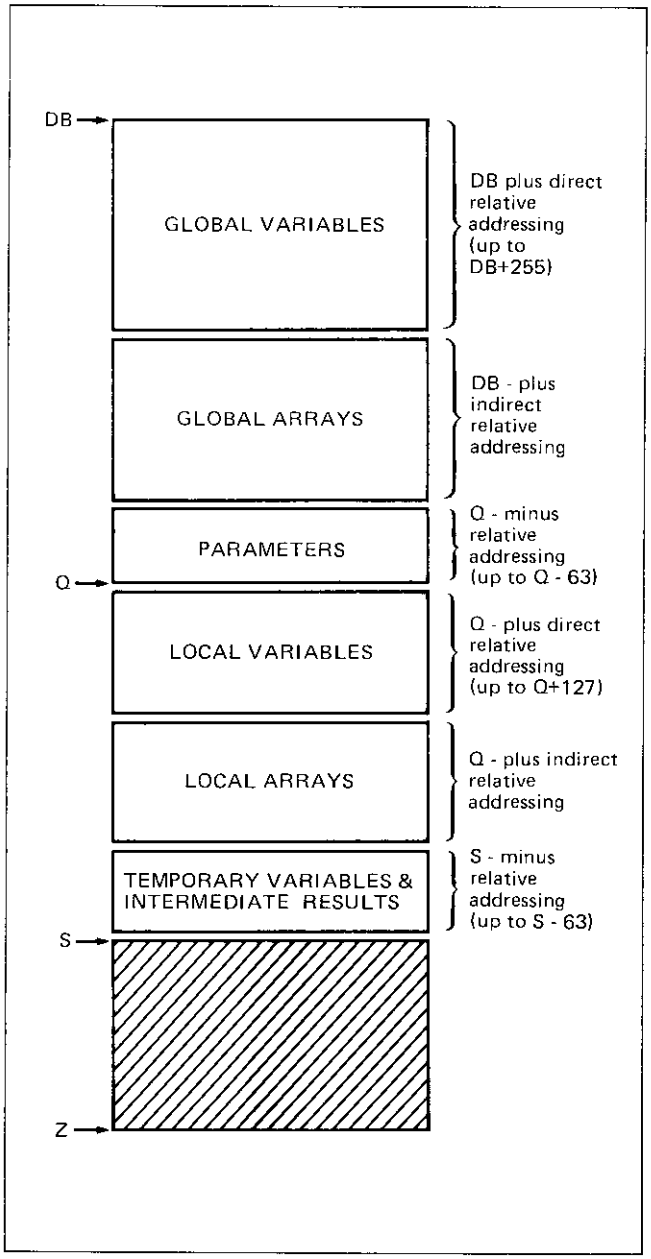


Table I

REGISTERS ACCESSIBLE TO THE PROGRAM	
REGISTER	FUNCTION
PB, P, PL, PB-Bank	Code Segment Pointers
DL, DB, Q, SM, SR, Z, DB-Bank, S-Bank	Stack Pointers
RA, RB, RC, RD	Top of Stack Registers
X	Index Register
STA	Status Register
SWCH	Switch Register
PCLK	Program Clock Register
REGISTERS DEDICATED FOR SYSTEM USE	
CIR	Current Instruction Register
NIR	Next Instruction Register
SP0, SP1, SP2, SP3, CTR, ABS-Bank, CPX1, CPX2, MOD	Scratch Pad, Flag, and Interrupt Registers
IOA, IOD	I/O Registers
ACOR, DCOR, OPND	Memory Address and Data Registers
RAR, SAVE	Firmware Address Registers

The four top stack registers are of special interest. In order to improve execution speed, up to four elements from the top of a user's data stack may be contained in these registers. This allows many functions to be treated as register-to-register operations rather than the slower-speed memory-to-register or register-to-memory type operations. These registers are manipulated by the CPU, and their use is fully transparent to the user.

Subprogram's view of the Data Stack



Firmware Storage and Control consists of microcode, stored in read-only memory (ROM), and associated control logic. Microcode routines control the operation of the Instruction Decoder and the Hardware Processor, in order to create the 3000 Series II operating environment —including the 209 instructions available to the programmer.

All instructions are 16 bits in length except stack operations, which are 8-bit instructions. These include a variety of memory reference, branch, arithmetic and data manipulation instructions that operate on integer, real, logical, packed decimal, character and string data. Floating point arithmetic can be performed in single precision (32 bits) or double precision (64 bits), integer arithmetic in 16-bit and 32-bit lengths, and packed decimal instructions extend to 28 digits of precision. In addition, there are a number of instructions designed to aid in creating the multiprogramming environment of the Series II. These include procedure call and exit instructions and others which implement various operating system functions previously done in software.

Input/output processor (IOP)

The Input/Output Processor controls the IOP bus and interrupt lines, providing the communications and data path between the CPU and I/O devices for direct I/O operations and interrupt processing, and also provides a data path between memory and I/O devices for programmed I/O operations.

I/O operations are divided into three categories, Direct I/O, Programmed I/O, and Interrupt Processing. Direct I/O operations take place as a result of I/O instructions executed by the CPU; they result in transfer of a word of information between the CPU and an I/O device through the IOP or cause a control function to take place in the I/O system. Devices connected to a Multiplexer (see Peripheral I/O Hardware) may use programmed I/O, with the Fundamental Series II hardware. Once started, programmed I/O operations can, (through the execution of I/O programs stored in memory) transfer block(s) of data between I/O devices and memory, and perform other device control functions without further CPU intervention or attention. The IOP also accepts interrupt, requests from the device controllers, interrogates them by means of a poll line to find the highest priority request, sends an interrupt signal to the CPU and supplies it with the number of the interrupting device.

Peripheral I/O hardware

Features

- **Peripheral interfacing to the HP 3000 Series II**
- **16 ports per terminal-controller**
- **Up to 4-terminal-controllers per system**
- **Support for 16 device controllers on the multiplexer channel**
- **Options for type 202C, 202S, and 202T modems**
- **Type 103A and 113B modem support**

The peripheral I/O hardware consists of the IOP bus, interrupt lines, and a multiplexer; these provide the basic peripheral interfacing capabilities. Additionally, an asynchronous terminal controller interfaces log-on and data-entry terminals.

30032B Asynchronous terminal controller

The Asynchronous Terminal Controller (ATC) is designed to interface user terminals to the HP 3000 Series II via the IOP bus. Up to 16 terminals (including the system console) can be interfaced. Terminals can be hardwired or connected through type 103A3, 113B, 202C, 202S, and 202T modems. Terminals interfaced through the ATC can be configured to the multiprogramming executive (MPE II) as data entry terminals, under the user program control, or as log-on terminals, accessing all the capabilities of the HP 3000 Series II. On the standard Series II models, the system console occupies one terminal port. Fifteen additional terminal ports are available before expansion to another controller is necessary. Terminals on HP 3000 Series II systems normally operate in character mode, except when accessed via the Data Entry Library (DEL/3000) when block mode is employed. Users who wish to access terminals in block mode directly (i.e. not using DEL/3000) must provide their own detection and correction facilities for transmission errors by calling operating system routines. The probability of transmission errors occurring at 2400 baud is slight, and negligible at 1200 baud or lower.

Multiplexer

The multiplexer performs programmed I/O operations for up to 16 device controllers concurrently. All device controllers may be involved in programmed I/O operations simultaneously. The multiplexer is connected to the IOP bus, through which I/O program words are fetched from memory. A solid state memory in the multiplexer is divided into 16 sections, one for each device controller. Typically, this memory contains the current I/O program word and related information for each device. When a device is selected for service, the multiplexer executes the indicated operation (or portion thereof) in conjunction with the device controller.

Fault control memory

Each fault control memory module consists of a memory control and logging (MCL) board; fault correction array (FCA) boards; and up to four memory array boards, each containing 64 kilobytes of memory with an access time of 350ns and an effective memory cycle time of 700ns. Additionally, each HP 3000 Series II System contains a fault logging interface (FLI) board.

The memory control and logging board (MCL) controls memory module operation, interfaces it to the system and contains storage for the logging of (corrected) faults.

The fault correction array board expands each memory word to 21 bits, in order to store the information necessary for fault detection and correction.

The fault correction array (FCA) boards interface the storage used for logging of faults (located on the MCL board in each memory module), to the Series II I/O system. MPE-II uses these boards to periodically read this information and store it in a disc file. This file is accessed by an HP Customer Engineer, from a terminal on the system, while performing preventive maintenance. If memory chips have a history of failures, they are replaced during maintenance.

Selector channel

The Selector Channel interfaces high speed peripheral devices to the HP 3000 Series II, and connects to the central data bus through a port controller. High-speed peripherals access the selector channel through their device controllers; the primary use is in interfacing the disc controller which is supplied as part of the standard HP 3000 Series II System.

HEWLETT hp PACKARD

MPE II Multiprogramming Executive

model 32002A

Features

- **Concurrent multilingual capability, COBOL, RPG, FORTRAN, BASIC, APL, and SPL**
- **Multiprogramming**
- **Virtual memory**
- **Stack architecture**
- **Simple and powerful command language**
- **Complete accounting of resources**
- **File backup and security**
- **Relocatable program modules**
- **Recursivity/reentrancy**
- **Dynamic resource allocation**
- **Remote processing via terminals**
- **Spooling — input and output**
- **Power fail/automatic restart**

MPE II is a general purpose, disc-based operating system that makes possible concurrent execution of many programs in a multilingual environment. When a user program enters execution, the instructions within it are executed on a multiprogramming basis. Should one job be temporarily suspended, perhaps to await the completion of an I/O operation, another can immediately employ the central processor. Thus, when many users are active in the system, uninterrupted processing and high user throughput can be maintained.

User programs are independent of the mode through which they are input; the user can run the same code from either traditional batch input devices or interactive terminals. In fact, the same system code is used to accomplish particular functions in either mode, resulting in storage economy and reduced overhead.

Stack architecture and virtual memory

The employment of stack architecture by MPE II automatically provides the separation of code from a user's data. This separation of data from code provides for both recursivity and reentrancy of user programs. That is, one copy of a program can be shared by many users while each still operates in his own environment free from interference by the other users. Although this is in fact a hardware feature, MPE II takes full advantage of it.

Storage for local data is allocated only as needed and is automatically freed when no longer required, allowing reuse of that area of memory by other parts of the program. Consequently, programs require less storage than conventional systems.

MPE II virtual memory provides a total memory space that far exceeds the maximum main memory of 512k bytes. Programs are logically divided into variable length segments of code and data which reside in disc memory. Only those code and data segments required at a particular time are brought into main memory; when a code segment is no longer needed it is overwritten by a new segment. Segments can contain the operating system, users' code and data areas. The management of the segments is automatically handled by MPE II, transparent to the user.

Command language

The simplicity of the command language greatly enhances the MPE II System's usability. The user interfaces with MPE II through commands (for general functions external to his programs) and intrinsic calls (for specific functions invoked during program execution). Common system commands are used to initiate and terminate jobs and sessions, re-specify file characteristics, compile and execute programs, and call various utility subsystems. The programmer need learn only one set of conventions for using these facilities because they all use the same command formats, special characters, and error-diagnostic methods. Intrinsic calls implement such functions as reading, writing on, and updating files, skipping forward or backward on a file, or returning system table information to the user's program. These intrinsic calls are available not only to the SPL (Systems Programming Language) but also to the higher level languages COBOL, RPG, FORTRAN, BASIC, and APL.

File management capabilities

MPE file system provides user program interaction with I/O devices in a manner that is device independent. Thus, for example, any program can read data from either a card reader, tape, or disc without changing the program.

File commands allow programs to reference files without specific knowledge of their actual names or characteristics, and allow file specifications to be altered at run-time.

The file system simplifies I/O programming and provides a straightforward method to access data. Files can be accessed in any language.

The file system security and account/group/user structure provides many classes of security for user files. Access to files may be controlled at several levels which range from unrestricted access by anyone to controlled access available only to the creator of the file. For example, a user could make his data file available to any other user in a 'read-only' mode, while only members of his immediate account can append data to the file. The file and account/group/user structure provides the user with security and integrity.

Spooling

Jobs and job input/output are automatically buffered, if desired, thus removing the contention that would normally be encountered with non-shareable devices.

This spooling capability requires no modification to programs or data to implement, thus it is "transparent" to the HP 3000 Series II user. For example, a simple STREAM command can be used to initiate a spooled job. After a spooled job is started a SHOWJOB Command will interactively display the status of the job.

Accounting

Accounting capability enables the HP 3000 Series II system manager to set CPU time, connect time and disc space limits on individual accounts, and to obtain reports of the usage of these resources broken down by individual group. It also enables an account manager to set limits and obtain reports on groups within his account. Job/session data is also provided to individual users to enable the placement of limits on jobs.

Through the logging capability, the system supervisor can collect a record of system activity at the user level on a disc file. The collected data enables the writing of a billing program which takes into account use of significant system resources, or to analyze the manner in which the system is used. Examples of statistics collected are amounts of virtual memory used by a process, number of I/O transactions to a file, number of processes created, use of files by name, etc.

Power fail/automatic restart

In case of a power failure the HP 3000 Series II preserves system and user permanent information, so that continuity of processing is maintained when the system restarts. When power is restored the system will restart unattended with all programs resuming at the point where they were interrupted.

Debugging facilities

Extensive system tools are provided for indepth debugging of System Programming Language (SPL) programs. These capabilities are especially useful when machine dependent routines are being developed.

System generation and maintenance

MPE II consists of a single operating system which can be specifically tailored to the installation needs within minutes. Through the system generation facilities, file directories and files modified as of a specified date can be dumped to tape. This capability, along with the standard system reload procedure, provides for complete file backup.

Supporting software

Standard programming languages and software subsystems greatly enhance and complement the capabilities of MPE II. These systems include the languages COBOL, RPG, FORTRAN, BASIC, APL, and SPL, plus a text editor, file copier, sort/merge package, data entry library, scientific library, utility functions, and system diagnostic software.

Diagnostics

Several levels of diagnostic software help identify and diagnose hardware problems in the HP 3000 Series II system. The levels of diagnostics are:

- Stand-alone diagnostics
- Microprocessor panel diagnostics (hard copy)
- Interactive system diagnostic (SLEUTH)

Compiler library

The HP 3000 Compiler Library is a set of subroutines that provides many operations commonly needed by users programming in COBOL, RPG, FORTRAN, SPL, and BASIC. These operations include:

- Matrix operations
- Complex arithmetic
- Trigonometric functions
- Mathematical functions
- Numeric conversions
- Utility functions

In addition, the Compiler Library includes a formatter that simplifies input/output operations for FORTRAN programs. This makes it unnecessary to specify precise machine operations; the user only specifies the format of the data, a list of variables, and a device or file.

FCOPY/3000

FCOPY/3000 is a program used for general file copying operations. In addition to this basic capability, it can translate character code, dump files in a user readable form, verify a copy operation, select a subset of a copied file, and ignore a specified number of read errors from a source file.

The capability to translate character codes allows the user to convert EBCDIC and BCD source files to ASCII and vice versa.

Dump formatting allows for the formatting of octal, hexadecimal, and character dumps. When a user specifies the dump formats and title, the utility automatically establishes the dump format according to the output device type.

Comparison capability allows the user to compare two files. When a compare error is found, the user is given both the record and the word or byte number where it occurred.

Through the subset option, the user can select a portion of a file based on field content, or number of records starting with a given record, or all records contained between two record numbers.

These functions can be performed as a single operation or as multiple operations within a single access to FCOPY.

FCOPY can copy files from any supported input device to any supported output device. HP 3000 Series I systems do not support tape cassettes as I/O devices. Series II systems do support tape cassette file copy with one modification to the normal procedure. When copying files on a Series II system from a tape cassette on one terminal to a tape cassette on another terminal, you must first copy the files to an intermediate I/O device (such as a disc).

EDIT/3000

The EDIT/3000 Test Editor permits the user to create and manipulate files of any ASCII characters. Lines, strings and characters can be inserted, deleted, replaced, searched for, etc. The files to be edited can be source language programs, such as COBOL, RPG, SPL, etc., or text material, such as reports.

The command language is designed so that a new user will find those commands that normally exist in all editors (e.g., DELETE, REPLACE, INSERT). The experienced user will find that EDIT contains commands to write complex edit command sequences, where editing is based on conditions found within the text itself.

- **All occurrences of a character string can be changed with one command**
- **A command to call user-written procedures for modifying or processing text**
- **USE mode for execution of pre-stored EDIT/3000 commands**
- **Nested, interactive loop facility for repetitive editing**
- **Multiple-line delete, insert, move and replace capability**
- **Provision for Boolean logic for conditional editing**
- **Many options for display before editing, display after editing, do not display, etc.**
- **Margins may be set and reset during operation**
- **HOLD file for storing data to be duplicated into other portion of the work file**
- **Selective concatenation of portions of files**
- **Line by line template display for easy modifications to complex text**

Command language summary

ADD	Enter lines of text into the WORK file from the standard input device or the HOLD file.
CHANGE	Replace one string by another over a specified part of the text.
DELETE	Delete characters and lines from the WORK file.
END	Terminate execution of EDIT.
FIND	Locate a string in the WORK file.
GATHER	Move and renumber portions of text from one location to another in the WORK file.
HOLD	Copy text from the WORK file into the HOLD file.
INSERT	Insert text into the WORK file from the standard input device or the HOLD file.
JOIN	Add all or portion of a file to the WORK file.
KEEP	Save all or part of the WORK file in a user file.
LIST	Print out any portion or all of the WORK file. Two options of this command are of special interest: OFFLINE – Directs the listing to a specified file. If in session mode, it can be used for instance to direct listings to the line printer. TRANSLATE – Converts all lowercase alphabetic characters to uppercase. This feature allows the use of output devices incapable of producing lowercase characters.
MODIFY	Modify lines in the WORK file interactively using three operations: delete (D), insert (I), and replace (R).
PROCEDURE	Calls and executes a procedure previously written by the user and stored in a segmented library (SL) file.
REPLACE	Replace lines in the WORK file.
SET	Alter parameters that are normally set by the subsystem and govern editing operations.
TEXT	Copy all or part of a user file onto the WORK file.
USE	Instructs EDIT/3000 to receive commands from a user's external file instead of from the normal input file.
VERIFY	Display the setting of options (see SET).
WHILE	Causes EDIT/3000 to repeat commands in a predefined command block as long as a specified condition within the text is true.
XPLAIN	Print an explanation of selected commands or all commands.

SORT/3000

- **Ascending or descending sort by keys**
- **Keys can be contiguous, separated, or overlapping**
- **Keys may be of multiple data types**
- **Record size is unrestricted and may be fixed or variable length**
- **Input and output media may be of various types (e.g., disc files, magnetic tapes, cards printer output, etc.,)**
- **The sorted output can be chosen from sequenced records, key fields, record numbers or record numbers plus key fields**
- **User specified routines may be used for key compare, pre-processing, and post processing**
- **Merges any sorted files**

SORT/3000 performs two activities:

- Orders records in a file according to a given key sequence
- Merges a number of sequenced files into a single sequenced file

This permits users of the HP 3000 Computer Systems to arrange large quantities of records (a file) into a prescribed order. Each record consists of a series of data fields which describe one "item" of information. Sorting is based on keys (values of one or more data fields). Merging forms one sorted sequence of records by combining one or more previously sorted sequences of records.

Environment

SORT is capable of operating in the minimum HP 3000 configuration. The subsystem may be employed in a variety of applications:

- As a free standing subsystem, it can be activated through commands in Batch or Session mode.
- As a number of procedures, the subsystem provides a set of procedures callable by user programs written in SPL, FORTRAN, and also via the SORT verb in COBOL.

The value of the data may be the following types:

ASCII
EBCDIC } sorted as 8-bit positive integers
Signed Integer with any precision
Positive Integer with any precision
Real Number with any precision
Packed Decimal
Numeric Display

TRACE/3000

TRACE/3000 is a programmatic debugging subsystem that aids the user in finding program logic errors in SPL and FORTRAN programs. TRACE helps the user follow the path of execution, computation of values, and manipulation of data in his programs by printing information about program identifiers (such as labels, variables, arrays, and subroutines), and structure points (critical points of passage into and out of program units) during program execution. TRACE allows the user to specify selective conditions for reporting information, print data only when a variable exceeds a certain value, or when it is changed a specific number of times. The user communicates with TRACE by entering special paragraphs and sentences through his job or session input stream. TRACE offers these features:

- Operation in batch job or timesharing session mode.
- Input of TRACE paragraphs and sentences in three ways:

  Through a Batch File (on cards, disc, or tape) in a job.

  Through the terminal in a session.

  Through a Batch File (on cards, disc, or tape) in a session. (This method is ideal when the user plans to issue the same directives during several successive runs of his program in session mode).
- Option to either print a report, or print a report and halt the user's program, upon satisfaction of specified conditions.

SPL/3000 compiler

- **A unique Systems Programming Language (SPL). Modern successor to assembly language programming**
- **High-level yet machine dependent. ALGOL-like high level statements are combined with special machine dependent statements for full capability**
- **Efficient coding. The high level nature of SPL/3000 reduces coding errors and increases program production**
- **Self-documenting for ease of readability**
- **Permits access to all hardware features and data types**
- **Dynamic allocation of local storage for working space and local variables in procedures. Memory de-allocated on exit from procedures**
- **Three program levels: Main program, procedures, subroutines**
- **Program segmentation feature**
- **Simple interface to other languages, and to the Multiprogramming Executive operating and file systems (MPE)**
- **Assemble statement permits machine level coding**

SPL is the Systems Programming Language for the HP 3000 Computer Systems. It serves as both a high-level language and a machine-dependent language. With SPL the programmer can express himself clearly and concisely while producing efficient object programs.

All of the HP-supplied software for the HP 3000 systems is written in SPL. Customers who are used to developing their application software using assembly language will find that SPL provides the same efficient and powerful results while cutting the development time in half.

The choice of programming languages on most computers lies in selecting one of two mutually exclusive groups: a high-level machine-independent language such as COBOL, on the one hand, and a completely machine dependent assembly language on the other.

In assembly language, the syntax usually matches the structure of the machine language very closely. Assembly language can be used to attain a high degree of efficiency and control, but usually at the expense of lengthy development.

High-level languages, on the other hand, insulate the programmer from the details of the machine. They enable the overall program to be written clearly and concisely because they follow the structure of normal human discourse.

To simplify systems programming, SPL combines the best features of both types of languages. It offers the programmer a high-level language similar to (but not equivalent to) ALGOL, to produce the more usual coding sequences. Moreover, it has added features which enable the programmer to easily exert control over machine-dependent functions of the computer system.

This facility allows the programmer (in the midst of high level constructs) to operate directly on hardware registers, perform branches based on hardware status, extract/deposit/shift bit fields, or generate any sequence of hardware machine instructions.

The language provides many features normally found only in applications languages such as ALGOL and PL/1, and includes:

- Free-form structure
- Arithmetic and logical expressions
- High level statements with unlimited nesting (IF, FOR, SWITCH, CASE, DO-UNTIL, WHILE-DO, MOVE, SCAN, assignment and compound statements)
- Recursive procedures and subroutines
- Variables and arrays of many data types

Environment

Programs may be compiled in batch mode or via a time-share "session".

Variables

Variables may be either "global" or "local". Global variables are those declared in the main program and are accessible from any part of the program including procedures. Local variables however, are declared within a procedure and are only accessible from within that procedure.

Data types supported*

- *Logical:* 16-bit TRUE/FALSE or 0 to 65535
- *Byte:* 8-bit character data or arithmetic values 0 to 255
- *Integer:* 16-bit arithmetic variables (-32768 to +32767)
- *Double Integer:* 32-bit arithmetic variables (+2,147,483,648 to -2,147,483,647)
- *Real:* 32-bit floating point variables (6.9 digit accuracy) $\pm 10^{77}$
- *Long Real:* 64-bit floating point variables (16-digit accuracy) $\pm 10^{77}$

**Single dimensional arrays may be any of these data types.*

Syntax features

Each SPL statement is either a high-level or machine-dependent feature.

High-level features: In all programming efforts, a need frequently arises for standard program constructs, such as loops, and evaluation of arithmetic expressions. Rather than hand-coding these often-used structures each time, SPL/3000 allows the programmer to write them at a high level. The compiler then provides an efficient, error-free code sequence in each case. Examples of such constructs include:

- RESULT: =(4*(J) + M - KJ MOD 10) / 31;
- IF J=1 THEN GO TO JP10 ELSE J:=J+5;
- WHILE VAR <0 DO ARRY (VAR:=VAR+3):=0
- DO (X:=X+7) UNTIL X = 1000;
- FOR P:=7 STEP 2 UNTIL 1000 DO BEGIN
  X(P):=1;
  Y(P):=3;
  END:

The high level features increase program production and contribute to documentation.

Machine-dependent features: SPL allows the use of machine-level constructs to insure complete control of the HP 3000 Computer Systems. These constructs permit the following:

- Direct register references
- Branching based on actual hardware conditions
- Bit extraction, deposit, and shift
- Generation of any sequence of hardware machine instructions (in the midst of high level constructs)

Examples of Machine-Dependent Statements

- IF A=6 THEN ASSEMBLE (LDI3; RI0 0;STOR TIME)
  <<reads time from I/O channel 3 if A=6>>
- IF OVERFLOW THEN RETURN;
  <<Tests the overflow condition in the arithmetic unit>>
- MOVE ARY :=SOURCE WHILE N;
  <<moves bytes from array source to ARY as long as they are numeric>>
- N02:=NUMBER. (13:3);
  <<extract 3 bits from 'number' starting at bit 13 and assign the resulting 3-bit field to N02 at its right-hand end. Rest of N02 set to zeros>>

Note: The initial payment for the fundamental operating software is included in the purchase price of the Series I or Series II system. There is an additional required monthly software fee which is ordered using product number 22823A.

HP 3000 Pre-Series II Configuration Guide

The configuration diagram is designed to aid you in ordering additional peripherals, memory, and other equipment for your pre-Series II HP 3000 (HP 3000CX and original HP 3000). Simply follow the steps indicated when planning your system.

Using the diagram

Equipment originally supplied with all configurations is shown in "clear white" outlined by "solid lines" in the diagram. Products in "gray screen" outlined by dotted lines may have been ordered and previously installed on the system. The configuration diagram is based on two card cages in the I/O bay, which is the most likely case. For systems with one card cage, consult your Hewlett-Packard salesman.

When indicating the present configuration and the peripherals to be added, matching the geometric shapes will insure that the correct peripherals are connected to the correct 'slots'. As you occupy each circle, square, or triangle with a peripheral device, write the slot number(s) in the selected option's corresponding geometric shape. Then cross out that numbered slot to avoid using the same slot twice.

To further aid you, the following discussions are provided for each option.

Hardware descriptions

Memory

The diagram shows a 96k byte minimum memory configuration. An additional 32k bytes of memory may be ordered. The maximum memory configuration for a pre-Series II HP 3000 is 128k bytes.

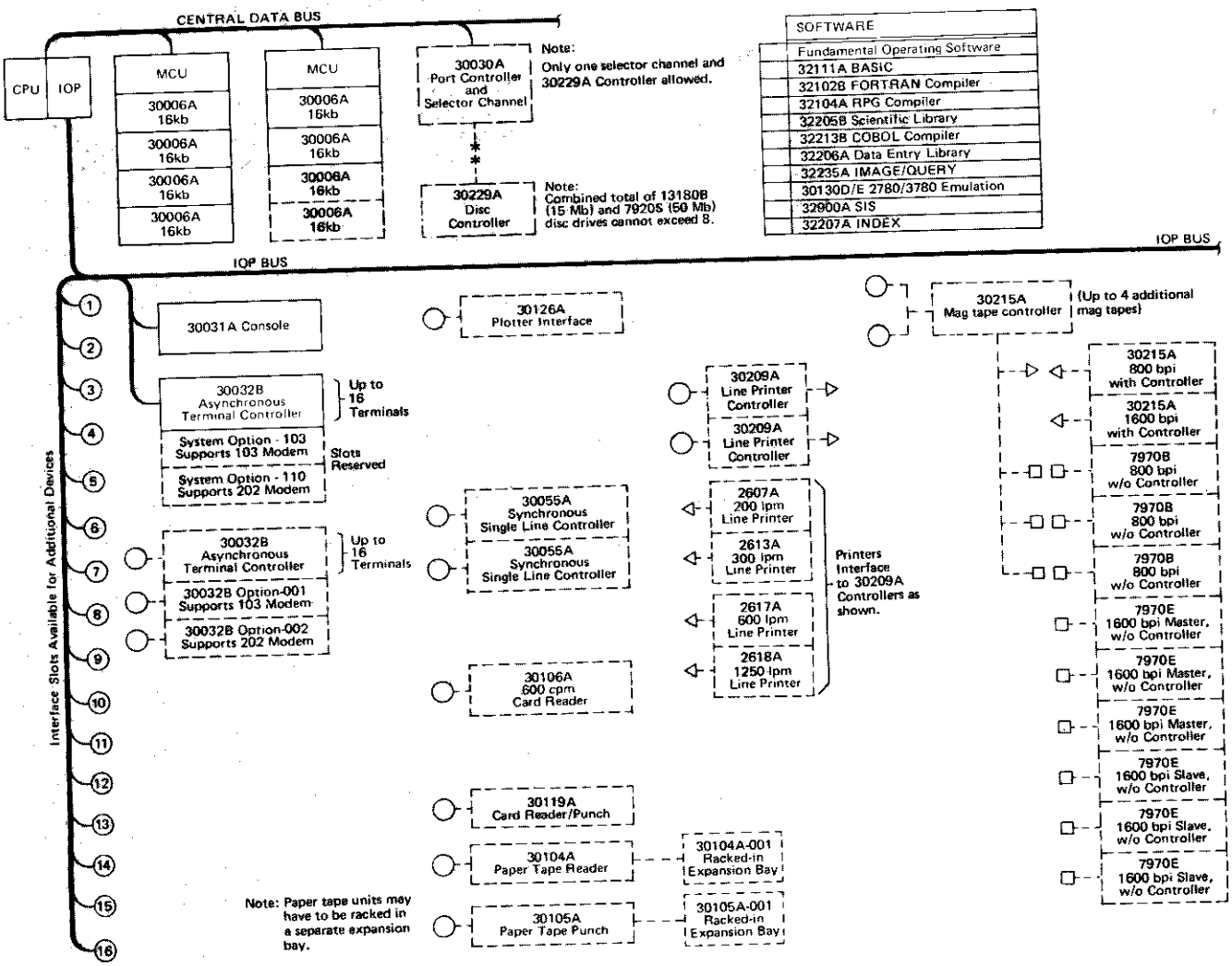
Ordering Information: 30431A 32k byte Memory Upgrade Kit

Connecting Terminals (via Asynchronous Terminal Controller)

One HP 30032B Asynchronous Terminal Controller (ATC) is supplied with each system. It permits the connection of up to 16 terminals.

Although a maximum of two ATC's may be connected to a pre-Series II HP 3000, it is recommended that no more than

Configuration diagram for HP 3000 and HP 3000CX systems



one be attached unless thorough performance tests have been conducted to insure that system performance with the additional terminals operating will be satisfactory in the user's application. Each ATC occupies one slot.

The terminals supported on the pre-Series II computers are:

HP 2749B – Teleprinter (ASR-33)
HP 2640A – CRT Terminal
HP 2640B – CRT Terminal
HP 2644A – CRT Terminal
(use of tape cartridge not supported)
HP 2645A – CRT Terminal
(up to 2400 baud asynchronous mode supported. Use of tape cartridges not supported).
HP 2762A – Printer Terminal
HP 2762B – Printer Terminal
IBM 2741
Memorex 1240
Execuport 300
Datapoint 3300
G.E. Terminet 300
Teletype ASR 33, 35, and 37

Terminals on pre-Series II HP 3000 systems normally operate in character mode, except when accessed via the Data Entry Library (DEL/3000), when block mode is employed on HP 2640 series terminals strapped for line transmission. Accessing terminals in other than character mode on pre-Series II systems is not supported unless DEL/3000 is used, because the asynchronous terminal controller software driver necessitates use of special programming techniques.

Modem support

As shown, modem support is optionally associated with each ATC. Each type of modem support for each ATC requires one slot. Additional modem support may be added to an installed system by ordering HP 30441A ATC Upgrade Kit. See Pricing Guide for details.

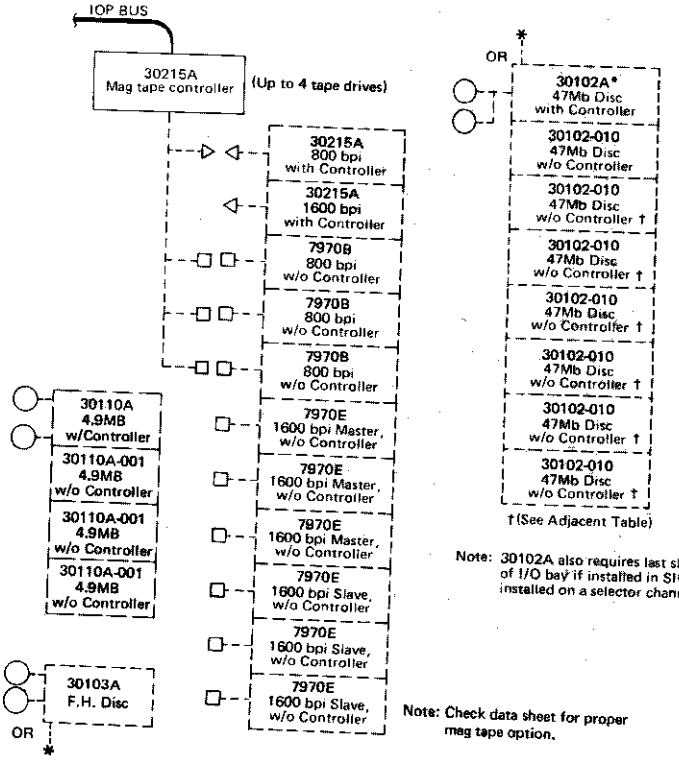
Modems supported for the pre-Series II HP 3000 are:

Type	Half/Full Duplex	Speed (cps)
Bell 103A	Full	30
Bell 113B	Full	30
Bell 202C	Half	120
Vadic 300	Full	30
Vadic 3400	Full	120

The modems listed are for dial-up use. Hewlett-Packard does not support the use of lease lines with the pre-Series II HP 3000 Computers.

Due to backup considerations, HP does not recommend more than 400 megabytes of disc storage on any one HP 3000 system.

Disc Controller Combinations
Refer to the charts on page 37



Note: Check data sheet for proper mag tape option.

Note: 30102A also requires last slot (not shown) on bottom card cage of I/O bay if installed in SIO MUX. 30102A may have been installed on a selector channel if no 30229A is connected.

DISC DRIVES		
DRIVE NUMBER	PRODUCT NUMBER FOR 208V, 3Ø, 60Hz	PRODUCT NUMBER FOR 230V, 1Ø, 50Hz
1	30102A	30102A 30102A-015
2	30102A-010	30102A-010 30102A-015
3	30102A-010	30102A-020 30102A-015
4	30102A-010	30102A-010 30102A-015
5	30102A-010	30102A-020 * 30102A-015
6	30102A-010	30102A-010 30102A-015
7	30102A-020	30102A-020 30102A-015
8	30102A-010	30102A-010 30102A-015

* Must be with a three bay system with an additional 30335A Power Control Unit (a total of two Power Control Units are required on the system).

Selector channel

The Selector Channel interfaces high speed peripheral devices to the computer and connects to the central data bus through a port controller. This channel is required when interfacing the 30229A disc controller to a pre-Series II HP 3000. Only one selector channel is allowed on HP 3000 and HP 3000CX computers.

If any cards presently occupy slots necessary for the addition of a selector channel, those cards must be moved to slots in the I/O bay (refer to the section headed 'Additions To I/O Bay').

Ordering information: 30030A Selector Channel (includes port controller, additional card cage, and cabling).

50 Mb and 15 Mb disc drives

The addition of a Selector Channel and Port Controller permits the user to attach up to a combined total of eight 7920A (50 Mb) and/or 13180B (15 Mb) disc subsystems. Note that only one 30229A disc controller is allowed.

To order the 13180B or 7920A disc drives, refer to the appropriate data sheet.

Magnetic tape drive

At least one magnetic tape is supplied as part of the standard configuration for a system. The first mag tape supplied (either 800 or 1600 bpi) occupies the triangle shaped slot shown. The controller provided with this standard tape drive permits the connection of three additional tape drives (for a total of four) without occupying further slots.

Ordering an additional 30215A magnetic tape controller allows four more tape drives to be put on the system (for a maximum of eight). The additional controller occupies two slots. Additional tape drives are ordered as indicated on the data sheet.

Note: Customers with pre-CX style cabinets (30390A – 52" bay with pedestal and modular door) desiring the add-on magnetic tapes in similar cabinets must order 7970B-302 or 7970B-305 (800 bpi) or 7970E-302, 7970E-303 or 7970E-305 (1600 bpi). See data sheet for details.

Ordering Information: 30215A Magnetic Tape Controller.

Line printers

Each line printer controller occupies one slot. A maximum of two line printer controllers can be added to each pre-Series II HP 3000 computer. Each controller will handle one of the printers indicated.

Line printers are ordered according to the instructions given on the appropriate data sheet.

Ordering Information: 30209A Line Printer Controller.

Emulation subsystem

Each 2780/3780 Emulation Subsystem occupies one slot. A maximum of two emulation subsystems are allowed. Consult the data sheet for ordering information.

Card equipment

The 30106A card reader and the 30119A card reader/punch occupy one slot each. A maximum of one 30106A and one 30119A are allowed on a system. Ordering information is available on the respective data sheets.

Plotter interface

The 30126A plotter interface occupies one slot, and only one plotter interface is allowed. Consult data sheet for ordering information.

Paper tape equipment

The 30104A Paper Tape Reader and the 30105A Paper Tape Punch each occupy one slot. Only one of each is allowed on a pre-Series II computer. The reader and punch subsystem together require 17 inches of vertical cabinet space. One subsystem or both may be installed below the magnetic tape drive on a three-bay system, if no other equipment occupies that space. If the space is not available, an additional cabinet must be ordered. Consult data sheet for ordering information.

47 Mb disc subsystem

The first 47 Mb disc added to the system must be 30102A. This product contains the controller for the device. As shown, this device occupies two slots, plus one not shown. Seven additional units (30102A-010) can be added to the first unit without occupying additional slots. Note that this disc subsystem can also be attached via the Selector Channel if the 30229A controller is not used. See the data sheet for ordering information.

4.9 Mb disc subsystem

As shown on the diagram, the first disc must be 30110A which contains the controller and occupies two slots. Three additional discs (30110A-010) may have been added without using additional slots. This device is no longer available from Hewlett-Packard but is present in many installed systems.

2 Mb or 4 Mb disc subsystem

As shown, the disc must be either 30103A-001 or 30103A-002, which contains the controller and occupies two slots. Only one device is allowed per system. These devices are no longer available from Hewlett-Packard but are present in many installed systems.

Note: The Disc Controller Combination Chart on the Configuration Guide indicates the supported disc configurations for pre-Series II HP 3000s. A configuration other than indicated should be checked by your Hewlett-Packard Sales Representative.

Additions to I/O bay

If any extra slots are occupied in the I/O bay because of the addition of new subsystems or the moving of cards from the CPU bay, a check must be made to insure sufficient power is available. To accomplish this, follow these steps:

Power check

Using Table below:

1. Locate each subsystem occupying a slot in the I/O bay in the table.
2. For each subsystem, circle the number of slots and amperes shown. Note that the Multiplexer Channel is already calculated.
3. Indicate the number of times each subsystem occurs in column (C). This is done only if the additional subsystems are occupying slots – not if they are attached to a device controller.
4. Multiply column (A) and (C) and enter in column (D) for each subsystem occupying slots.
5. Add up the number of slots indicated in column (D).
6. This total should equal the number of slots crossed out on the configuration guide. If not, an error has been made and steps (1) through (5) must be repeated.
7. After the number of slots has checked, multiply columns (B) and (C) and enter in column (E) for each subsystem occupying slots.
8. Add up column (E). If the total is 55 amperes or less, no additional power is required.
9. If the total of column (E) is above 55, additional power is required and the power supply indicated below must be ordered.

Ordering Information: 30412A Add-on Power Supply for Pre-Series II. 30412A-001 Additional Card Cage (not required if two card cages in I/O bay, which is most likely).

	Product No.	Card No.	No. of Slots (A)	Maximum Current @ 5V (B)	No. of Subsystems This System (C)	Calculated Slots Used This System (D)	Calculated Amperes This System (E)
Unit							
Multiplexer Channel	30035A	30035A	1	3.6	1	1	3.6
Disc							
*2 – 4 Mb	30103A	30203A	2	5.5			
*4.9 Mb	30110A	30210A	2	9.9			
47 Mb	30102A	30202A	3	14.3			
Mag Tape							
7970	30215A	30215A	2	9.9			
Line Printers							
All	30209A	30051A	1	4.4			
Card Equipment							
600 CPM Reader	30106A	30206A	1	3.3			
Reader/Punch	30119A	30219A	1	4.0			
*1200 CPM Reader	30107A	30207A	1	3.3			
*250 CPM Punch	30112A	30051A	1	4.4			
Paper Tape							
Reader	30104A	30050A	1	4.0			
Punch	30105A	30050A	1	4.0			
Miscellaneous							
2780/3780 Emulat.	30130B	30055A	1	3.5			
Plotter Interface	30126A	30226A	1	2.2			
**ATC	30032B	30032B/ 30060A	1	2.8			
**103 Modem Control	30032B-001	30061A	1	1.3			
**202 Modem Control	30032B-002	30061A	1	1.3			
**Clock/Console	30031A	30031A	1	3.3			
				TOTALS			

*Product no longer offered. **Do not include if in CPU bay (which is the most likely location).

Maximum Amperes: 55

HEWLETT hp PACKARD

HP 3000 Series I and Pre-Series II Upgrade

model 30306A
30409C

Two kits are available for upgrading HP 3000, HP 3000CX, and Series I systems to HP 3000 Series II configurations. The model 30306A kit expands an existing system to a Series II Model 6 with a 192kb memory, which can be further increased to 512kb. The model 30409C kit upgrades an existing system to an HP 3000 Series II Model 8 with a 320kb memory (also expandable to 512kb) and greater I/O capacity.

Features

- **192 to 512kb of fault control memory**
- **Multiprogramming Executive II Operating System**
- **209 unique instructions**
- **64-bit extended precision numbers**
- **Power fail/automatic restart**

With either of these upgrade kits the user should experience a substantial improvement in job throughput and response times. The upgrades provide increased memory and an expanded MPE II operating system, plus the following components:

- **Series II central processor**
- **Series II instruction set**
- **Series II multiplexer channel**
- **Associated power supplies and card cages**
- **60 Hz, 12.6 KVA isolation transformer**

Certain existing system components will be replaced by the upgrade, and exchange credit for these items will be given.

Software components

The Series II software, which is part of the upgrade subsystem, includes:

- Multiprogramming Executive II
- Series II Compiler Library
- Series II Utilities
- SPL
- SORT
- EDIT

Additionally, all language processors, libraries, utilities, or data base management subsystems will be supplied if they were purchased for, and currently run on, the existing HP 3000 system. All syntactical and operational aspects of the upgraded software have been carried over to the HP 3000 Series II software. This means that commercially oriented and most scientific/timesharing programs will run on the upgraded Series II computer with only minor changes. Programs utilizing FORTRAN double precision and BASIC long data types will require recompilation and possible recoding.

Note: STAR software is not supported on Hewlett-Packard Series II systems.

Maintenance

The basic monthly maintenance charge for the upgraded system is as indicated for the standard HP 3000 Series II Model 6 or 8 plus the charge for any equipment added to the standard models and minus the charge for standard equipment or subsystems not included in the upgraded system.

Warranty

The equipment purchased as part of this upgrade product carries the standard Hewlett-Packard 90-day warranty. The new CPU, memory, multiplexer channel, power supplies, and other equipment will be in warranty for 90 days. The equipment owned prior to the upgrade (i.e., disc drives, line printers) will not go back into warranty as a result of the upgrade. During the warranty period the basic monthly maintenance charge calculated for the upgraded system will be reduced. The amount of this reduction is available from your Hewlett-Packard Sales Representative.

Installation

Field installation during normal working hours by an HP Customer Engineer is included in the price of the upgrade. Installation outside of normal working hours is on an extra-charge basis subject to local availability.

Training

A one-day on-site course (HP 22818A – HP 3000CX to HP 3000 Series II Upgrade Training) is available separately. This course teaches the current user of an HP 3000, HP 3000CX or HP 3000 Series I system the steps to take to convert to an HP 3000 Series II. During the course, the appropriate Series II compilers and libraries are installed on the student's system. The student is then given instruction in the use of these tools on the old system so that they may properly simulate the Series II environment and implement any necessary conversion before the Series II upgrade is actually installed. Contact your Hewlett-Packard Sales Representative for complete information.

Specifications

Power requirements

Standard Model

208V + 5% – 10%, 3 phase, 60 Hz ± ½ Hz, 7.5 KVA

230V + 5% – 10%, 50 Hz ± ½ Hz, 7.5 KVA

System must be connected to power supply via an isolation transformer.

Environmental conditions

Operating Temperature: 18 to 25°C (64 to 77°F)

Relative Humidity: 40% to 80% (non-condensing)

Heat Dissipation: 22,900 btu/hr (5752 kilocalories/hr)

Documentation

Manuals for the Series II Fundamental Operating Software and Hardware are included in the product. Documentation detailing the changes to the FORTRAN compiler, BASIC interpreter, BASIC compiler, and Scientific Library may be purchased as additional items.

Configuration notes

Cabinets – System owners with more than two pre-3000CX cabinets (30390A – 52" bay with pedestal and modular door) may order the appropriate quantity of option 150 to replace these cabinets. This will provide all-new 56-inch (142.2 cm) cabinets for the System. Customers with 7900A (4.9Mb) disc drive in the second bay from the right will need to order an additional bay (option 150) to contain this disc drive.

Selector Channel – For systems containing a 30030A selector channel, order option 132 to upgrade to the Series II specified 30030B unit.

Asynchronous Terminal Controller – HP 3000 Systems installed before December, 1974 require option 152 to upgrade to the current ATC.

Fixed Head Swapping Disc (2Mb) – The operating system for the Series II (MPE II) exceeds the 2Mb storage capacity of the 30103A-001. When upgrading a system, one of the following alternatives must be selected:

a. Not to use the 30103A-001 as a system swapping disc.
b. Obtain a 30229A controller, a 15Mb disc drive subsystem, and a 30030B Selector Channel.
c. Issue a special order for a fixed-disc upgrade (30103A-E01) to expand the storage capacity to 4Mb.

Unsupported Peripherals – The following HP 3000 and HP 3000CX peripherals will not be supported on the Series II: IBM 2741 Terminal, HP 30107A Card Reader, and HP 30112A Card Punch.

Site preparation data for upgrade to model 6

	HP 7920A 50Mb DISC DRIVE		TWO SYSTEM BAYS		HP 2640B CRT CONSOLE AND DESK	
	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230	208 phase/phase	230	115	230
PHASES	1	1	3	1	1	1
CURRENT PER PHASE	4.5A	2.3A	* †	* 12A	1.3	0.7
CONNECTION CODE	C	E	M	M	F	F
HEAT OUTPUT (per hour)	2200 btu	554 kcal	14,000 btu	3500 kcal	483 btu	129 kcal
WEIGHT	240 lb	109 kg	790 lb	358 kg	139 lb	64 kg
SIGNAL CABLE LENGTH	**	**	–	–	25 ft	7.6 m

Site preparation data for upgrade to model 8

	HP 7920A 50Mb DISC DRIVE		THREE SYSTEM BAYS		HP 2640B CRT CONSOLE AND DESK	
	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230	208 phase/phase	230	115	230
PHASES	1	1	3	1	1	1
CURRENT PER PHASE	6A	3A	* ††	* 15.5 A	1.3	0.7
CONNECTION CODE	C	E	M	M	F	F
HEAT OUTPUT (per hour)	2200 btu	554 kcal	15,400 btu	3881 kcal	483 btu	129 kcal
WEIGHT	240 lb	109 kg	1010 lb	458 kg	139 lb	64 kg
SIGNAL CABLE LENGTH	**	**	–	–	25 ft	7.6 m

** Plan for 300% overcurrent turn-on surge. † A = 9.5A; B = 11A; C = 2A. †† A = 11A; B = 13A; C = 7A.*

***Up to eight disc drives may be daisy-chained to a controller. The cable length from the controller to the first drive is 18 ft. (5.5 m). The cable length between disc drives is 8 ft. (2.4 m).*

In addition, each drive also has a cable back to the controller. The length of this cable for each drive is 50 ft. (15.2 m).

The maximum cumulative length of daisy-chained cable is 74 ft (22.5 m). Longer cables may be special ordered, but this is not advised.

Memory — In order to increase memory from 256 kilobytes to 320 kilobytes (or above), an additional memory array board, power supply, and module control unit are required. The equipment is obtained by specifying option 502 when ordering with the upgrade subsystem, or by ordering the 30411A subsystem, when ordering as an individual line item.

To order additional memory at a later date (after system upgrade) an HP 30411A can be ordered as a separate product.

Disc Controller Configurations — The following tables show which disc controller configurations can be supported in the upgraded system. With existing system which have a 30229A controller, 7905 and 7920 discs can be accommodated.

***One-controller configurations**

Multiplexer Channel	Selector Channel
1. 7900A (4.9Mb) Controller	
2. 2888A (47Mb) Controller	
3.	30229A Controller

***Two-controller configurations**

Multiplexer Channel	Selector Channel
1. 7900A (4.9Mb) Controller 2888A (47Mb) Controller	
**2. 2888A (47Mb) Controller 2660A (4Mb) Controller	
3. 2888A (47Mb) Controller	2660A (4Mb) Controller
4. 7900A Controller	30229A Controller
5. 2888A (47Mb) Controller	30229A Controller

**Hewlett-Packard does not recommend more than 400 megabytes of disc storage or more than 8 physical drives be attached to any HP 3000.*

***Must use same software channel.*

The configurations listed above have been thoroughly tested on the Series II. Disc configurations different from those listed should be checked by your Hewlett-Packard Sales Representative.

Trade-in allowances

A credit toward the purchase of this upgrade product will be issued for the following replaced equipment which must be returned to Hewlett-Packard:

- the old CPU, including the extended instruction set, if present.
- all core memory and memory controllers.
- the old multiplexer channel.
- two cabinets with fans, blowers, power distribution units, and electrical wiring.
- system control panel (either the "CX" panel contained in the cabinet door or the older maintenance panels with interface which had been mounted in the separate system desk. The system desk itself, if present, stays with the customer.)
- the remaining DC power supplies.
- the card cages mounted in the two cabinets and the associated backplanes and cables.

The amount of the credit depends on the memory configuration of the existing system. In addition, if the system being upgraded has a selector channel, there is a credit to the customer for returning the two replaced printed circuit assemblies to Hewlett-Packard (the new assemblies are ordered via option 132). The amounts of these credits are available from your Hewlett-Packard Sales Representative.

There is no trade-in credit available for any additional older style cabinets replaced via option 150.

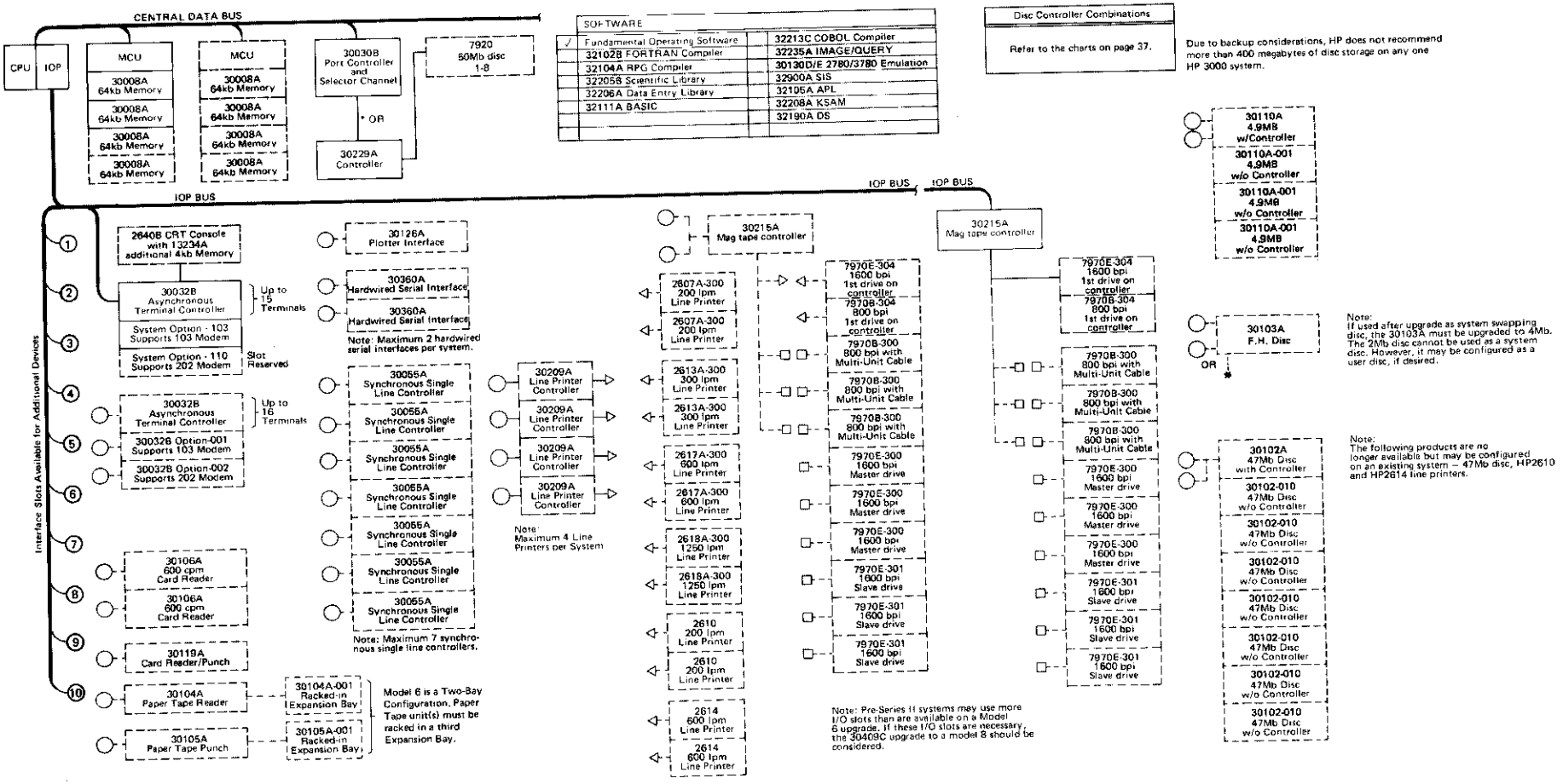
Ordering information

30306A Upgrade of an HP 3000 Series I or pre-Series II to a Series II Model 6 includes the following:
Series II CPU
192 kilobyte fault control memory expandable to 512kb
Extended instruction set
Multiplexer Channel
Two Series II cabinets, including power supplies, card cages and cables
MPE II operating system
Compiler Library
Series II utilities

30306-015 System power for 230V, single phase, 50 Hz operation
-132 Upgrade existing selector channel (30030A) to Series II compatible selector channel (30030B)
-150 Add one Series II style peripheral cabinet
-152 Upgrade early version asynchronous terminal controller board to present board
-501 Increase memory to 256kb
-502 Increase memory to 320kb
-503 Increase memory to 384kb
-504 Increase memory to 448kb
-505 Increase memory to 512kb

30409C Upgrade of HP 3000 Series I or pre-Series II to Series II Model 8 includes the same equipment and options as the Model 6 upgrade above (30306A), with the addition of the following:
320kb fault control memory expandable to 512kb
One additional Series II cabinet, resulting in greater I/O capacity

Maximum configuration diagram for upgrade to model 6

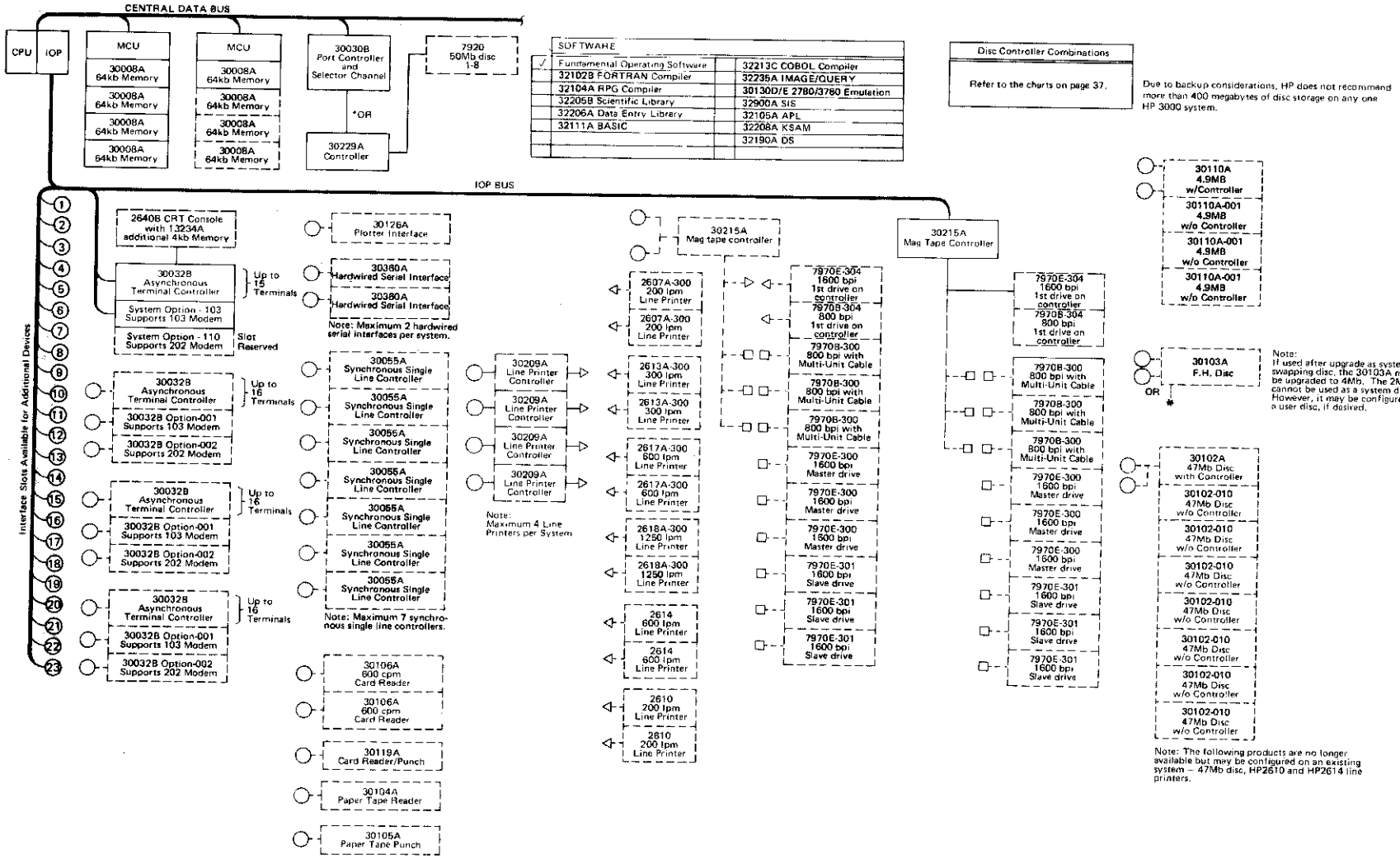


SOFTWARE			
√	Fundamental Operating Software		32213C COBOL Compiler
	32102B FORTRAN Compiler		32235A IMAGE/QUERY
	32104A RPG Compiler		30130D/E 2780/3780 Emulation
	32205B Scientific Library		32900A SIS
	32206A Data Entry Library		32105A APL
	32111A BASIC		32208A KSAM
			32190A DS

Disc Controller Combinations
Refer to the charts on page 37.

Due to backup considerations, HP does not recommend more than 400 megabytes of disc storage on any one HP 3000 system.

Maximum configuration diagram for upgrade to model 8



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HP 3000 Series II Model 6 Memory Expansion Upgrade

model 30411B

The 30411B memory expansion upgrade kit allows you to expand the memory capacity of HP 3000 Series II Model 6 systems beyond 256k bytes to a maximum of 512k bytes*. Designed for Model 6 systems with memory of 128k, 192k, or 256k bytes, the upgrade kit also increases the existing memory by 64k bytes. The number of I/O slots remains unchanged. As illustrated in the table below, further memory expansion (up to the 512kb limit) can be accomplished by simply adding the necessary 30008A 64k byte memory array boards. These boards can be purchased with the upgrade kit, if desired.

Present System	Number of 30008A 64k byte memory boards required after addition of 30411B to expand memory to			
	320kb	384kb	448kb	512kb
128k byte Model 6	+2	+3	+4	+5
192k byte Model 6	+1	+2	+3	+4
256k byte Model 6	0	+1	+2	+3

The configuration of the upgraded system is outlined in the Model 6 Configuration Guide data sheet.

**To expand the memory of a Model 6 system to 256k bytes or less, add the appropriate number of 30008A 64k byte memory array boards. The memory expansion upgrade kit is not required.*

Software

No software products are required with the upgrade kit. All software used with the previous system will operate with the upgraded system without modification.

Hardware supplied

One 64kb memory board, memory power supply, error correcting memory array, memory controller, cables, and mounting hardware.

Warranty

The new hardware components furnished with the kit are warranted for 90 days from the date of installation. This warranty is implemented as a free service contract on the new equipment only.

System requirements

HP 3000 Series II Model 6 with memory of 128kb, 192kb, or 256kb.

Ordering information

30411B Series II Memory Expansion Kit for the Model 6.

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HP3000 Series II Model 8 Upgrade

model 30408A

The 30408A upgrade kit is designed for use with HP 3000 Series II, Models 5, 6, and 7 to allow memory expansion beyond 256k to a maximum of 512k bytes, or expand the number of available I/O slots.

The upgrade kit consists of a single cabinet that is installed to the left of the existing CPU bay. It contains power supplies, two card cages, and 64k bytes of memory.

I/O slots

By installing the 30408A, the number of available I/O slots is increased as follows:

Model	From	To
5	15	23
6	10	23
7	13	23

(see Model 8 data sheet for configuration constraints of upgraded system.)

Memory

Assuming the initial system has 256k bytes of memory, after upgrading, the system will have a memory of 320k bytes, plus expansion capability up to 512k bytes simply by adding the necessary memory array boards. These can be purchased with the upgrade kit if desired. For Model 6 systems which have already increased the memory capacity to 320kb or greater, option 002 is available to increase *only* the I/O capacity.

Note: Order additional 30008A 64kb memory modules to increase memory to the desired capacity.

Software

No software products are included with the upgrade kit. All software used with the previous system will operate with the upgraded system without modification.

Warranty

The new hardware components furnished with the kit are warranted for 90 days from date of installation. This warranty is implemented as a free service contract on the new equipment only.

System requirements

HP 3000 Series II, Model 5, 6, or 7.

Equipment supplied

I/O cabinet, memory expansion kit with power supply, 64k byte fault control memory board, I/O power supply, two card cages, and cabling.

Ordering information

30408A	Series II, Model 8 upgrade kit for Model 5, 6, or 7.
-001	Required for Model 6 systems with 256kb or less. Adds memory expansion and I/O expansion kits.
-002	Required for Model 6 systems with 320kb or greater only. Deletes memory expansion kit and 64kb memory board.

Add-On Hardware for HP 3000 Series II, Model 5

The diagram below is designed to allow owners of Model 5 Systems to select add-on equipment for their system. The diagram shows the maximum allowable configuration of a Model 5 and differs from the earlier diagrams as follows:

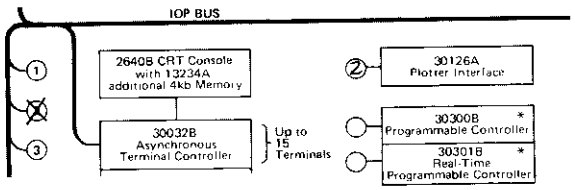
The 30229A Disc controller can support up to eight drives which can be a mixture of 7905s and the new 7920 (50 Megabytes). The two types of drives can be intermixed in any way.

Ordering information

Select the add-on peripherals required from the diagram and consult the pricing guide at the back of this book for complete ordering details.

How to configure a system

When choosing options denoted by "circles", be certain to write the number of the interface slot which the option will occupy in the open circle beside the selected option; then, cross out the numbered circle connected to the IOP Bus to show that the interface slot is no longer available. For example:



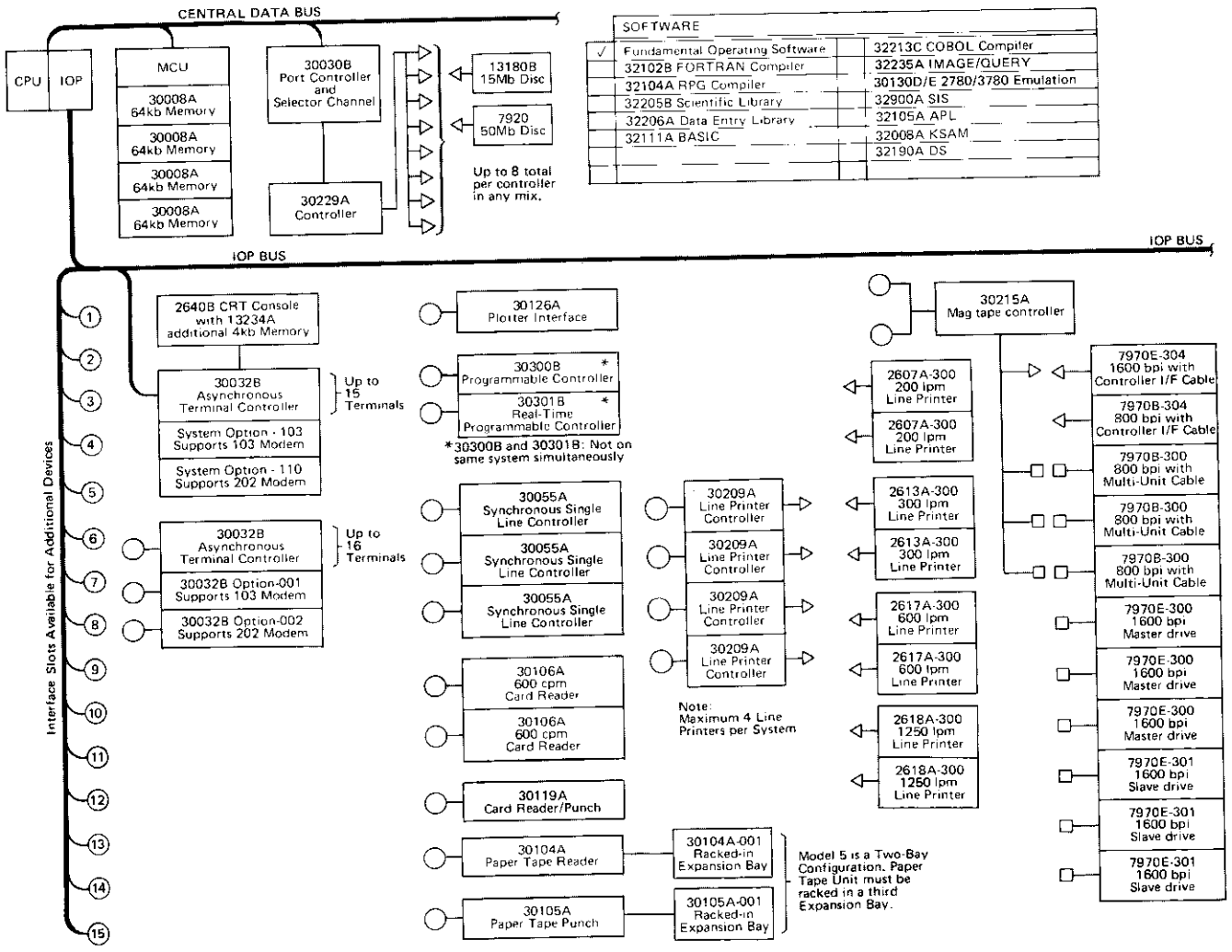
As a result, the options that have been chosen and the interface slots they occupy will be evident at a glance. Do not exceed the total number of available interface slots on the IOP Bus.

Devices identified with triangles or squares will function only in positions designated by matching geometric shapes.

The "Pricing Guide" at the rear of this publication may offer additional specific qualifications for selecting options.

Interfacing Optional Equipment Through Interface Slots. 15 interface slots (numbered "circles" connected to the IOP Bus) are available for additional products, and can be occupied by optional equipment identified with an attached "circle".

Maximum configuration diagram, model 5



Connecting Additional Terminals. One asynchronous terminal controller (ATC) is supplied. It permits the connection of up to 16 terminals (one of the 16 ports of the ATC is occupied by the system console). One additional ATC, with a capacity to interface 16 terminals, can be supported by the Model 5.

Disc Drive. One 15 Mb Disc Subsystem with controller is supplied, connected directly to the Central Data Bus through a Selector Channel. The controller can handle a total of 8 drives.

Additionally, 47 Mb disc units may be connected to the system through the interface slots on the IOP Bus. This method will occupy 3 interface slots (unit identified with 3 "circles"). A first unit must contain a controller; as many as 8 units can be handled by the controller.

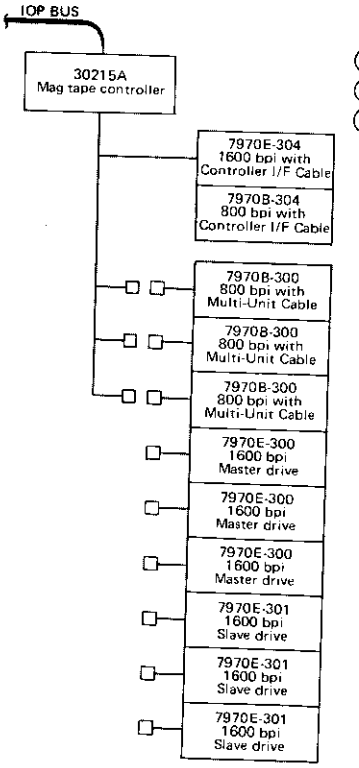
The system can support two disc controllers, only one of which may be a 30229.

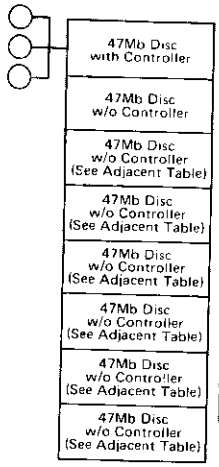
Hewlett-Packard does not recommend more than 400 megabytes of disc storage or more than eight physical drives on any one HP 3000 system.

Magnetic Tape Units. One 1600 bpi unit with controller is supplied (connected directly to the IOP Bus); an 800 bpi unit can be chosen as a substitute. The controller in the first unit can handle 3 additional optional units. 9 units (with "squares") are offered as alternatives to satisfy the three available positions (designated by 3 "squares"). Additionally, magnetic tape units may be connected to the system through the interface slots on the IOP Bus. This method will occupy 2 interface slots (unit identified with 2 "circles"). The first position is identified by a "triangle" and the 3 remaining positions are identified by "squares". Either of 2 units – 1600 bpi or 800 bpi (denoted by a "triangle"), satisfies the requirements of the first position. The other 3 available positions may be satisfied by any 9 alternative units (identified with "squares").

Line Printers. 8 options are available; as many as 4 line printers may be connected to any Series II System. Each 30209A line printer controller occupies a single interface slot in the IOP Bus.

Additional Peripheral Devices. Plotter Interface; Programmable Controllers; Emulation Subsystem; Card Readers; Card Reader/Punch; Paper Tape Reader; Paper Tape Punch; each of these requires one interface slot.





DISC DRIVES		
DRIVE NUMBER	PRODUCT NUMBER FOR 208V, 3Ø, 60Hz	PRODUCT NUMBER FOR 230V, 1Ø, 50Hz
1	30102A	30102A 30102A-015
2	30102A-010	30102A-010 30102A-015
3	30102A-010	30102A-020 30102A-015
4	30102A-010	30102A-010 30102A-015
5	30102A-010	30102A-020 * 30102A-015
6	30102A-010	30102A-010 30102A-015
7	30102A-020	30102A-020 30102A-015
8	30102A-010	30102A-010 30102A-015

* Must be with a three bay system with an additional 30335A Power Control Unit (a total of two Power Control Units are required on the system).

Add-On Hardware for HP 3000 Series II, Model 7

The diagram below is designed to allow owners of Model 7 Systems to select add-on equipment for their system. The diagram shows the maximum allowable configuration of a Model 7 and differs from the earlier diagrams as follows:

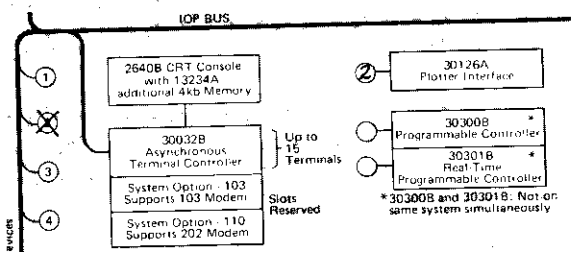
The 30229A Disc controller can support up to eight drives which can be a mixture of 7905s and the new 7920 (50 Megabytes). The two types of drives can be intermixed in any way.

Ordering information

Select the add-on peripherals required from the diagram and consult the pricing guide at the back of this book for complete ordering details.

How to configure a system

When choosing options denoted by "circles", be certain to write the number of the interface slot which the option will occupy in the open circle beside the selected option; then, cross out the numbered circle connected to the IOP Bus to show that the interface slot is no longer available. For example:

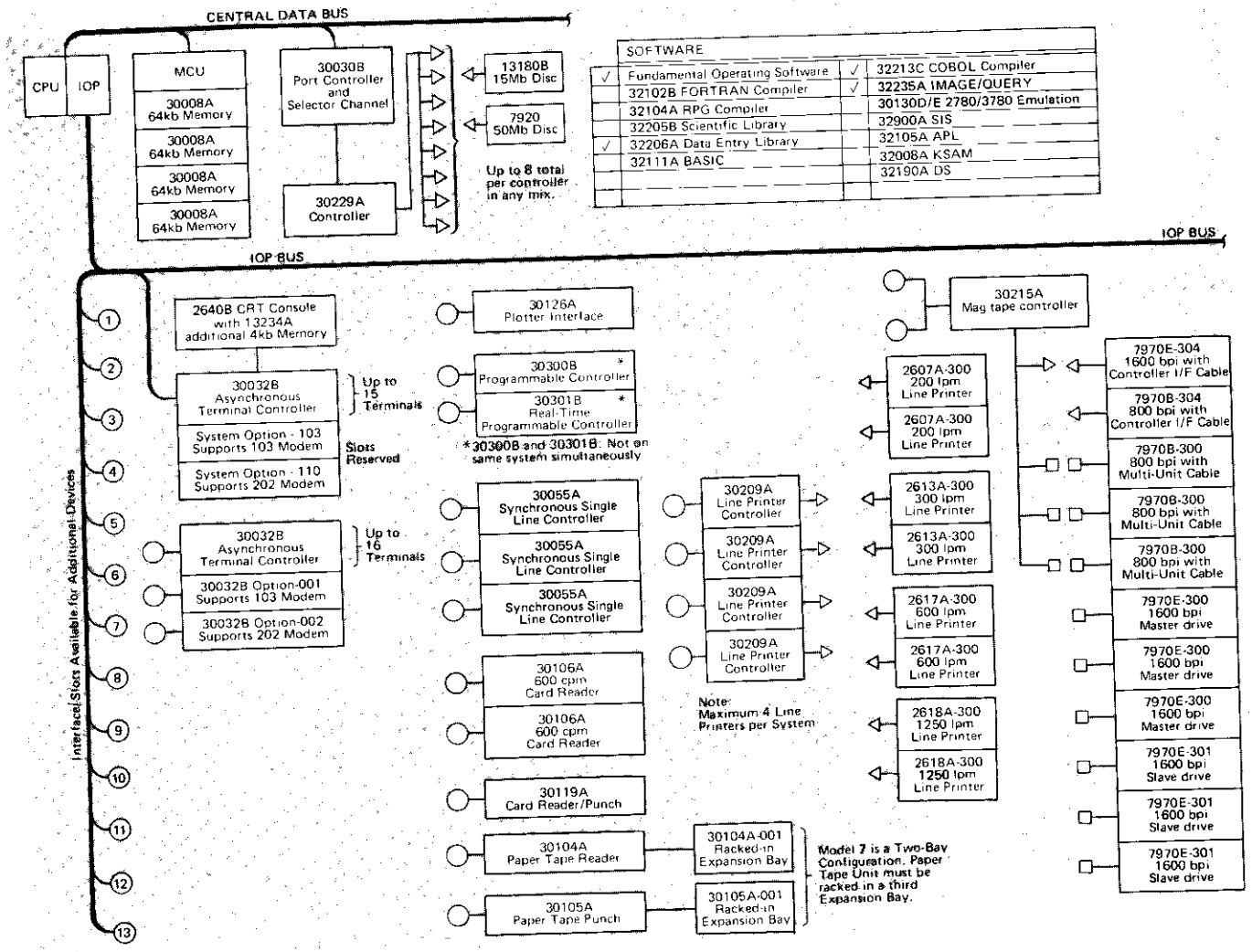


As a result, the options that have been chosen and the interface slots they occupy, will be evident at a glance. Do not exceed the total number of available interface slots on the IOP Bus.

Devices identified with triangles or squares will function only in positions designated by matching geometric shapes.

The "Pricing Guide" at the rear of this publication may offer additional specific qualifications for selecting options.

Maximum configuration diagram, model 7



Interfacing Optional Equipment Through Interface Slots. 13 interface slots (numbered "circles" connected to the IOP Bus) are available for additional products, and can be occupied by optional equipment identified with an attached "circle".

Connecting Additional Terminals. One asynchronous terminal controller (ATC) is supplied. It permits the connection of up to 16 terminals (one of the 16 ports of the ATC is occupied by the system console). One additional ATC, with a capacity to interface 16 terminals, can be supported by the Model 7.

Disc Drives. Two 47 Mb Disc Subsystems are supplied, one unit with a controller and one unit without controller. The unit with a controller is connected directly to the IOP Bus, and can handle a total of 8 drives.

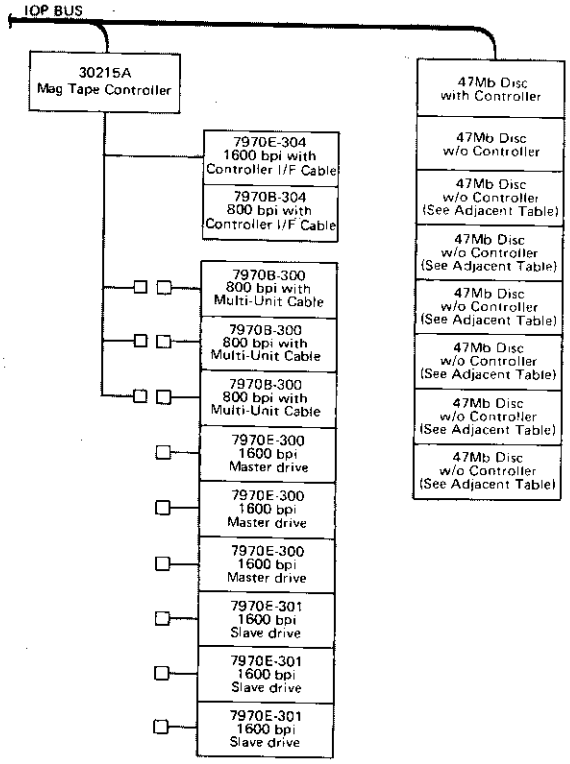
In addition, one 30229 controller may be installed which can support up to eight 7905/7920 drives in any mixture.

Hewlett-Packard does not recommend more than 400 megabytes of disc storage or more than 8 physical drives on any one HP 3000 system.

Magnetic Tape Units. One 1600 bpi unit with controller is supplied (connected directly to the IOP Bus); an 800 bpi unit can be chosen as a substitute. The controller in the first unit can handle 3 additional optional units. 9 units (with "squares") are offered as alternatives to satisfy the three available positions (designated by 3 "squares"). Additionally, magnetic tape units may be connected to the system through the interface slots on the IOP Bus. This method will occupy 2 interface slots (unit identified with 2 "circles"). The first position is identified by a "triangle" and the 3 remaining positions are identified by "squares". Either of 2 units – 1600 bpi or 800 bpi (denoted by a "triangle"), satisfies the requirements of the first position. The other 3 available positions may be satisfied by any 9 alternative units (identified with "squares").

Line Printers. 8 options are available; as many as 4 line printers may be connected to any Series II System. Each 30209A line printer controller occupies a single interface slot in the IOP Bus.

Additional Peripheral Devices. Plotter Interface; Programmable Controllers; Emulation Subsystem; Card Readers; Card Reader/Punch; Paper Tape Reader; Paper Tape Punch; each of these requires one interface slot.



DISC DRIVES		
DRIVE NUMBER	PRODUCT NUMBER FOR 208V, 30, 60Hz	PRODUCT NUMBER FOR 230V, 10, 50Hz
1	30102A	30102A 30102A-015
2	30102A-010	30102A-010 30102A-015
3	30102A-010	30102A-020 30102A-015
4	30102A-010	30102A-010 30102A-015
5	30102A-010	30102A-020 * 30102A-015
6	30102A-010	30102A-010 30102A-015
7	30102A-020	30102A-020 30102A-015
8	30102A-010	30102A-010 30102A-015

* Must be with a three bay system with an additional 30335A Power Control Unit (a total of two Power Control Units are required on the system).

Add-On Hardware for HP 3000 Series II, Model 9

The diagram below is designed to allow owners of Model 7 Systems to select add-on equipment for their system. The diagram shows the maximum allowable configuration of a Model 7 and differs from the earlier diagrams as follows:

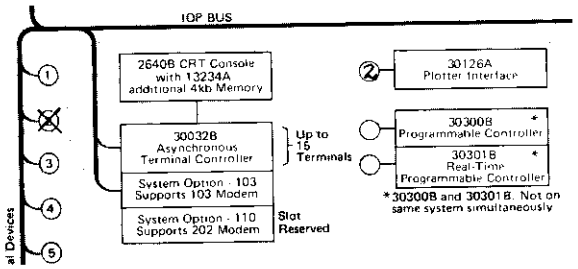
The 30229A Disc controller can support up to eight drives which can be a mixture of 7905s and the new 7920 (50 Megabytes). The two types of drives can be intermixed in any way.

Ordering information

Select the add-on peripherals required from the diagram and consult the pricing guide at the back of this book for complete ordering details.

How to configure a system

When choosing options denoted by "circles", be certain to write the number of the interface slot which the option will occupy in the open circle beside the selected option; then, cross out the numbered circle connected to the IOP Bus to show that the interface slot is no longer available. For example:

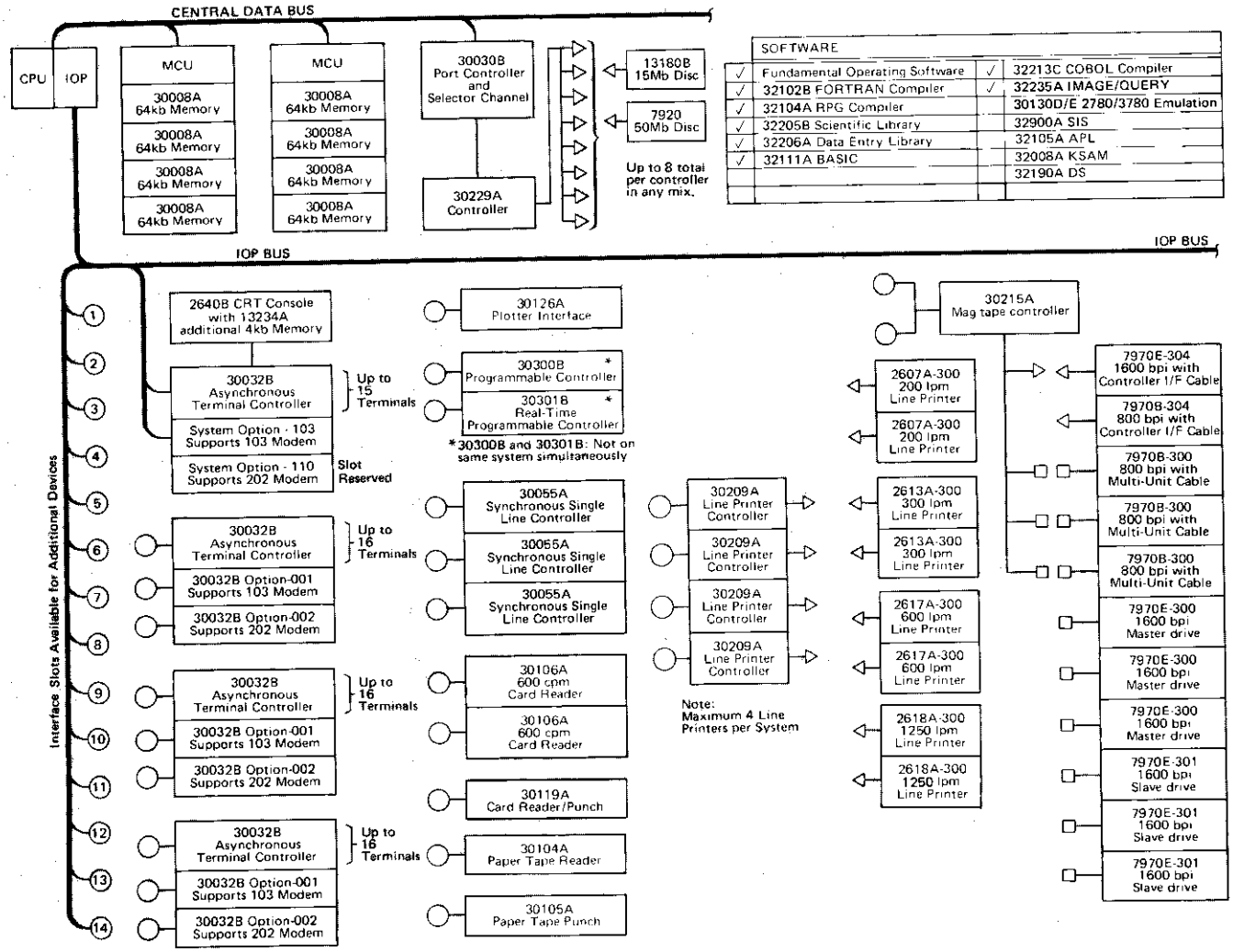


As a result, the options that have been chosen and the interface slots they occupy, will be evident at a glance. Do not exceed the total number of available interface slots on the IOP Bus.

Devices identified with triangles or squares will function only in positions designated by matching geometric shapes.

The "Pricing Guide" at the rear of this publication may offer additional specific qualifications for selecting options.

Maximum configuration diagram, model 9



Interfacing Optional Equipment Through Interface Slots. 14 interface slots (numbered "circles" connected to the IOP Bus) are available for additional products, and can be occupied by optional equipment identified with an attached "circle".

Connecting Additional Terminals. One asynchronous terminal controller (ATC) is supplied. It permits the connection of up to 16 terminals (one of the 16 ports of the ATC is occupied by the system console). Three additional ATCs, each with a capacity to interface 16 terminals, can be supported by the Model 9.

Disc Drives. Two 47 Mb Disc Subsystems are supplied, one unit with a controller and one unit without controller. The unit with a controller is connected directly to the IOP Bus, and can handle a total of 8 drives.

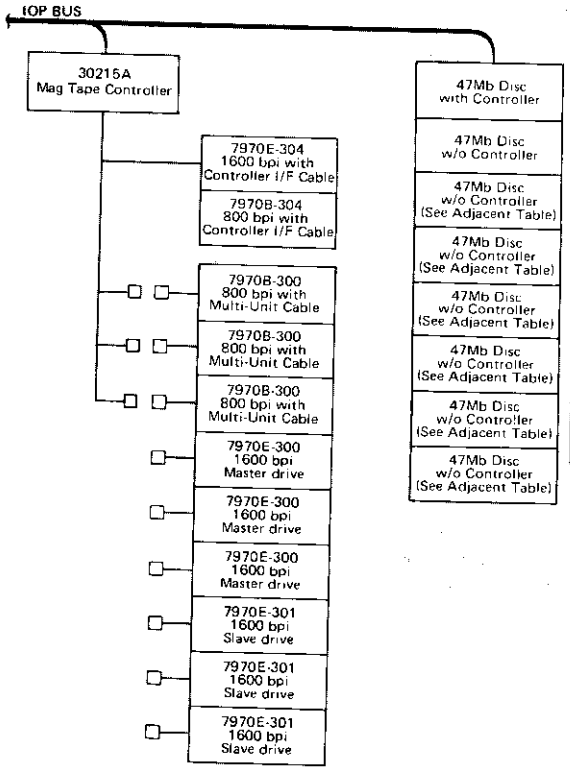
In addition, one 30229 controller may be installed which can support up to eight 7905/7920 drives in any mixture.

Hewlett-Packard does not recommend more than 400 megabytes of disc storage or more than 8 physical drives on any one HP 3000 system.

Magnetic Tape Units. One 1600 bpi unit with controller is supplied (connected directly to the IOP Bus); an 800 bpi unit can be chosen as a substitute. The controller in the first unit can handle 3 additional optional units. 9 units (with "squares") are offered as alternatives to satisfy the three available positions (designated by 3 "squares"). Additionally, magnetic tape units may be connected to the system through the interface slots on the IOP Bus. This method will occupy 2 interface slots (unit identified with 2 "circles"). The first position is identified by a "triangle" and the 3 remaining positions are identified by "squares". Either of 2 units – 1600 bpi or 800 bpi (denoted by a "triangle"), satisfies the requirements of the first position. The other 3 available positions may be satisfied by any 9 alternative units (identified with "squares").

Line Printers. 8 options are available; as many as 4 line printers may be connected to any Series II System. Each 30209A line printer controller occupies a single interface slot in the IOP Bus.

Additional Peripheral Devices. Plotter Interface; Programmable Controllers; Emulation Subsystem; Card Readers; Card Reader/Punch; Paper Tape Reader; Paper Tape Punch; each of these requires one interface slot.



47Mb Disc with Controller
47Mb Disc w/o Controller
47Mb Disc w/o Controller (See Adjacent Table)
47Mb Disc w/o Controller (See Adjacent Table)
47Mb Disc w/o Controller (See Adjacent Table)
47Mb Disc w/o Controller (See Adjacent Table)
47Mb Disc w/o Controller (See Adjacent Table)
47Mb Disc w/o Controller (See Adjacent Table)

DISC DRIVES		
DRIVE NUMBER	PRODUCT NUMBER FOR 208V, 3Ø, 60Hz	PRODUCT NUMBER FOR 230V, 1Ø, 50Hz
1	30102A	30102A 30102A-015
2	30102A-010	30102A-010 30102A-015
3	30102A-010	30102A-020 30102A-015
4	30102A-010	30102A-010 30102A-015
5	30102A-010	30102A-020* 30102A-015
6	30102A-010	30102A-010 30102A-015
7	30102A-020	30102A-020 30102A-015
8	30102A-010	30102A-010 30102A-015

*Must be with a three bay system with an additional 30335A Power Control Unit (a total of two Power Control Units are required on the system).

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COBOL/3000 Compiler

model 32213C

Features

- 1968 ANSI standard COBOL
- Direct communication with SORT/3000 via SORT verb
- Communications with COBOL or non-COBOL subroutines
- Table handling up to 3 dimensions
- Sequential and random files
- Object code segmentation controlled by programmer
- Data segmentation through dynamic-type subroutines
- Packed decimal, binary and display (zoned) data types
- Compile time editing
- Selective compilation
- Concurrent batch and terminal capability
- Optimal bounds checking for tables at program execution time

COBOL provides the user with language resembling English as a programming tool. It is self-documenting, easy to learn, and permits fast program development. The language has efficient statements to simplify file descriptions, I/O, table handling, sorting, mass storage manipulation and report generation. The compiler is integrated into the HP 3000 Multiprogramming Executive (MPE) to allow great flexibility in every environment.

Implementation level

The major standard describing COBOL compilers is the ANSI standard. Hewlett-Packard COBOL has fully implemented* the ANSI 1968 standard in all categories. The following table shows the COBOL rating.

COBOL modules

COBOL is a set of functional processing modules that have the following capabilities:

Nucleus: Provides a basic language capability for the internal processing of data within the basic structure of the four divisions of a COBOL program.

Table Handling: For defining tables of contiguous data items and accessing an item relative to its position in the table. Tables may be variable length and may have up to three dimensions.

*Except report writer.

MODULE	ANSI* RATING
Nucleus	High
Table Handling	High
Sequential Access	High
Random Access	High
SORT	High
Report Writer	Null
Segmentation	High
Library	High

ANSI: American National Standards Institute

**ECMA: European Computer Manufacturers Association*

Sequential Access: To access records of a file in an established sequence. Sharing memory area among files is also provided.

Random Access: To access records of a mass storage file according to a programmer-supplied key. Sharing memory area among files is also provided.

Sort: To order a file of records according to a set of user-specified keys within each record. Special processing of addition, deletion, creation, altering, editing, etc., is provided.

Segmentation: To specify object program segmentation requirements.

Library: For specifying text that is to be copied from a library. Library text is available to a source program at compile time and need not be actually written as part of the source program.

Interprogram Communication: Provides the capability to call (or be called by) a program written in COBOL or other HP 3000 Languages.

Language Extensions: In addition to the ANSI Standard, Hewlett Packard has implemented a number of extensions which include:

Interprogram Communication
Packed Decimal (COMPUTATIONAL-3)
Note Lines [defined by *(an asterisk) in column 7]
Current-Date (MM/DD/YY)
Time-of-day (HHMMSS)
THEN optional
Multiple REDEFINEs of a given location
Unary +
Go to MORE-LABELS EXIT
Synchronized for index data items
Forms message for special forms

Data types

COBOL allows
Binary (Computational), Packed
Decimal (Computational-3), and
Display (Zoned) data types.

Environment

COBOL is fully integrated into the Multiprogramming Executive-II (MPE-II), providing flexibility in compiling, linking, segmenting and executing in batch and session mode. It is also fully compatible with the MPE-C operating system of the Series I.

Program compatibility

Most programs written for any of the HP 3000 computer systems can be run without conversion on any other HP 3000.

System requirements

The minimum system required is an HP 3000 Series II operating under MPE II with at least 192k bytes of memory; or an HP 3000 Series I, HP 3000CX, or original HP 3000 operating under MPE-C with 128k bytes of memory.

The COBOL Compiler Subsystem is installed by a factory-authorized Customer Engineer. Installation is included in the list price.

Ordering information

HP 3000 Series II:

32213C. Installation of COBOL and run-time library in object form by factory-authorized Customer Engineer. Includes 32213-90001 manual.

HP 3000 Series I and Pre-Series II Systems:

32213B. Installation of COBOL and run-time library in object form by factory-authorized Customer Engineer. Includes 32213-90001 manual.

Since COBOL/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -003, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard representative.

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RPG/3000 Compiler

model 32104A

Features

- **Automatic program segmentation**
- **Edit codes**
- **Calculation control of I/O**
- **Closed subroutines**
- **Single dimension arrays**
- **Automatic EBCDIC/ASCII file translation and alternate collating sequence**
- **Cross reference**
- **Formatted dump**
- **Run time error options can be preselected or dynamic**
- **DEBUG allows source level debugging**
- **Spread cards**
- **File error option**

RPG is a machine-independent, problem-oriented language that is easy to learn, use, and code. It allows the user to specify many important operations with a minimum of effort, by making simple entries on specially formatted coding sheets. Because RPG is a standard language available on many different machines, programs can be submitted coded in another manufacturer's RPG or RPG II, directly to the Hewlett-Packard RPG compiler with little or no re-coding for conversion. In addition, the RPG compiler helps the user detect errors at the source language level with extensive diagnostic messages.

HP extensions to RPG II

Parameters for external subroutine calls:
Parameters may be specified after an EXIT (external subroutine call) operation, simplifying interfacing with COBOL, SPL, BASIC or FORTRAN subroutines.

Interface to data base management:
Data bases can be accessed through regular I/O reads and writes by specifying the file as being an IMAGE data base in the file specification section.

Run-time error options:
Three methods are provided for handling run-time errors.

1. Specifying on the Control Record at compile time whether the run-time error should be ignored or the program terminated.
2. Allowing the operator to determine the mode of operation at run time.
3. Testing an error code in RPG calculations and determining the mode of operation programmatically.

Cross reference option:
A cross reference may be requested showing all references to file names, indicators and field names.

Automatic program segmentation:
RPG will automatically segment code generated for an RPG program in 1K, 2K, 3K, or 4K-word segments, resulting in a virtually unlimited size RPG program.

EBCDIC/ASCII automatic translation:
The user can request RPG to automatically generate file translation tables for EBCDIC to ASCII or ASCII to EBCDIC conversions, or to use an EBCDIC alternate collating sequence.

Combined terminal file:
The user may define an Input/Output terminal file.

Calculation indicator repetition:
Duplicate conditioning indicators need not be repeated line-to-line in calculation.

Data types

RPG allows data to be input or output in the following formats:

- binary — one or two word binary data
- packed decimal
- alphanumeric
- unpacked decimal
- unpacked decimal with leading or trailing sign

Environment

RPG runs under the Multiprogramming Executive Operating System (MPE), providing the user with flexibility such as:

- compile/execute in batch or timesharing mode
- device independence
- call any program compiled in other languages
- an interactive debugging facility

MPE file support

All file types supported by the Multiprogramming Executive Operating System are available to the user through RPG/3000. This includes input, output and update files accessed sequentially, or randomly by relative record number.

RPG also supports fully indexed files on the Series II via KSAM/3000, an optional extension to the MPE file system.

For HP 3000 Series I and Pre-Series II systems, RPG supports indexed files via INDEX/3000.

Specification types

The statements that describe the input, processing, and output to the compiler must be written according to the rules of RPG. The seven specification types are:

Control Record
File Description
File Extension
Line Counter
Input
Calculation
Output

Program compatibility

Programs written for any of the HP 3000 computer systems can be run without conversion on any other HP 3000.

System requirements

The minimum system required is an HP 3000 Series II operating under MPE II; or an HP 3000 Series I, HP 3000CX, or original HP 3000 operating under MPE-C.

Ordering information

32104A RPG/3000. Installation of RPG compiler and runtime library in object form by a factory-authorized Customer Engineer. Includes 30104-90001 reference manual.

Since RPG/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -011, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard sales representative.

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FORTRAN/3000 Compiler

model 32102B

Features

- Seven data types
- Character variables and character arrays
- Bit extract and deposit capability with PARTIAL-WORD DESIGNATORS
- Arrays may have up to 255 dimensions
- Named common blocks may be initialized by block data subprograms
- Multiple entry points for subprograms
- Supports user-written error handling routines which are called under trap conditions
- Parameter statement for specifying constants with symbolic names
- Dynamic array declaration and allocation in subprograms
- Up to 99 files may be used during execution of a FORTRAN program
- FUNCTIONS and SUBROUTINES may be called recursively
- The dependent statement of a logical IF can be another logical IF
- Parameters to non-FORTRAN subprograms may be passed by value rather than reference
- ACCEPT and DISPLAY statements for free field input/output
- Compilation time editing
- Symbolic names may contain up to 15 characters
- Action labels may be specified in READ/WRITE statements to indicate point of transfer in case of end-of-file or I/O error
- A label can be used as an argument in subprogram call statements to allow alternate return points
- Mixed mode arithmetic supported
- Generic functions
- Built-in optional cross reference listing
- Undefined variable detection

HP FORTRAN is based on ANSI STANDARD FORTRAN (X3.9-1966). In addition, FORTRAN has many extensions which expand the capabilities and increase the power of the language.

Environment

The Multiprogramming Executive (MPE) provides great flexibility for the FORTRAN user in the following areas:

- Compile in batch or timesharing mode, or call the compiler programmatically
- Compile subroutines written in other languages (e.g., COBOL) as part of the main FORTRAN object program
- Execute in either batch or timesharing mode
- File equate for device independent I/O
- Segment programs without re-compiling
- Call any program or subprogram compiled in any other language, limited only by security
- A symbolic debugging facility provided by the use of TRACE

Data types

FORTRAN provides seven types of data.

- INTEGER type: A 16-bit quantity including sign. The range is +32767 to -32768
- DOUBLE INTEGER type: A 32-bit quantity including sign. The range is +2147483647 to -2147483648
- LOGICAL type: A 16-bit mask. The least significant bit is used to determine the Boolean value (True and False).
- REAL type: A 32-bit quantity with sign, exponent and mantissa. The range is $\pm(2^{-256}, 2^{+256})$ with 6 to 7 decimal digit accuracy.
- DOUBLE PRECISION type: A 64-bit* quantity with sign, exponent and mantissa. The range is identical to REAL but with 16 decimal digit accuracy.
- COMPLEX type: A 64-bit* quantity consisting of two type reals, one for the real part and one for the imaginary part.
- CHARACTER type: Character values are represented by strings of 8-bit USASCII code.

**Double precision for HP 3000 Series I and pre-Series II computers is 48-bit quantity with sign, exponent, and mantissa.*

Source program format

FORTRAN was designed with several powerful convenience features for timesharing users. The nature of terminal devices makes the historical position-dependent fixed-format program representation inconvenient; however, FORTRAN surmounts these drawbacks by offering both fixed format and free format representation for source language input.

File facility

Uniform access to disc files and standard input/output devices is accomplished through the MPE file system. Users access their files using normal READ/WRITE statements. The structure of a file and method of access can be defined via a file statement by the programmer or left to default values. This provides device independence and easy access to all types of files.

Device type can be defined at execution time; consequently, the devices used by a program can be readily changed.

Sequential and random access of disc files is supported by FORTRAN.

Users with highly specialized requirements may communicate directly with the MPE file system. Data file privacy is achieved through the normal MPE protection mechanisms.

Debug facility

The TRACE program and FORTRAN are designed to work together, providing a convenient and powerful capability for the user in monitoring program execution. A traceable item is a symbolic name of a simple variable, array, statement-function, or external procedure or is a statement label of an executable statement. Monitoring can be conditional, thereby eliminating massive amounts of output.

Program compatibility

Most programs written for the HP 3000 Series I, HP 3000CX, and original HP 3000 can be run without conversion on an HP 3000 Series II. Programs utilizing double precision numbers will require recompilation and some recoding.

System requirements

The minimum system required is an HP 3000 Series II operating under MPE II; or an HP 3000 Series I, HP 3000CX, or original HP 3000 operating under MPE-C.

Ordering information

32102B FORTRAN/3000. Installation of FORTRAN compiler in object form by a factory-authorized Customer Engineer. Includes 30000-90040 reference manual.

32102B-001. Replaces Series II manuals with Series I and Pre-Series II version.

Since FORTRAN/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -007, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard representative.

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BASIC/3000 Interpreter

model 32101B

Features

- **A powerful language that's easy to learn**
- **Programs and data files can be accessed from either timeshare or batch mode**
- **Conversational program generation with extensive messages**
- **Four numeric data types: real, integer, real extended precision, and complex**
- **Mixed mode arithmetic**
- **All standard functions (SIN, COS, LOG, etc.,) plus matrices, strings and files**
- **Program segmentation with common storage**
- **User definable file security including password**
- **Can be used alone or in conjunction with BASIC Compiler**

BASIC is an easy to learn language designed especially for interactive terminal use. The HP BASIC language contains extensions that make it a powerful implementation of BASIC.

Environment

Timesharing mode

Implementation of BASIC in the HP 3000 operating system (MPE) results in a very powerful language which encourages the user to take advantage of extensive conversational capabilities.

Batch mode

HP BASIC itself is a flexible language that may also be used in Batch Mode. In Batch Mode, all input (i.e., program statements, commands and data) is read from the batch input device; all output is directed to the batch output device.

User tailored modes

BASIC permits full use of MPE device independence. Users can link each type of input (e.g., program statements, commands and data) and output (e.g., program output, messages and listings) with any available peripheral device. This flexibility within BASIC can be employed to construct end-user packages such that BASIC is invisible to the user. The resultant simplicity of execution is especially important to instructional/educational applications.

Data types

BASIC permits four types of numeric representation:

- INTEGER Type: A 16-bit quantity. The range is -32768 to +32767.
- REAL Type: A 32-bit quantity with sign, exponent and mantissa. The range is $\pm(10^{-78}, 10^{+77})$ with 6 to 7 decimal digit accuracy.
- LONG Type: A 64-bit * quantity with sign, exponent and mantissa. The range is identical to REAL but with 16 decimal digit accuracy.
- COMPLEX Type: 64-bit * quantity consisting of two real numbers, the real part and the imaginary part.

Mixing of data types within an arithmetic expression is allowed.

**Double precision for HP 3000 Series I and Pre-Series II computers is 48-bit quantity with sign, exponent, and mantissa.*

Character string manipulation

The user may define and manipulate ASCII character strings and string arrays. All digits, upper and lower case alphabetic characters, and all other printing and non-printing ASCII characters can be stored in string variables. They can be input and output at the terminal and stored and retrieved from data files. Substrings as small as zero characters and as large as 255 characters in length can be printed, concatenated and compared to other strings. These may be used for branching or sorting.

A CONVERT statement is available for conversion of numeric strings to numeric values and vice versa. Several built-in functions are available for manipulation (e.g., to obtain the numerical value of a character's ASCII code and remove leading and trailing blanks, etc.,). Easy intermixing of string and numeric data is provided for program and file input and output.

Data files

BASIC maintains three distinct file types:

- FORMATTED files: Provide advanced, easy-to-use capabilities that are intended for (but not restricted to) BASIC language use. These enable run-time checking of file data type.
- ASCII and BINARY files: These are available for communicating data to and from programs written in languages other than BASIC.

BASIC FORMATTED files may have a record size between 4 and 319 words. Data can be accessed either serially or on a record basis with random access to any record in the file. The ADVANCE and UPDATE statements provide the capability to access individual items within a record. Files may be created and purged either by commands or under program control.

Through the operating system, data file security among different levels of users is achieved by a set of restrictions (e.g., read-only, read-only with dynamic locking, etc.,) which may be placed on the access of the files. A data scrambler may also be used. This security feature can be used in conjunction with the name and password security provided by the operating system.

Subroutines

BASIC provides four types of subroutines:

- Built-in functions include SIN, TAN, TNH (hyperbolic tangent). Approximately 40 such functions are provided.
- User defined functions are established in the user's program and can be called from within the program. They may consist of multiple statements and local variables and arrays whose scope extends only within the declared function.
- A simple subroutine consists of a set of BASIC statements followed by a return statement. There is no explicit indication in a program as to which statements comprise a subroutine.
- External subroutines not controlled by BASIC and written in another language, i.e., FORTRAN, SPL. BASIC programs may call external subroutines from one of the libraries accessible to the user.

TRACE-debug facility

This mode serves in an interactive debugging capacity. Several commands are available for:

- Tracing the path of execution through a program and the change in value of variables.
- Setting breakpoints, displaying and changing values of variables and resuming operation.
- Displaying names of files currently open to a program.
- Displaying a list of functions and programs which represent the path through which nested calls will return.

Additional features

- Multiline statements allowed
- IF-THEN-ELSE statements and compound statement blocks
- Program access to system clock
- Embedded FOR loops in input/output statements
- Formatting (PRINT USING) with dynamically definable output images
- Extra input items optionally saved in a buffer for optional subsequent input
- String arrays with complete substring accessibility
- Substring search functions
- File management under program control
- Move forward or backward any number of elements through a file without knowing what data types are being skipped
- User definable file security
- Program profile showing number of executions and amount of CPU time for each statement executed
- Specifications of many operating system commands under program control

Program compatibility

Most programs written for the HP 3000 Series I, HP 3000CX, and original HP 3000, can be run without conversion on the HP 3000 Series II.

System requirements

The minimum system required is an HP 3000 Series II operating under MPE II; or an HP 3000 Series I, HP 3000CX, or original HP 3000 operating under MPE-C.

Ordering information

32111A HP 3000 BASIC. Installation of both BASIC interpreter and compiler in object form by a factory-authorized Customer Engineer. Includes 30000-90026 and 32103-90001 Reference Manuals.

32111A-001. Replaces Series II manuals with Series I and Pre-Series II version.

Since BASIC/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -002, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard representative.

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BASIC/3000 Compiler

model 32103B

Features

- **Supports all HP 3000 BASIC interpreter language extensions**
- **Faster average execution speed than interpreter**
- **Shareable machine code**
- **Can be combined with SPL procedures and FORTRAN subroutines in the same program file**
- **Load-and-go capability**

The BASIC compiler provides the means for converting BASIC programs (having been written, debugged and saved via the BASIC Interpreter) into machine code. Compiled BASIC programs exist in the system as actual code segments and can be run directly, rather than through line-by-line interpreting.

Since the programs to be compiled are written using the BASIC Interpreter, all of the language features described for the interpreter apply to the BASIC/3000 Compiler as well.

Environment

There are three general phases in the development of a BASIC compiled program.

Program development

In the first phase, a BASIC program is written and debugged interactively using the BASIC Interpreter commands and statements. The interpreter constructs the interpretive version of a program. When the user is satisfied that the BASIC program runs properly in its interpretive form, the program is saved (SAVE, FAST) in a file. This fast save file is the "source" input to the BASIC Compiler.

Compile and prepare

The BASIC compiler is used to compile the fast save file. The program is then prepared in a form that results in an efficient machine code version of the original program.

Execution

The third phase is to execute the program directly under the operating system using the RUN command.

BASIC programs may be compiled in batch or timesharing mode, and programs may be run in either mode.

Program compatibility

Most programs written for the HP 3000 Series I, HP 3000CX, and original HP 3000, can be run without conversion on an HP 3000 Series II. Some programs utilizing double precision (LONG) numbers will require recompilation and some recoding.

System requirements

The minimum system required is an HP 3000 Series II operating under MPE II; or an HP 3000 Series I, HP 3000CX, or original HP 3000 operating under MPE-C.

Ordering information

32111A HP 3000 BASIC. Installation of both BASIC interpreter and compiler in object form by a factory-authorized Customer Engineer. Includes 30000-90026 and 32103-90001 reference manuals.

32111A-001. Replaces Series II manuals with Series I and Pre-Series II version.

Since BASIC/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -002, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard representative.

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APL\3000 Language Subsystem

model 32105A

Features

- Patterned after APLSV – shared variables, same standard notations and extensions, many enhancements
- Virtual workspaces – size limited only by on-line storage
- Friendly, powerful editor
- APLGOL, a structured, easy-to-maintain language extension to APL
- Full power of the HP 3000 Series II file system
- Interactive or batch operation
- Dynamic incremental compiler
- Extended control functions
- Access through terminals with standard ASCII interface

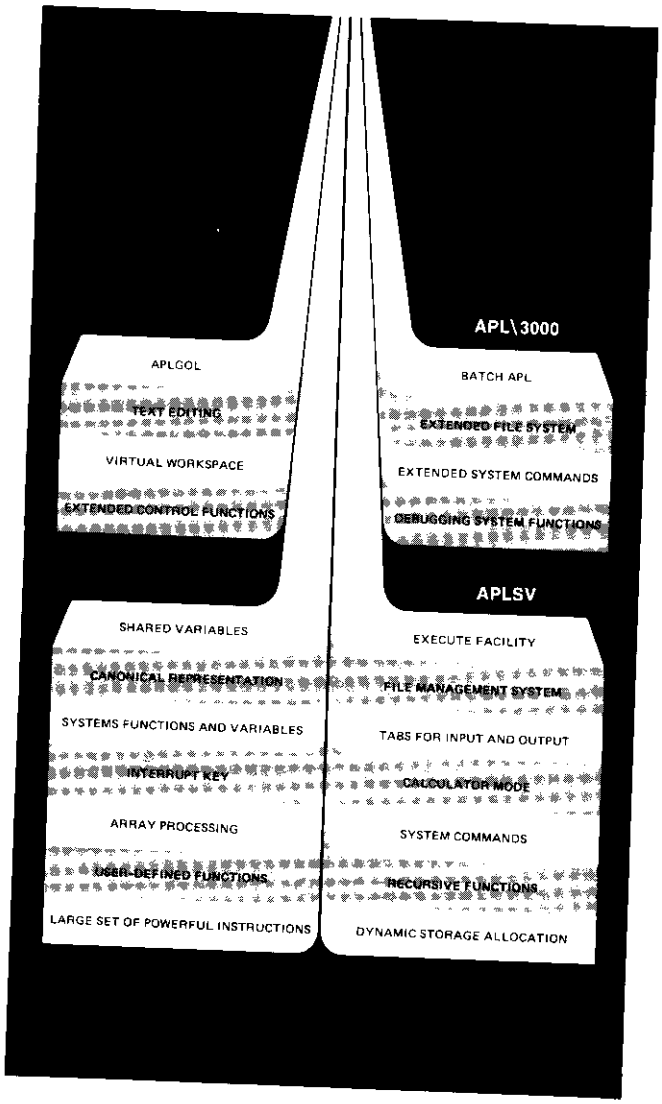
APL\3000 is a language subsystem for the Hewlett-Packard 3000 Series II Computers consisting of an advanced version of APL (A Programming Language). This language is popular in both business and scientific environments because of its conciseness, power, and exceptional facility for manipulating arrays of data.

The APL user works in an environment known as a workspace in which can be placed variables (data) and user-defined functions (algorithms). Workspaces can be SAVEd, LOADed, and modified. The user enters APL in a calculator mode. Calculations and function execution can be done directly.

Full APL plus extensions

APL\3000 contains the extensions to IBM APLSV which typically are part of the most recent implementations of the language. These include: format (⍕), execute (⍎), scan (\ ), and matrix (⌹); continue workspace; system variables; shared variable capability; system functions such as canonical representation (⎕*CR*), name list (⎕*NL*), and DEBUG and TRACE functions.

In addition to the extensions commonly found in APLSV, APL\3000 is substantially enhanced by the addition of several other powerful extensions, as indicated in the chart.



To enhance the applicability of APL, several interesting and useful extensions have been added to APLSV to make APL\3000 extremely powerful.

Environment

APL\3000 is accessed through the HP 3000 Series II Multiprogramming Executive (MPE). MPE gives the user the capability to:

- Program in multiple languages
- Execute in either interactive or batch mode
- Access the MPE file facility

Twelve to sixteen terminals may be run simultaneously on a 512k byte dedicated APL system. Up to sixteen terminals can be run on a 512k byte system in a multi-lingual environment. Particular performance needs should be discussed with a Hewlett-Packard representative.

Any terminal which uses a standard ASCII interface at speeds from 110 to 2400 baud can be used; it is not necessary for the terminal to have an APL character set. APL\3000 provides for both bit pairing and character pairing APL terminals.

Virtual workspaces

A firmware-assisted virtual memory scheme is employed in APL\3000 with the result that very large workspaces are available to the user, constrained only by the amount of free on-line storage. In many cases this important feature allows the incorporation of files into the workspace.

Friendly, powerful editor

APL\3000 features a full text editor which may be used in both calculator mode (use control E) and edit mode. Information in edit mode can be stored as a character matrix or vector matrix if desired. A HELP command lists all commands or individual meanings as requested. (Note: HELP can also be used in other modes to obtain information about operators and systems commands).

The editor is much more powerful and friendly than the standard del (∇) editor. Edit commands, most of which can be abbreviated, are: ADD, BRIEF, CHANGE, COPY, CURSOR, DELETE, DELTA, END, FIND, HELP, EXPLAIN, LIST, LOCK, MATRIX, MODIFY, QUIT, REPLACE, RESEQUENCE, UNDO, VECTOR, VERBOSE.

APLGOL

Users have the option of defining functions in either APL or APLGOL, a unique Hewlett-Packard extension of APL. APLGOL uses ALGOL-like keywords in conjunction with APL expressions to describe the control flow within a given function. This provides a framework for structured programming in an APL environment.

APLGOL is easy to read and maintain because:

- It is automatically indented upon editing to depict the shape of nested control structures.
- Structured (restricted) control flow makes code easier to maintain by preventing the user from creating confusing, unstructured programs.
- Additional instructions such as multiple branching and assertion statements (proof of correctness) further simplify programming.

The APLGOL commands are: ASSERT, BEGIN END, BEGIN + END CASE, CASE OF, EXIT, FOREVER DO, HALT, IF DO, IF THEN ELSE, NULL, REPEAT UNTIL, WHILE DO.

Shared variables

This facility allows the user to send and receive information outside of APL. Communication with other processes can include devices such as printers, plotters, mag tapes, and files. It does not include passing information directly between two APL workspaces.

File system

A link to the MPE file system is provided through the use of shared variables to give APL\3000 the full power and flexibility of the MPE file facility. APL provides a straightforward mechanism for data type conversion to and from APL and the file system. Features include allowing reference to files without specific knowledge of their actual names or characteristics and many classes of file security.

Dynamic incremental compiler

Rather than interpreting function code, as is done in other systems, APL\3000 compiles, runs, then saves the compiled code statement by statement. Subsequent program executions can often use this saved code, allowing them to rerun much faster. Of course, when solving one-line one-time problems compiled code is thrown out just as it would be for an interpreter.

A 'signature' containing characteristics of the statements (such as data types, ranks, & dimensions) is saved in the code for each statement. On subsequent runs this signature is compared with the new input data; should the characteristics change, then a new compilation is performed, if necessary, typically generating a more flexible code which is able to handle all the data experienced to date. Compiling is done automatically, so that to the user the system retains all the benefits of an interpreter.

Extended control functions

For debugging involved chains or for applications which require returning to previous environments, the APL\3000 extended control functions are extremely useful. Complex problems in such areas as artificial intelligence, pattern recognition, modeling simultaneous processes, and symbol manipulation can be solved through use of the extended control functions. Standard APL implementations limit the user to a linear stack, while APL\3000 with its extended control functions offers capabilities such as co-routining and backtracking.

Specifications

Data types

Character – Character values are represented by strings of 8-bit USASCII code.

Boolean (logical) – 16-bit strings of value zero (false) or one (true).

Integer – A 16-bit quantity including sign. The range is -32768 to +32767.

Floating Point – A 64-bit quantity with sign, exponent, and mantissa. The range is $\pm(2^{-256}, 2^{+256})$ with 16 decimal digit accuracy.

Arithmetic Progression Vector – A representation of vectors of the form A+Bx2N where A, B, and N are integers.

Workspace Size: Initially 1 million bytes, which can be extended to the amount of available on-line storage.

Maximum Array Rank: 63

Maximum Array Size: 32,767 elements

Terminal: Accepts terminals, with or without APL character set, which use a standard ASCII interface at speeds from 110 to 2400 baud. Provisions made for both bit and character pairing. Support to take advantage of special features in the HP 2641A Display Station is provided. The following APL terminals have been tested: Computer Devices Teleterm 1030, Anderson Jacobson 630, Gen-Com System Model 300, and Data Media Elite 1520.

System requirements and performance

The minimum system required is an HP 3000 Series II with 256k bytes of memory operating under MPE II. Operation with 13 or more terminals requires a full memory system (512k bytes). Maximum recommended number of simultaneous users is 16.

Ordering information

32105A APL\3000. Installation of APL compiler (in object form) and hardware microcode by a factory-authorized Customer Engineer. Includes 32105-90002 reference manual and 32105-90003 pocket guide.

Since APL\3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -001, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard sales representative.

Manuals

32105-90002 APL\3000 Reference Manual
32105-90003 Pocket guide

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IMAGE/3000 Data Base Management Subsystem

model 32215A

Features

- **Network structuring allows for complex relationships among data**
- **Privacy and Class-type security at data base, data set, and data item levels**
- **Serial, direct, calculated, and chained access methods**
- **Concurrent batch and/or terminal access**
- **Access to multiple data bases**
- **Logically related files can be handled as a single entity (a data base)**
- **Deleted record space automatically reuseable**
- **Library routines callable from COBOL, RPG, FORTRAN, BASIC and SPL**

IMAGE is a general purpose data base management system designed for use with any HP 3000 Computer System. IMAGE offers the capabilities to create a data base, describe data base structures, and access, maintain, restructure and backup data. It allows information to be related logically between data sets; this linking minimizes data redundancy and facilitates information retrieval. IMAGE operates concurrently in both terminal and batch environments within the constraints of an external (MPE) and internal security scheme. The IMAGE Data Base Management Subsystem provides the basis for developing information systems tailored to today's corporate, industrial, and educational needs. Application programs for use with IMAGE may be written in COBOL, RPG II, FORTRAN, Compiled BASIC and SPL.

Terminology

The brief glossary that follows will clarify and provide familiarity with the terms employed.

Data item – smallest accessible unit of data, may consist of a field or a logically contiguous group of fields.

Data entry – groups of data items comprising a record or transaction.

Data set – collection of like data entries. Data sets reside in the disc files of the data base.

Privacy – provisions controlling read-access to data items, entries, or sets.

Security – provisions controlling write-access to data items, entries, or sets.

IMAGE components

IMAGE consists of three components:

Data base definition language. The data base designer describes the items (length, data type, symbolic name), security, data sets, data set relationships, and storage needed using a *data base definition language;* this description is called the *schema.* Schema statements are then processed by a schema processor (DBSCHEMA), to create a stored data structure known as the *data base root file.* The location and relationships of information are known to IMAGE through this root file.

Data base management intrinsics. To access or maintain data, a set of IMAGE Library Routines is provided; these are callable from user written programs, and include the following:

DBOPEN – initiates access to a data base
DBINFO – returns information about the data base currently being accessed
DBGET – retrieves items from data entries
DBPUT – adds new data entries
DBLOCK – provides temporary exclusive control of a data base
DBCLOSE – terminates access to a data base
DBFIND – prepares for chained access to data entries
DBUPDATE – modifies existing data entries
DBDELETE – deletes data entries
DBUNLOCK – relinquishes temporary exclusive control of a data base

Data base utilities. Stand alone utility programs aid in the creation of data sets and the maintenance of the data base. These utilities handle a data base or data sets and ascertain that all the information is successfully transferred.

DBUTIL

(1) allocates and initializes disc space for a data base
(2) re-initializes the data sets of a data base back to their empty condition
(3) purges the root file and all data sets of a data base

DBSTORE – produces a physical copy of a data base on magnetic tape

DBRESTOR – copies a data base from magnetic tape to disc.

DBUNLOAD – produces a logical copy (data only) of a data base on magnetic tape

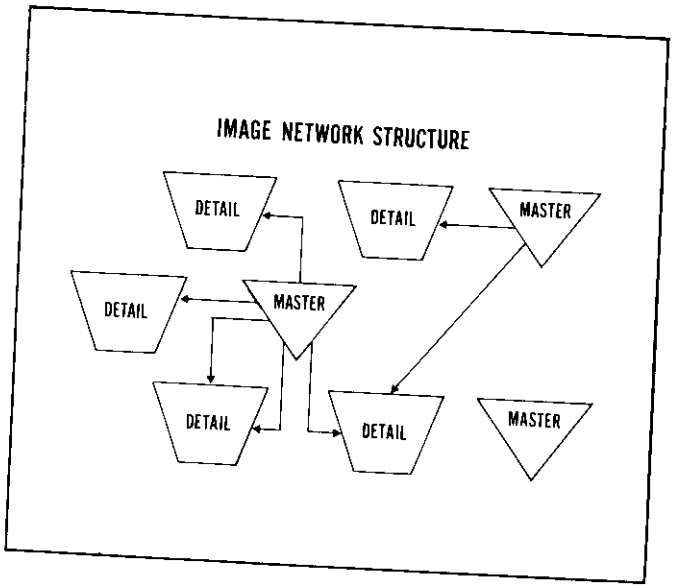
DBLOAD – loads data from a DBUNLOAD tape into an existing data base on disc

Data types

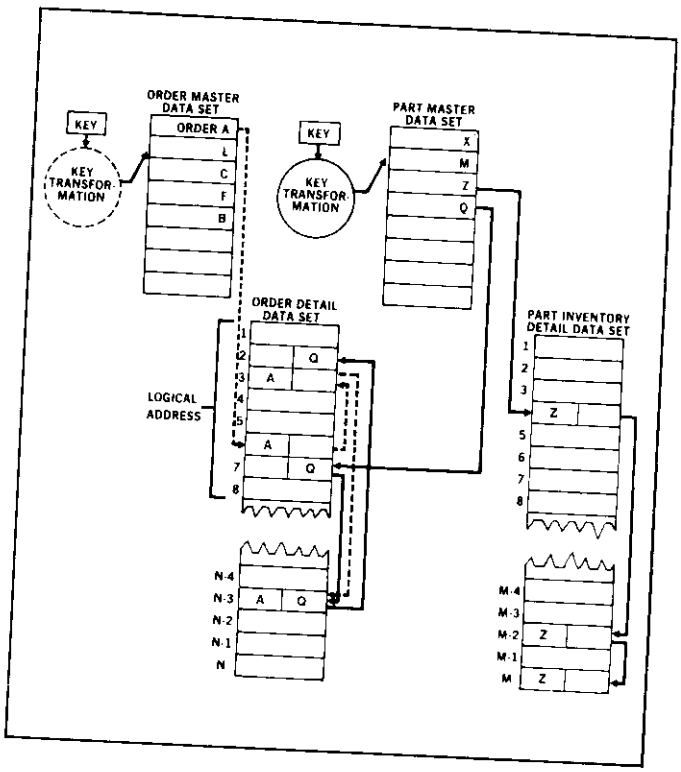
Signed binary integer, logical binary, REAL, ASCII character string, packed decimal, and zoned decimal.

Data set types. IMAGE supports two types of data sets, master and detail. Access to data entries in a master data set may be calculated, based on the key value of the data entry. Access to a data entry in a detail data set is usually via a particular master entry and a particular relationship between the master and detail data sets.

The logical relationships which may exist are exemplified in the following diagram:



An example of data set relationships is shown in the following diagram.



MASTER-DETAIL CHAIN PATHS:

Order Master entry A links to Order Detail entries 6, 3, and N-3.
Parts Master entry Q links to Order Detail entries 7, N-3, and 2.
Parts Master Z links to part inventory entries 4, M-2 and M.
This data structure allows a master entry to be related to many detail entries, and a detail entry related to many master entries.

Security

IMAGE contains a class-type privacy and security scheme. Up to sixty-three classes of users can be defined. A password is associated with each class. Sets of user classes can then be permitted 'read' or 'read-and-write' access to any or all data items and data sets, independent of the elements accessible to other user classes.

Restructuring

DBLOAD and DBUNLOAD utilities provide for restructuring data bases in a number of ways, including:

- Changing data item name or data set name
- Increasing or decreasing data set capacities
- Adding or removing data items at the end of a data entry
- Changing data set relationships

Accessing data bases

A data base can be accessed in the following ways:

From COBOL, FORTRAN and BASIC – through a "CALL" statement to the IMAGE intrinsics

From RPG – through the chain and read statements after the data base has been declared in the file specifications section

From SPL – through intrinsic calls to IMAGE

From QUERY – as part of the language function

Additional features

- Multiple master-detail data set relationships
- Shared and exclusive data base access
- Dump and load backup capability
- Storage and retrieval of related entries in sorted sequence
- Automatic linkage management when data is added, modified, or deleted
- Efficient disc utilization (no index or overflow areas)

Specifications

- Data item names per data base: 255
- Data items per data entry: 127
- Data sets per data base: 99
- Detail data sets per master data set: 16
- Search items (keys) per detail data set: 16
- Maximum entry size: 4094 Bytes
- Entries per data set: $2^{23} - 1$ (8,388,607)
- Entries per chain: 65,535
- Characters per data base name: 6
- Characters per password: 8
- Characters per data set name: 16
- Characters per data item name: 16

Data Base compatibility

Most data bases created on any of the HP 3000 computer systems can be used on any other HP 3000 without conversion. Data bases utilizing the "LONG" data type, in BASIC, and the "Double Precision" data type, in FORTRAN, will require a redesign and reload to accommodate four-word (versus 3-word) data.

System requirements

The minimum system required is an HP 3000 Series II operating under MPE II; or an HP 3000 Series I, HP 3000CX, or original HP 3000 operating under MPE-C.

Ordering information

32235A Data Base Management. Installation of IMAGE and QUERY in object form by a factory-authorized Customer Engineer. Includes 30000-90041 and 30000-90042 reference manuals.

Since IMAGE/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -008, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard sales representative.

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QUERY/3000
Data Base Inquiry Facility

model 32216A

Features

- **Interactive or batch data base interrogation**
- **Boolean-logic selection of data**
- **9 data types converted, error checked and displayed**
- **Extensive editing of output items**
- **Multiple level sort for grouped items**
- **Formatted reporting of retrieved data including page titles, column headings, group subtotals, totals and averages**
- **10 software storage registers for arithmetic operations and reporting**
- **Command files to store complex or frequently-used commands for repeated execution**
- **Data base updating through addition, deletion and modification of data records**
- **English-like commands for simplified use by non-programmers**
- **Display of the data base structure accessible to an individual user**

QUERY is designed to easily locate, report and update data values within an IMAGE data base. QUERY may be executed from either a terminal or batch device; reported output may be directed to either a terminal or a line printer. The user communicates with QUERY through 23 unique commands.

Security considerations

QUERY adheres to all the security provisions that a data base designer includes in the IMAGE data base. The security-level word, obtained from the data base designer, determines which data elements (i.e., data items and data sets) the user is allowed to access. QUERY will return an error whenever a user's security level does not match the security level within an IMAGE element.

The user may determine which data elements are accessible to him by entering the FORM command. QUERY responds by listing all the data elements available to the user, based upon the level word that he entered.

Locating data

QUERY is capable of retrieving all occurrences of data within a data set which meet user-specified conditions. To accomplish this, the user enters a FIND command which includes logical terms that are similar to phrases spoken in English. For example, suppose a production control manager wishes to know which part numbers are in short supply or over supply when compared with outstanding customer orders. Assuming the data base contains a part-number data set, the manager could locate all such parts with one FIND command as follows (note – LT means "is less than" and GT means "is greater than"):

```
FIND QUANTY LT 100 AND CUST-ORD GT 50
OR QUANTY GT 10000 AND CUST-ORD LT 1000
```

QUERY responds to the FIND command by locating all the data records which contain the requested data item values.

Reporting data

After the data records have been located through the FIND command, the user may enter a REPORT command to specify which items within those records QUERY is to display. The REPORT command may also specify:

- top-of-page titles including date and time
- addition, counting and averaging of selected data items
- arithmetic operations on data items using registers
- column headings, group subtotals and totals
- line spacing
- up to 5 levels of sorting to produce grouped items
- edit masks to suppress leading zeroes, insert punctuation characters, etc.
- page skipping

For quick information, the REPORT command can simply specify that all data item names and their values are to be displayed without formatting. The LIST command will display all or specified data items, automatically formatted and with headings.

Updating a data base

Maintenance of the data base can also be performed using QUERY. The ADD, DELETE, and REPLACE commands, designed for this purpose, allow insertion and deletion of data records and replacement of data item values. When ADD is entered, QUERY will prompt a terminal user for data item values. The user is not required to enter values for all items.

Frequently used procedures

Repetitive or complex operations are easily performed through QUERY's ability to execute FIND, REPORT and UPDATE commands from a command file stored on disc. A command stored within a file is referred to as a procedure; a procedure may consist of one or more lines. QUERY provides commands for creating, deleting and listing procedures within a command file. Also, the lines within a procedure may be added, deleted or replaced.

Data types

The following data types are converted and error-checked during QUERY I/O operations:

- one word integer numbers
- two word integer numbers
- two word real numbers
- extended precision real numbers
- one word logical values as absolute numbers
- ASCII character strings containing no lower-case alphabetics
- general ASCII character strings
- zoned decimal numbers
- packed decimal numbers

Procedure compatibility

Most procedures written for any of the HP 3000 computer systems can be run on any other HP 3000 without conversion. Procedures utilizing BASIC "LONG" data or FORTRAN "Double Precision" data types will require a redesign of their report format.

System requirements

The minimum system required is an HP 3000 Series II operating under MPE II; or an HP 3000 Series I, HP 3000CX, or original HP 3000 operating under MPE-C.

Ordering information

32235A Data Base Management. Installation of IMAGE and QUERY in object form by a factory-authorized Customer Engineer. Includes 30000-90041 and 30000-90042 reference manuals.

Since QUERY/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -008, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard sales representative.

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SAMPLE QUERY/3000 REPORT

AS OF: 01/14/76 PAGE 1

BOBO'S MERCANTILE
ON HAND INVENTORY

BIN#	SUPPLIER	STOCK	SHIP DATE	INVENTORY AMOUNT
0	H & S SURPLUS			
		7391Z22F	8/13/74	$5,012.50
		5405T14F	9/11/74	$12,129.60
		6650D22S	12/05/75	$14,985.00
	BIN TOTAL			$32,127.10
1	ACME WIDGET			
	BAY PAPER CO.	2457A11C	12/01/75	$553,477,666.95
	CARDINAL MILLS	7391Z22F	12/01/75	$4,704.00
	JAKE'S JUNK	5405T14F	11/28/75	$1,396.00
		3739A14F	12/15/75	$1,189.32
	BIN TOTAL			$553,484,956.27

HEWLETT hp PACKARD

INDEX/3000
Indexed File Organization Method

model 32207A

Features

- **One key per data record**
- **Key length up to 100 character/bytes**
- **Fixed length data records**
- **Sequential or random data record retrieval by key values or by physical record number**
- **Data record content updatable**
- **Data record located by key value, physical record number, or approximate key value.**
- **INDEX files accessible from RPG, COBOL, FORTRAN, or SPL programs**
- **Full set of INDEX utility commands**
- **INDEX files compatible with the MPE STORE/RESTORE commands**

INDEX/3000 is a file access method for the HP 3000 Series I Computer System. INDEX makes it possible for the programmer to create and maintain disc files whose records can be accessed by the value of key fields within the data records. Each data record contains one key field. Records can be written to an INDEX file in any order without regard for key value sequences. Records can be accessed sequentially or randomly by key value, physical record number, approximate key value, or in chronological (physically sequential) order. INDEX files are accessible from RPG, COBOL, FORTRAN, or SPL programs, and are compatible with the MPE STORE/RESTORE commands.

Terminology

The following brief glossary defines the terminology associated with INDEX.

Key (index): A user-defined field within a data record. The value of the key field (employee number, for example) can be used to locate and access the particular data record.

Approximate key: a key value which may not actually exist in the key file. Approximate keys allow the user to access data records whose corresponding key fields contain a value equal to or greater than the specified approximate key.

Data file: A file containing all the data records. The user may rewrite any of the content of a data file except key values.

Key file: A file used for accessing data records in a data file by key value. There is one entry in the key file for each key field in every data record of the associated data file. INDEX automatically manipulates the content of all key files.

INDEX/3000 Components

Procedures and intrinsics

There is a set of special procedures provided to assist the programmer in accessing INDEX data records through COBOL, FORTRAN, or SPL programming languages. RPG supports INDEX files directly so that use of these procedures is not necessary. INDEX files are incompatible with the BASIC language of Series I Systems.

INDEX utility program XUTIL

This utility program provides a set of commands designed specifically for creating and manipulating INDEX files.

BUILD	– Build an INDEX file consisting of key and data file
ERASE	– Set an existing INDEX file to empty state
FORMAL	– Menu
LISTF	– List status of INDEX file
LOAD	– Load an INDEX file from a sequential file
SORT	– Sort data file into key sequence and remove deleted records
SPACE	– Analyze disc space requirements
TEST	– Runs a complete test of XUTIL and INDEX
VERSION	– List current version of INDEX library
UNLOAD	– Dump an INDEX file to a sequential file
EXIT	– Terminates XUTIL and passes control back to the MPE Command Interpreter

INDEX file structure

An INDEX file consists of two physical disc files: a data file and key file. An INDEX data file contains all the data records. The associated key file contains one set of entries that maintains the logical sequence of the data records. When a data record is added to a data file, a key entry is added to the associated key file for the key field in the new data record.

Accessing INDEX files

An INDEX file may be opened in any of the three following modes.

Exclusive mode: Exclusive access is required for a user to add or delete records. No other user may access, inquire, or update that file at the same time.

Semi exclusive mode: Allows one user to update an existing record while multiple users do shared inquiry. No user can add or delete records in this mode.

Shared mode: Multiple users can do inquiries into the file.

Key file restructuring

Newly added records are appended to the end of the key file. Then key file is sorted in ascending key sequence when the file is closed. This restructuring is invisible to the user.

Data types

Data fields may contain any Series I data types. Integer, double integer, REAL, four-word long REAL, byte string, packed decimal, and numerical display. Key fields can be packed decimal or byte character data types. (Positive integer data types can be defined as byte keys.)

Security

All MPE File System security provisions also apply to INDEX files.

Compatibility

MPE STORE/RESTORE commands can be used with INDEX files.

Installation

INDEX is installed by a factory-authorized Customer Engineer. Installation is included in the list price.

Ordering information

32207A INDEX File Organization Method Subsystem.

Includes the XUTIL utility program, user callable procedures, and the INDEX/3000 Reference Manual. All software supplied in object code form.

Since INDEX/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -009, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard sales representative.

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KSAM/3000
Keyed Sequential Access Method

model 32208A

Features

- One primary key per data record
- Up to 15 alternate keys per data record
- Key length up to 255 bytes
- Duplicate key values allowed
- Fixed or variable length data records
- Sequential or random data record retrieval by key values or by physical record number
- Data record retrieval by generic (partial) key values
- Data record retrieval by approximate key values
- Data record content (including primary key field) updatable
- Data record locating by key value, physical record number, or logical record number within a key sequence
- KSAM files accessible from RPG, COBOL, FORTRAN, BASIC, or SPL programs
- Concurrent access to KSAM files is supported for multiple users and multiple programs
- Full set of KSAM utility commands
- KSAM files compatible with the MPE STORE/RESTORE commands
- FCOPY/3000 can be used to copy, and optionally resequence, KSAM files

KSAM/3000 is a file access method for the HP 3000 Series II Computer System. KSAM makes it possible for the programmer to create and maintain disc files whose records can be accessed by the value of key fields within the data records. Each data record contains one primary key field and may include up to 15 alternate key fields. Records can be written to a KSAM file in any order without regard for key value sequences. If the records have been pre-sorted and are being written to the KSAM file in primary key order, KSAM can also check the primary key value of each record to see if it is in the proper sequence. Records can be accessed sequentially or randomly by primary or alternate key value, physical record number, generic key value, approximate key value, logical record number within a key sequence, or in chronological (physically sequential) order. KSAM files are accessible from RPG, COBOL, FORTRAN, BASIC, or SPL programs and are compatible with the MPE STORE/RESTORE commands and FCOPY/3000.

Terminology

The following brief glossary defines the terminology associated with KSAM.

Key (index): A user-defined field within a data record. The value of the key field (social security number, for example) can be used to locate and access the particular data record.

Primary key: The key whose sequence is the most important. The primary key is the default key for any interactions with KSAM files from the various languages and utilities.

Alternate key: A key that can be used instead of the primary key to reference the data record.

Duplicate keys: The same value (zip code, for example) in the same key field in two or more data records.

Generic key (partial key): The leading part of a key value (the first two zip code digits, for example). Generic keys allow the user to access all data records whose corresponding key fields contain a common leading value, even though the full value of those key fields may differ.

Approximate key: A key value which may not actually exist in the key file. Approximate keys allow the user to access data records whose corresponding key fields contain a value equal to or greater than the specified approximate key.

Data file: A file containing all the data records. The user may alter any of the content of a data file including primary key field values.

Key file: A file used for accessing data records in a data file by key value. There is one entry in the key file for each key field in every data record of the associated data file. KSAM automatically manipulates the content of all key files.

KSAM components

KSAM consists of the following two logical components:

KSAM procedures and intrinsics. To assist the programmer in accessing KSAM data records, special sets of COBOL procedures, BASIC procedures, and MPE File System intrinsics (for FORTRAN and SPL) have been provided.

Note: Most of the standard MPE File System intrinsics can be used with little or no parameter changes to access and manipulate KSAM files.

KSAM utility program (KSAMUTIL). This utility program provides a set of commands designed specifically for creating and manipulating KSAM files.

BUILD	– Creates a KSAM file consisting of a data file and a key file
ERASE	– Clears the content of a KSAM data file and resets the pointers in the associated key file
PURGE	– Deletes a KSAM file from the system
RENAME	– Changes the name of a KSAM data file or key file

SAVE – Saves a session/job temporary KSAM file as a permanent file

VERIFY – Displays the current status of a KSAM file

HELP – Displays a description of all the KSAMUTIL commands

EXIT – Terminates KSAMUTIL and passes control back to the MPE Command Interpreter

KSAM file structure

A KSAM file consists of two physical disc files: a data file and a key file. A KSAM data file contains all the data records. The associated key file contains one or more sets of entries that maintain the primary and alternate logical sequences of the data records. When a data record is added to a data file, a key entry is added to the associated key file for each defined key field in the new data record. These key entries are dynamically added in ascending order. The diagram below illustrates the functional relationship between a KSAM data file and its key file.

Accessing KSAM files

KSAM files can be accessed in the following ways.

From RPG: Through file specifications and chaining operations.

From COBOL: Through call statements to a special set of COBOL procedures designed specifically for use with KSAM files (these procedures correspond to the INDEXED I-O module of ANSI X3.23-1974 COBOL).

From FORTRAN: Through call statements to MPE File System intrinsics or to the special set of COBOL procedures.

From BASIC: Through call statements to a special set of BASIC procedures designed specifically for use with KSAM files.

From SPL: Through MPE File System intrinsic calls.

Key file restructuring

KSAM automatically performs any key file restructuring required to accommodate newly added records to the associated data file. This restructuring is invisible to the user.

Data types

Data fields, including key fields, may contain the following types of data: integer, double integer, REAL, four-word long REAL, byte string, packed decimal, and numerical display.

Security

All MPE File System security provisions also apply to KSAM files.

Compatibility

FCOPY/3000 and the MPE STORE/RESTORE commands can be used with KSAM files. FCOPY can produce copies of files that are sequenced in primary key order, alternate key order, or chronological order. In addition, the NOKSAM option allows the user to retrieve records that have been flagged as "deleted".

System requirements

KSAM will operate with any HP 3000 Series II system using MPE II.

Ordering information

32208A KSAM/3000. Installation of KSAM subsystem and utility program (KSAMUTIL) in object form by a factory-authorized Customer Engineer. Includes 30000-90079 reference manual.

Since KSAM/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -010, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard sales representative.

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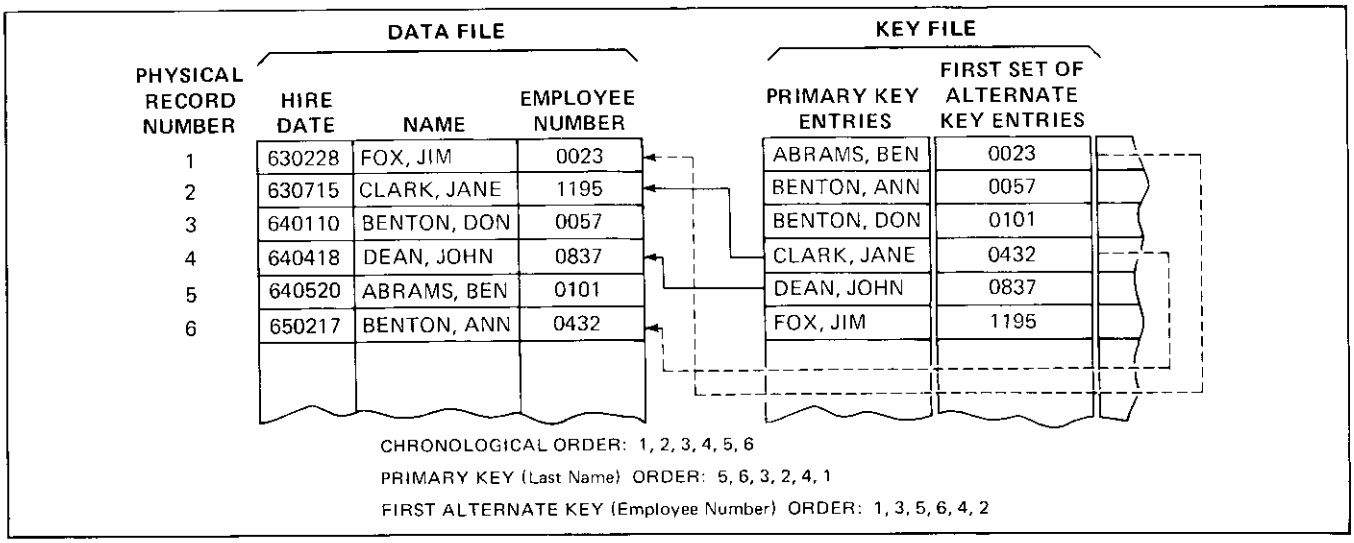
Simplified KSAM/3000 file structure



HEWLETT hp PACKARD

DEL/3000
Data Entry Library

model 32206A

Features

- **Forms creation, update and deletion through a single forms maintenance program**
- **Ten forms, terminal, and advance procedures**
- **Eight edit procedures**
- **Forms chaining**
- **Procedures callable from COBOL, BASIC, FORTRAN, and SPL**
- **Supports user-written procedures**
- **Employs HP 2640-series CRT terminals with display enhancements and line/full page block mode operation**
- **Interfaces with hardwired or remote terminals**

The Data Entry Library is a programming aid designed to simplify terminal oriented data collection on the HP 3000 Computer Systems. It consists of a form maintenance program for screen creation, updating, and deletion. Additionally, it includes a set of data entry procedures for data editing, forms, and terminal manipulation. These procedures are callable from COBOL, BASIC, FORTRAN, and SPL, for data entry from the terminals.

Forms maintenance program

The program FORMAINT interacts with the forms designer to create, modify and delete screens for the CRT terminals. Additionally, it has the ability to create the forms file where the screen definitions are stored. FORMAINT will also maintain a file directory in the forms file. Specifically, the user selects one of the following functions.

Defining a new form — This function will prompt the user for the name of the form to be defined and the next form, if it is a member of a series. After the CRT screen is cleared, the terminal operator can layout the form and press the "ENTER" key. FORMAINT will scan the form for unprotected fields and prompt the terminal operator for the appropriate editing, test, range-check, and file look-up information. The information is then catalogued in the forms file for subsequent processing by the application program. If a line of the form exceeds 216 characters (including non-printing form control characters) the form must be defined on a Series II prior to its use on a pre-Series II computer.

Listing form file directory — After the screen is cleared, the names of all the forms contained in the forms file are displayed.

Modifying an existing form — The name of the form to be modified is requested from the terminal user. The form is then displayed on the CRT screen for modification. Upon completion of the editing (terminated by pressing the "ENTER" key), the user can optionally modify the forms sequence in a series.

Displaying an existing form — The name of the form is requested from the terminal operator and the form is displayed on the CRT screen.

Deleting an existing form — This function will request the form name from the terminal operator and delete the form from the forms file.

Deleting an existing form file — The name of the current form file is displayed to the terminal user and the file is deleted from the system, if verified by the user.

Exiting from forms maintenance program — The command EXIT closes all files and returns control to MPE.

User callable procedures

There are eighteen procedures which can be used by application programs; these are classified into four groups.

Forms procedures — To aid the application program in manipulating the forms contained in the forms file, including:

OPENFORM	Opens a specified form file, verifies the file created by FORMAINT, and initializes communications area of the user's data stack.
FINDFORM	Searches the form file for a specified form and sets current form information in communications area of the user's data stack.

GETFORM	Reads form definition into user-buffer and adds control characters to lock the keyboard, set format mode, etc.
NEXTEDIT	Returns edit specifications to user-keyboard, set format mode, etc.

Terminal procedures — The application program can control the CRT terminal and retrieve information with the following procedures:

OPENTERM	Identifies the terminal to the computer, verifies it is of the correct type, determines the terminal operating mode (line/page) and sets the information in the communication area of the user's data stack. Note: For the HP 2645 terminal the operating mode is automatically set to page.
WRITETERM	Writes the contents of the user-program buffer to the terminal.
READTERM	Reads all unprotected fields from the screen, removes unit or record-operators.
TERMSTATUS	Reads the terminal status information and stores its value in the user-buffer area.

Edit procedures — To edit the unprotected fields on the CRT screen the following procedures are available:

ALPHAEDIT	Scans input field, indicates an edit failure condition if characters are not the letters A thru Z.
ALPHAFILL	Performs like ALPHAEDIT, except there may be any number of spaces to the right of the last alpha character.
ANEDIT	Scans the input field, indicates an edit failure if any character is not alphabetic letter, space, or digit 0 thru 9.
NUMRCEDIT	Scans the input field, indicates an edit failure if any character is not digit 0 thru 9.
ZEROFILL	Works like NUMRCEDIT except there may be any number of spaces before or after the numeric digits.
NRANGE	Compares input data with the contents of a range-low and a range-high field.
MIICREATE	Generates a modulo eleven checkdigit and insets the digits in the right-most digit-space of the input field.
MIIVERIFY	Will generate a modulo eleven check-digit and compare with the right-most digit-space of the input field.

Advanced procedures — These are special combinations of previous procedures to perform specific terminal-handling or editing tasks:

SHOWFORM	Combines the FINDFORM, GETFORM, WRITETERM, and READTERM procedures.
EDITFIELD	Combines NEXTEDIT with the required edit procedures to perform the appropriate editing.

Hardware required

DEL/3000 will run on any HP 3000 Series II operating under MPE II, and on HP 3000 Series I, HP 3000CX, and original HP 3000 systems operating under MPE-C.

Terminals — Any HP 2640-series terminal with at least 4k bytes of available memory.

(Note: Block mode set for page is supported on the Series II computer system only, and on all terminals except the HP 2640A).

Software required

Languages — The User Callable Procedures can be accessed from application programs written in COBOL, BASIC, FORTRAN, and SPL. Procedures accessed from COBOL have special entry points accommodating parameter-passing. These entry points are addressed by placing a "C" in front of the procedure name in the COBOL program (e.g., OPENFORM COBOL entry point is COPENFORM).

Data stack requirements — A communication area of 256 contiguous words of memory is needed for parameter passing, and a user-dependent buffer area for storing terminal input and output.

Forms file requirements — The FORMAINT-created forms file size defaults to 10,000 logical records, initially allocated with one extent.

Ordering information

32206A DEL/3000. Installation of DEL procedures and forms maintenance program in object form by a factory-authorized Customer Engineer. Includes 30000-90050 reference manual.

Since DEL/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -004, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard representative.

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HEWLETT hp PACKARD

Scientific Library

model 32205B

Features

- **Error and gamma functions**
- **Exponential, sine-cosine, and Fresnel integrals**
- **Elliptic functions and integrals**
- **Bessel functions**
- **Elementary statistics**
- **One-way frequency distribution**
- **Correlation**
- **Multiple linear regression**

The Scientific Library is a collection of procedures that perform the functions required most often in scientific applications. These procedures may be called directly by user programs written in FORTRAN or SPL.

The Scientific Library provides procedures for the following functions:

- Error function of a single-precision or extended-precision number
- Complementary error function of a single-precision or extended-precision number
- Gamma function of a single-precision or extended-precision number
- Natural logarithm of the gamma function of a single-precision or extended-precision number
- Single-precision or extended-precision elliptic integral function of the first or second kind
- Single-precision or extended-precision complete elliptic integral function of the first or second part
- Special integral functions (exponential, sine-cosine, and Fresnel) of a single-precision number
- Jacobian elliptic functions sn, cn, and dn using single-precision or extended-precision parameters
- Bessel function of the first or second kind of a single-precision or extended precision number
- Computation of mean, standard deviation, standard error of the mean, variance, kurtosis, skewness, minimum, maximum, and range
- Calculation of product-moment correlation coefficients, means, and standard deviations
- Extraction of a subset of correlation coefficients and a vector of a dependent variable
- Computation of multiple linear regression coefficients and related analyses
- Inversion of a symmetric matrix stored in triangular form

Program compatibility

Most routines used in programs written for the HP 3000 Series I, HP 3000CX, and original HP 3000 will run without conversion on an HP 3000 Series II. Programs utilizing the BASIC "LONG" or FORTRAN "Double Precision" data types will require conversion.

System requirements

The minimum system required is an HP 3000 Series II operating under MPE II; or an HP 3000 Series I, HP 3000CX, or original HP 3000 operating under MPE-C. Additionally, a language compiler is needed to call these routines.

Ordering information

32205B Scientific Library. Installation of Scientific Library in object form by a factory-authorized Customer Engineer. Includes 30000-90027 reference manual.

32205B-001. Replaces the Series II manual with the Series I version (30000-90010).

Since the Scientific Library is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -012, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard sales representative.

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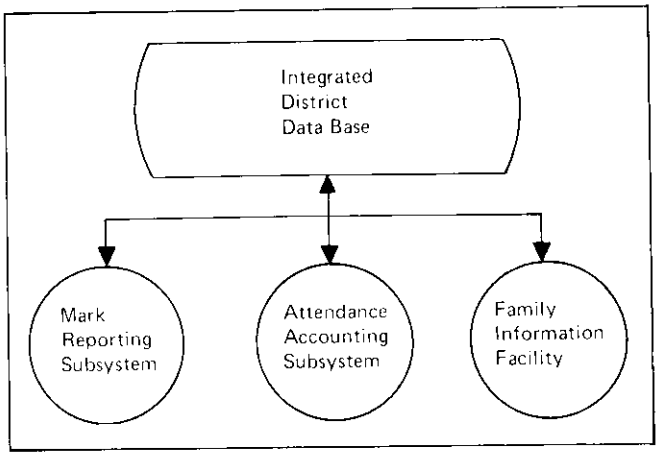
SIS/3000 Student Information System

model 32900A

Hewlett-Packard's Student Information System (SIS/3000) is an administrative application software package for elementary, secondary and vocational schools. Designed for HP 3000 Series II computer systems, SIS is written in COBOL and uses HP's IMAGE for data base management. Five major SIS elements are:

- Integrated district data base and maintenance modules
- Family Information Facility
- Mark Reporting Subsystem
- Attendance Accounting Subsystem
- SAS/3000 Student Assignment System



Features

- **Terminal and batch access**
- **Integrated district data base**
- **Family Information Facility**
  Extensive family profiles
  Student personal profiles
  School-oriented student information
  Complete non-student profiles
  Emergency information
  Mailing labels
- **Mark Reporting Subsystem**
  Variable mark reporting periods
  Teacher-to-parent comments
  Mark definition
  Weighted mark averages
  Honor rolls
  Report flexibility
- **Attendance Accounting Subsystem**
  Variable attendance periods
  Calendar day code flexibility
  Student attendance categories
  Absence recording flexibility
  Adjustable school calendar
  Daily absence reporting
  Remote data collection via mark-sense cards
- Compatibility between SIS/3000 data base and the Student Assignment System data base.

SAS performs three major functions:

- Assigns students to classes
- Provides comprehensive reports
- Maintains school and student files

Terminal and batch access

SIS provides either terminal or batch access for entry, storage, retrieval and maintenance of data.

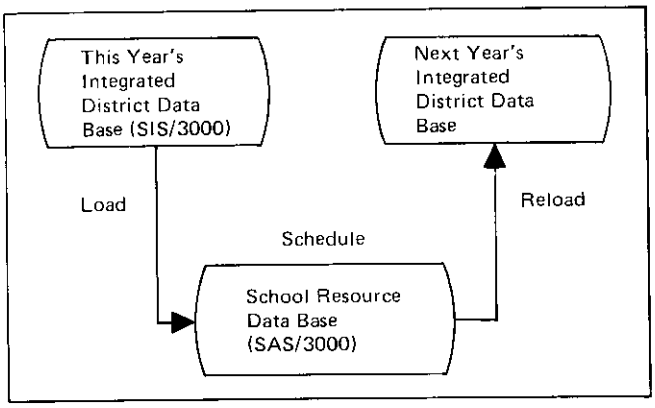
Integrated district data base

The integrated data base, with data residing in one place and available to all proper users, provides a number of benefits:

- Reduced disc storage requirements
- Simplified maintenance processes
- Data base definition integrity and security
- Easy enhancement and extensions

Compatibility with SAS/3000

SIS software may be used to programmatically initialize the SAS data base. Upon completion of the student scheduling process, the detailed information may be transferred to the Integrated District Data Base where it becomes available for use by the SIS subsystems, Mark Reporting and Attendance.



Features

- **On-line student scheduling**
- **Multiple semester scheduling**
- **Time period and school week scheduling flexibility**
- **Class and semester load balancing**
- **Course blocking**
- **Up to five student categories**
- **Scheduling priorities**
- **Corequisite courses**
- **Fill-in study halls**
- **Alternate courses**
- **Ability and grade level restrictions**
- **Partial or complete scheduling**
- **Locking and unlocking scheduled students**
- **Optional overload scheduling in classes**
- **Comprehensive reports**

Terminal and batch access

All elements of the school's Master Schedule and students' course requests may be updated or viewed on hard copy devices or CRT terminals. SAS provides either terminal or batch access for entry storage, retrieval and maintenance of data.

On-line scheduling

Individual student course requests may be entered on-line and scheduled without rescheduling all other students.

Multiple semester scheduling

Students can be scheduled into classes which meet for up to, or any combination of, five semesters. The length of the semester is defined by the user in terms of number of weeks.

Time period flexibility

The school day may be divided into as many as 32 time modules. Classes can meet for any number of consecutive or nonconsecutive modules.

School week flexibility

Regular or irregular time patterns up to 10 days in length may be specified, enabling schedules to reflect actual school cycles which do not repeat each week.

Class balancing

A comprehensive algorithm allows sex and category-balancing options based on user-defined priorities.

Corequisite courses

A corequisite is a course which must be taken concurrently with one or more courses. Up to two corequisites can be specified for each course.

Study hall assignment

Study halls may be automatically assigned for all free modules after classes have been assigned. Complete control is permitted over the times study halls are offered.

Alternate courses

Each course can be assigned an alternate. If a student has a conflict and has requested one or more courses with alternates, then attempts will be made to construct a schedule using the alternates. A student will not be given a schedule with more than one alternate.

Grade level restrictions

This feature allows a school to restrict a course to a particular grade level or range.

Complete or partial scheduling

Schools may choose between two modes of operation during student scheduling. The partial scheduling mode allows a student to retain his seat in all classes scheduled, even if one of the requests could not be scheduled. The complete scheduling mode does not allow students to occupy seats in any class unless all requests are satisfied. The mode of operation may be altered from one scheduling run to another.

Schedule locking

An administrator can permanently schedule or "lock" a portion of the total student body at any time. Subsequent scheduling runs will include only those students who are not scheduled and will use the seats remaining from the master schedule. The schedule can also be unlocked to allow rescheduling of every student at any time.

Overload run

An option is provided to allow a student to be placed in a section with zero or negative seats rather than rejecting him. All balancing options apply; that is, all sections of a course will be overloaded evenly.

Comprehensive reports

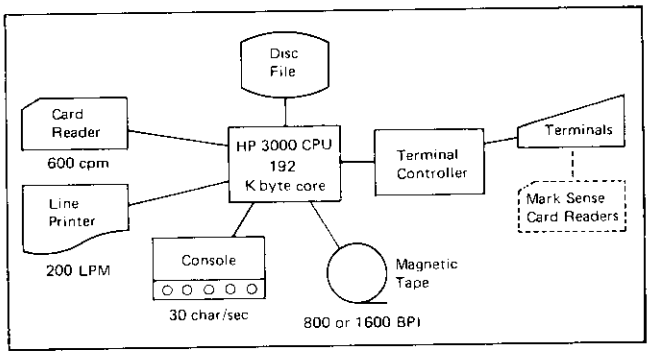
SAS provides the following reports:

- Course List
- Room List
- Student Request List
- Scheduling Reject List

- Teacher List
- Course Tally
- Conflict Matrix
- Master Schedule
- Student Schedule
- Teacher Schedule
- Class List
- Period Distribution List

Hardware requirements

SIS will operate on any HP 3000 computer system which has the following equipment configuration:



Disc storage requirements for SIS depend on the size of the district data base. The most critical parameters affecting size are the number of students, families and courses per student. Typically approximately 1,000 characters (or bytes) are required for each student.

Terminals

SIS and SAS can be accessed from standard hard copy devices or CRT terminals. At least one terminal is required to use the Attendance Accounting Subsystem. Although mark reporting and attendance data may be entered through standard terminals, an HP 7260A Optical Mark Reader with a reject hopper (option 002) is recommended for faster data entry.

Software requirements

The minimum software required is:

MPE	EDIT
SORT	IMAGE
SPL	COBOL

Recommended software

QUERY provides added capability of generating reports from the SIS and SAS data bases.

Documentation supplied

HP SIS/3000 Reference Manual (32900-90001), 3 copies
HP SIS/3000 Technical Manual (32900-90005), 1 copy
HP SAS/3000 Reference Manual (32901-90001), 3 copies
HP SAS/3000 Technical Manual (32901-90005), 1 copy

Training

Training is available from the local Hewlett-Packard Training Center.

Ordering information

32900A SIS/3000. Installation of SIS/3000 and SAS/3000 in source form by a factory-authorized Customer Engineer. Includes documentation as described above. A software license agreement is required – contact local HP Field Engineer for details.

Since SIS/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -013, which includes full HP software support services. For prepaid software, please consult your Hewlett-Packard sales representative.

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2780/3780 Emulation Subsystem Software

model 30130D
30130E

Features

- **Runs in full multiprogramming environment**
- **Accessible from both interactive terminals and traditional batch devices**
- **Unrestricted peripheral and file access for input and output**
- **Provides for multiple users to queue jobs to be transmitted**
- **Automatic blank compression and trailing blank truncation**
- **Unlimited record blocking**

The 2780/3780 Emulation Subsystem Software allows the user to transfer data between an HP 3000 and a variety of remote host processors, in a full multiprogramming environment. It communicates via public telephone or private leased lines at speeds up to 9600 bits-per-second through a variety of HP recommended modems (see HP 3000 Configuration Guide for Synchronous Modems).* The emulator causes the HP 3000 to appear (to a remote processor) as either an IBM 2780 or 3780 Data Communication Terminal. The Emulation Subsystem is very flexible in that it allows the user to employ a variety of input/output devices.

The package provides the user with all standard 2780 capabilities with the exception of 6-bit transcode and all standard 3780 capabilities except for reverse interrupt and conversational mode. Also offered are 22 optional capabilities, the most significant of which are:

- **Blank compression**
- **Short record truncation**
- **EBCDIC and ASCII transparency**
- **Horizontal tabulation**
- **All 2780/3780 vertical format control**
- **Multi-record transmission (can optionally transmit more than seven records per block under user control)**
- **Print/punch component select**

The user interfaces with the emulator through seven commands which control the sequence of input/output processing. Additionally, the full capabilities of the HP 3000 are available with related service utilities (e.g., EDIT/3000) to expedite job control programming and to facilitate program/data file transfer and maintenance.

System requirements

The 30130E will operate with any HP 3000 Series II Computer System. The 30130D will operate with an HP 3000 Series I, HP 3000CX, or original HP 3000. Purchaser must supply modem.

Installation

The 30130D/E subsystems are installed by a factory authorized Customer Engineer. Installation is included in the list price.

Ordering information

The 30130D/E consist of software only.

The 30055A Synchronous Single Line Controller interface must also be ordered.

Since the 2780/3780 subsystem is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -006, which includes full HP software support services. For prepaid software, please consult your Hewlett-Packard sales representative.

Copyright

**2780 emulation is incompatible with four wire, 4800 baud transmission.*

HEWLETT hp PACKARD

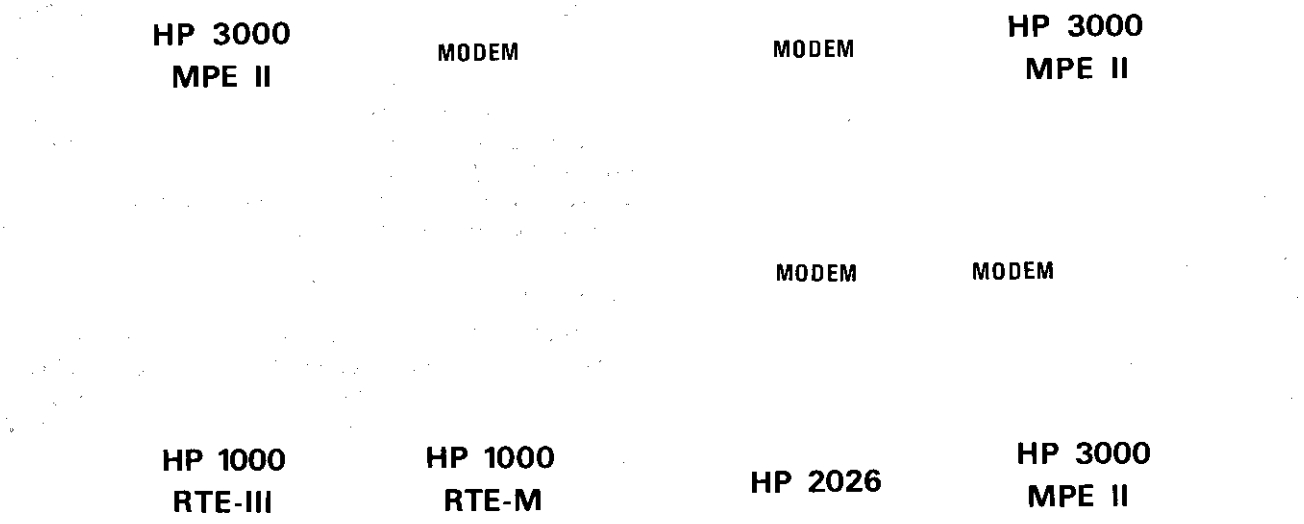
Distributed Systems/3000 Software

model 32190A

The Distributed Systems/3000 (DS/3000) Software enhancements to the Multiprogramming Executive (MPE) operating system provide the capability to establish interactive communications links between different types of HP computer systems in geographically dispersed locations. Part of the Hewlett-Packard Distributed Systems Network, these links permit an HP 3000 Series II Computer System to communicate with another HP 3000 Series II system, with an HP 1000 system, or with an HP 2026 system. This flexibility allows you to design a network configuration capable of performing your specific data processing tasks.

Designed to be both easy to use and versatile enough to adapt to a broad spectrum of commercial/industrial applications, most of the powerful DS/3000 capabilities can be used with little or no programming effort. As soon as the system hardware and software are installed, you can begin to make use of the expanded computational features.

The three communications links which connect these various systems (1000/3000, 2026/3000, and 3000/3000) differ in their purposes and features. These differences stem from the functions and applications which each computer is designed to perform. The HP 3000 Series II is a powerful, versatile, general purpose computer system with concurrent interactive, batch, and communication capabilities. When communicating with another HP 3000 or with an HP 1000, many high level communications facilities are provided for the implementation of network resource sharing, distributed data management, and coordinated distribution of processing functions. The HP 2026, on the other hand, is dedicated to source data entry and editing, information storage and retrieval, and data communications. The HP 2026 communication capabilities were designed specifically for efficient batch mode data transmission. Therefore, the 2026/3000 communications link requires fewer interactive capabilities and is discussed separately from the 1000/3000 and 3000/3000 links, which have many features in common.



1000/3000—3000/3000 Communications Links

Two of the computer systems that may be linked in the HP Distributed Systems Network are the HP 1000 and HP 3000. Since each of these computers perform functionally different data processing tasks, their association in a network provides you with the benefits of their combined capabilities. The HP 1000 is a high performance computer system designed for real time computation and instrumentation applications. These time critical tasks are given full and immediate computer attention by the HP 1000 Real Time Executive (RTE) operating system. The Multiprogramming Executive (MPE) operating system is the key to the versatile performance of the HP 3000 computer system. MPE permits on-line applications, such as transaction processing and interactive program development, to run concurrently with batch jobs, timeshare users, and remote job entry.

With each of these computers optimized for specific types of applications, the 1000/3000 and 3000/3000 communications links give you the opportunity to select the appropriate blend of computing power for your specific requirements. After either of these communications links has been established by simply logging on to both the local and remote systems from a local terminal, the following capabilities are immediately available:

- **Remote command processing**
- **Program-to-program communications**
- **Remote file access**
- **Remote data base access**
- **Remote calls to the RTE system executive (1000/3000 only)**

Remote command processing

Using DS/3000 remote command processing, you can execute the entire set of MPE commands on a remote HP 3000 while connected to a local HP 3000 or a local HP 1000. You can also execute system level RTE operator commands on a remote HP 1000 while connected to a local HP 3000.

To execute a remote MPE or system level RTE operator command from a local HP 3000, you enter the following at your local terminal:

```
:REMOTE command
```

where *command* is the desired MPE or RTE operator command in its normal format. For example, if you want to display the status of an input/output device on a remote HP 3000, you can issue a remote SHOWDEV command from a local HP 3000 as follows:

```
:REMOTE SHOWDEV 10
```

Or, to display the description and status of an I/O device on a remote HP 1000, you could issue a remote EQ command from a local HP 3000.

```
:REMOTE EQ, 2
```

In response to these commands, the system displays information on the availability and current state of the specified device.

The procedure for issuing a remote MPE command from a local HP 1000 has only slightly different format. After the remote HP 3000 is accessed and the communications link is established, you need only enter the following at your local HP 1000:

```
#command
```

where *command* is the desired MPE command in its normal format. For example, the information obtained from the remote SHOWDEV command above, could be retrieved from a local HP 1000 as follows:

```
#SHOWDEV 10
```

Thus, users of both HP 3000 and HP 1000 computer systems have virtual terminal capability to a remote HP 3000 system.

Program-to-program communications

A set of procedures (called intrinsics) makes it possible for two or more programs residing on remote computer systems to exchange information with one another. For a given data transfer between the programs, one of the programs is the master, and the other is the slave. The master program opens the data link, initiates the slave program, and is always in control. The slave program merely responds to requests received from the master. In the 1000/3000 and 3000/3000 communications links this master/slave relationship is dynamic in that it is determined solely by the design of the applications program. Each computer in the network can be used either as a master or as a slave or may operate in both modes simultaneously, depending on what you require for your specific application.

Intrinsic	Requested Action
POPEN	Initiates and activates a slave process in a remote HP 1000 and initiates program-to-program communications with the slave program.
PREAD	Sends a read request to the remote slave program asking the slave to send a block of data back to the master.
PWRITE	Sends a block of data to the remote slave program.
PCONTROL	Transmits a tag field (containing user-defined control information) to the remote slave program and receives a tag back from the slave.
PCLOSE	Terminates (kills) the remote slave process.
GET	Receives the next request from the remote master program.
ACCEPT	Accepts (and completes) the request received by the preceding GET intrinsic call.
REJECT	Rejects the request received by the preceding GET intrinsic call.
PCHECK	Returns an integer code specifying the completion status of the most recently executed slave program-to-program intrinsic. (HP 3000 only.)
FINIS	Terminates communication with the master program. (HP 1000 only.)

These intrinsics can be used directly from a FORTRAN or Assembly language program on an HP 1000, or from a FORTRAN or SPL (Systems Programming Language) program on an HP 3000 for program-to-program communication. User-created interface routines can be developed for the HP 3000 to allow this capability for other programming languages.

Remote file access

With DS/3000 linking an HP 3000 with either another HP 3000 or an HP 1000, you have access to the files of the remote system, under control of the usual system file security. Peripheral devices connected to the remote system are also readily accessible, since they are treated by the system as files. Two methods exist by which you can access remote files: command access and program access.

Command access is available only for the 3000/3000 communications link. With command access you merely issue a local MPE FILE command defining the desired device or file residing at the remote HP 3000 site. Included in the FILE command must be a remote device specification denoting the location of the desired file. The remote file may then be utilized as if it resided on your local computer. For example, after logging on to your local HP 3000, you establish a communications link with a single remote log-on command.

```
:REMOTE HELLO RUSER.RACCOUNT; DSLINE=RCPU
```

Here the DS communications line RCPU is opened to the remote HP 3000. Next, you can issue the MPE FILE command to define your required remote file.

```
:FILE SOURCE1; DEV=RCPU#DISC
```

This command specifies SOURCE1 as the file you wish to access and defines its location as the remote system disc. File SOURCE1 is now at your disposal, just as though it resided on your local HP 3000.

Program access is available through both the 3000/3000 and 1000/3000 communications links. With program access your applications programs can define, control, and access disc files and/or devices on the remote system by means of the following intrinsics:

INTRINSICS			Requested Action
1000/3000		3000/3000	
Local HP 3000 Call to Remote HP 1000	Local HP 1000 Call to Remote HP 3000	Local HP 3000 Call to Remote HP 3000	
DCRET			Creates a file.
DNAME	FRNAM	FRENAME	Renames a specified file.
DPURG			Removes a file and directory entry.
DOPEN	FOPEN	FOPEN	Opens a specified file.
DCLOS	FCLOS	FCLOSE	Closes a specified file.
DREAD	FREAD	FREAD	Transfers one record from a file (sequential file on HP 3000).
	FRDIR	FREADDIR	Reads a record from a direct access file.
	FRLAB	FREADLABEL	Reads a user file label.
DWRIT	FWRIT	FWRITE	Transfers one record to a file (sequential file on HP 3000).
	FWDIR	FWRITEDIR	Writes a record to a direct access file.
	FWLAB	FWRITELABEL	Writes a user's file label.
	FSTMD	FSETMODE	Changes file access mode.
	FLOCK	FLOCK	Dynamically locks a file.
	FUNLK	FUNLOCK	Dynamically unlocks a file.
	FUPDT	FUPDATE	Updates a record in a file.
DPOSN	FSPAC	FSPACE	Positions a file.
DAPOS			Positions a file to a known record.
	FPOIN	FPOINT	Resets pointer for sequential file.
	FRDSK	FREADSEEK	Prepares for reading a direct access file.
DCONT			Sends control request to peripheral device identified as a type 0 file.
	FCNTL	FCONTROL	Performs control of file or terminal device.
DWIND			Resets file to first record.
DLOCF	FINFO	FGETINFO	Returns file status.
	FCHEK	FCHECK	Requests details on file I/O errors.
DSTAT			Returns 250 bytes (125 words) of disc directory.
	FRLAT	FRELATE	Determines if file pair is interactive (requires human intervention for all input operations), or duplicative (echoes all input operations to a display device without intervention by the operating system software), or both.

In addition to remote program access of standard MPE files, DS/3000 also allows you to access remote KSAM/3000 (Keyed Sequential Access Method) files using standard KSAM intrinsics.

Remote data base access

The remote data base access feature of DS/3000 gives you the capability to access data bases on remote computer systems. Using the QUERY and IMAGE data base inquiry facilities of the remote system, you can locate, report, and update data values in remote IMAGE/1000 and IMAGE/3000 data bases.

Data base access using program-to-program communications is available with both the 1000/3000 and 3000/3000 communications links. By first initiating a program on your local system, you can then run a remote program which contains standard IMAGE calls accessing and/or updating the remote data base. The remote program then passes the requested information back to your local program.

An additional feature of the 3000/3000 communications link is the ability to interrogate data bases on remote HP 3000 computer systems using remote QUERY interactive commands.

Remote calls to the RTE system executive

FORTRAN and SPL programs on an HP 3000 Series II can make calls to the system executive of a remote HP 1000 system to write to, read from, control, or get the status of I/O devices. Other calls can be used to schedule programs without wait, request system clock time, and set the execution interval or start time of a program.

2026/3000 Communications Link

The HP 2026 system was designed to meet the data entry and data communications needs of companies with geographically dispersed locations. To serve these needs each HP 2026 can have a network of terminals communicating interactively with the local HP 2026. Data transmission between one HP 2026 and another and between an HP 2026 and a central host computer, however, is in a batch mode. Thus, data can be entered, stored, and retrieved locally, and then communicated to a central computer for batch processing.

To enhance the remote processing functions and data communications between an HP 2026 local data entry station and an HP 3000 remote host computer, DS/3000 provides:

- **Remote command processing from the HP 2026**
- **Point-to-point file transfer**

The DS/3000 operation, however, in no way alters the standard HP 2026 to HP 2026 communications features or the system's remote job entry capabilities.

Remote command processing

All HP 3000 MPE commands can be executed remotely from the system console of the HP 2026 in an interactive mode. After the remote data link is established, the procedure for entering the MPE commands at the HP 2026 system console is as follows:

```
#command
```

where *command* is the desired MPE command in its normal form. For example, to display the names of all disc files residing in the remote log-on group and account of the remote HP 3000, you could issue a remote LISTF command from the local HP 2026 system console as follows:

```
#LISTF
```

The system responds by printing

```
FILENAME

DATA1     DATA5     DATA6     FILE3     SOURCE1
```

Point-to-point file transfer

HP 2026 users located at remote terminals can create files to be sent to the host HP 3000 and place them in a queue until transmission to the HP 3000 is initiated from the HP 2026 system console. The system operator at the HP 2026 system console can specify additional files for transfer after the 2026/3000 link is established.

Files residing on the HP 3000 can be transmitted to the HP 2026 at the request of the system operator at the HP 2026 system console. Requests can be made for specific files, or all files named in the HP 3000 transfer queue may be sent to the HP 2026 after the 2026/3000 link is established. The queued files could, for example, be report listings from various operations performed on the HP 3000. Thus, multiple processing systems on the HP 3000 can send information to the HP 2026 by placing their report listings in disc files and these disc file names in the queue for transfer to the HP 2026.

Procedures may also be initiated in advance by the HP 2026 system operator to permit the HP 3000 to retrieve all of the HP 2026 queued files and send any queued HP 3000 files to the HP 2026 on request.

A typical DS application for the HP 2026 could be the creation of order files on a local HP 2026 system at a sales office. Once the communications link has been established by either the HP 2026 or the HP 3000, these data files could be transferred to the remote HP 3000 for processing. After the orders are processed, report files and updates to the local HP 2026 data files could be transmitted back to the local HP 2026.

Features of DS/3000 Communications Links

With the powerful remote communications capabilities provided by these three HP computer systems, you can now configure your computer systems network to coordinate and maximize the efforts and resources of your total organization. With HP 3000 computer systems available for batch and transaction-oriented data processing at remote or central sites, HP 1000 systems for dedicated applications on the factory floor or in the lab, and HP 2026 systems for remote data entry to a central EDP installation, DS/3000 provides you with all of the features necessary to make this distributed processing concept a reality.

- **Virtual terminal capability to remote HP 3000 systems**
- **Simultaneous local and remote processing with HP 1000 and HP 3000 systems**
- **Intersystem data transfer**
- **Bidirectional interleaved communications**
- **Switched, leased, and hardwired lines**
- **High data throughput**
- **Peripheral sharing**
- **Network design flexibility**
- **Network control**
- **Network security**
- **Network reliability**

Virtual terminal capability to remote HP 3000 systems

This feature allows terminals physically connected to one computer system to operate logically as though they were connected to a remote HP 3000. Virtual terminal capability to remote HP 3000 Series II systems is available to HP 2026 system consoles and to all terminals connected to HP 1000 or HP 3000 Series II systems in an HP Distributed Systems Network, providing access to all the hardware and software resources of any HP 3000 in the entire network.

Simultaneous local and remote processing

Within each HP 3000 or HP 1000 system in an HP Distributed Systems Network, a wide variety of processing can be in progress simultaneously, including local and remote batch jobs, local and remote transaction processing, local and remote interactive problem solving, intersystem program-to-program communication, and remote job entry.

Intersystem data transfer

Within an HP Distributed Systems Network you can transfer data from one system to another. The command mode of the remote file access capability of the 3000/3000 link makes it easy for a user on one HP 3000 system to access the files and devices of any other directly connected HP 3000 system in the network. The DS/3000 program-to-program communications capability of both the 1000/3000 and 3000/3000 links can also be used for performing high-speed intersystem block data transfers. In the 2026/3000 communications link, the remote file transfer capability allows the HP 2026 and HP 3000 to send files to and accept files from each other.

Bidirectional interleaving

Each physical communications line in an HP Distributed Systems Network can be used concurrently by many different batch and interactive applications originating from either end of the line. You can also obtain exclusive access to a specific line, if necessary, given the proper security codes. DS/3000 automatically multiplexes and demultiplexes all data being transferred over each line, so that in interleaved usage, each application is essentially unaware that anyone else is using the same line.

Switched, leased, and hardwired lines

DS/3000 offers a choice of switched, leased, or hardwired lines in its 3000/3000 communications link and allows you to mix these line types freely throughout your network. So you can choose the most economical type of line for each particular link. The HP 2026 communicates with the HP 3000 via modems over switched or leased lines. The HP 1000 and HP 3000 communicate over a hardwired connection consisting of a coaxial cable available in lengths up to 2000 feet. Additional information on switched networks and leased line service can be found in the HP 3000 Configuration Guide for Synchronous Modems.

High data throughput

Up to 2.5 million bits per second can be transferred between two HP 3000 systems and between HP 3000 and HP 1000 systems using a hardwired line (coaxial cable) up to 1000 feet long. At 2000 feet this maximum hardware line speed is 1.25 million bits per second. The effective data transfer rate is some proprotion of the maximum line speed, depending on line protocol, system configuration, and record size. Using common carrier facilities for 3000/3000 and 2026/3000 communication, data can be transferred at a rate of up to 9600 bits per second depending upon line conditioning and choice of modem. With the 2026/3000 link each HP 2026 system console has exclusive access to a switched or leased line to the HP 3000. In the 3000/3000 link, when an application requires the maximum possible data throughput over a line, DS/3000 allows the user to obtain exclusive access to a line, given the proper security codes. In this case, the effective data transfer rate is a function of the application.

Peripheral sharing

With DS/3000 you can share the use of expensive peripherals among several systems via communications lines, thus achieving a significant cost saving without sacrificing capability.

Network design flexibility

DS/3000 offers you a full choice of network configurations with the ability to connect individual systems together in rings, stars, strings, or combinations of all three. DS/3000 has also been designed so that the master/slave relationships between any two HP 3000 computers and between HP 1000 and HP 3000 systems in the network are truly dynamic. Both of the systems in a link can alternate freely from master to slave status or operate in both modes simultaneously.

Network control

With DS/3000 you can have a computer network that distributes computer power to the locations where it is needed while, at the same time, maintaining control at a central location. The remote command processing feature allows a single system manager to control all satellite systems from the central EDP facility.

Network security

Within an HP Distributed Systems Network the accounting structure and file security features of the operating systems provide total protection against unauthorized use of HP 3000 and HP 1000 systems and their disc files. For example, to initiate a remote HP 3000 session from an HP 1000, HP 2026, or another HP 3000, the user must supply the proper ID sequences to log on to the remote system, as well as on to the local system. Passwords can be attached to user names, account names, group names, and disc file names to provide a multi-level security scheme within each HP 3000 in the network. In addition, the file systems can be used to attach access levels to individual disc files, thus strictly limiting read, write, or read/write access to a particular subset of users. The HP 1000 and HP 2026 operating systems provide similar security code protection of disc files from unauthorized users.

Network reliability

DS/3000 uses cyclic redundancy check (CRC) characters to ensure that each particular block of data is transferred successfully from one system to another. If this CRC character indicates that an error has occurred, the block is automatically retransmitted. If an error persists through the maximum number of retransmissions, DS/3000 considers the error to be irrecoverable and reports it to the user. The HP 3000's fault control memory provides an added measure of reliability, detecting and automatically correcting single-bit errors. In addition, DS/3000 contains specific procedures that the customer can execute to determine if his network configuration is working properly.

System requirements

The minimum system required is an HP 3000 Series II operating under MPE II with 192k bytes of memory.

Installation

The 32190A software will be installed by a factory authorized Customer Engineer. Installation is included in the list price.

Configuration notes

The 32190A software is designed to run on HP 3000 Series II Computer Systems only, and each HP 3000 in the network must be equipped with DS/3000 software. Each HP 1000 in the network must have an RTE-III, RTE-MII, or RTE-MIII operating system and DS/1000 software (model 91741A and 91740A/B). All HP 2026 systems come equipped with DS/2026 software as part of the standard software package.

Documentation supplied

DS/3000 Reference Manual (32190-90001)

DS/3000 to DS/1000 Reference Manual for HP 3000 Users (32190-90005)

Site Preparation and Installation Manual DS/3000 Modem Link (32190-90003)

Site Preparation and Installation Manual DS/3000 Hardwired Link (32190-90004)

NOTE: Information on the 2026/3000 communications link is part of the HP 2026 Data Entry/Communications System Reference Manual (22704-90001), which is supplied with each HP 2026 system.

Ordering information

32190A consists of DS/3000 software only. The appropriate HP 3000 hardware interfaces and cables must also be ordered. For 3000/3000 modem communications the 30055A Synchronous Single-Line Controller is required. For 3000/3000 hardwired communications the 30360A Hardwired Serial Interface is required. For 1000/3000 communications the 30360A Hardwired Serial Interface and 30220A cable kit are required. For 2026/3000 communications the 30055A Synchronous Single-Line Controller is required.

Since DS/3000 is purchased on an initial payment and monthly fee basis, you must arrange for the monthly payment by ordering product number 22823A option -005, which includes full HP software support services. For prepaid software purchase, please consult your Hewlett-Packard sales representative.

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HEWLETT hp PACKARD

Hardwired Serial Interface and Cabling for HP Distributed System Networks

models 30360A, 30220A

The HP 30360A Hardwired Serial Interface card provides the hardware for the HP 3000 Series II to link it with coaxial cable to other computers in an HP Distributed System network. This card is used for high-speed asynchronous, point-to-point data transfer between computers. The interface fits into a single I/O slot of the computer.

Features

- **2.5 M-bits per second transfer rate up to 1000 ft./ hardware data rate**
- **SIO programmable bit rate from 9.804 K-bits per second to 2.5 M-bits per second/hardware data rate**
- **4 software selectable channels**
- **Connector panel**
- **SIO programmable**
- **Hardware transmission of an acknowledge word without program interruption**
- **Programmable error detection**
- **Call back or line monitoring timer**
- **Optically isolated reception**
- **Immediate line turnaround**

The cable is isolated at the receiver end by an optically isolated gate. This enables long distance date transmission with high reliability against errors due to common mode noise or ground level shifting.

The HP 30360A has several other features including automatic data acknowledgement or handshaking via hardware; CRC generation, transmission, and processing through hardware.

The CRC accumulation is a 16-bit feedback shift register that implements a 15th degree CRC polynomial.

Specifications

System requirements

The minimum system required is an HP 3000 Series II Model 6.

Hardwired Serial Interface must be inter-connected with 30220A cable kits. Several optional lengths are available as listed below:

30220A	25 ft.
Option 001	100 ft.
Option 002	250 ft.
Option 003	500 ft.
Option 004	1000 ft.
Option 005	2000 ft.

It is the responsibility of the customer to route these cables for his facility.

Power requirements

4.5A	(+5V)
.260A	(+15V)
.040A	(-15V)

Product Support

Equipment supplied

Hardwired Serial Interface kit including one PC board (30360-60001), cable connector panel (30360-60003).

Software supplied

Interface Diagnostic (D432)

Documentation supplied

Installation and Service Manual (30360-90001)

Ordering information

HP 30360A Hardwired Serial Interface Kit. Hardware data transfer speed of 2.5 M-bits up to 1000 ft; 1.25 M-bits at 2000 ft. the maximum distance.

HP 30220A Cable must be ordered with the HP 30360A.

HEWLETT hp PACKARD

Synchronous Single Line Controller for HP Distributed System Networks

model 30055A

The HP 30055A Synchronous Single Line Controller provides the hardware for the HP 3000 Series II to link it via modems to other computers in an HP Distributed Systems Network. It is also utilized in remote job entry systems, such as the 2780/3780 Emulation subsystem. This interface card connects to a modem for providing data transfers between computers at different locations. The card fits into a single I/O slot of the computer.

Features

- **Plug-in compatibility with all HP 3000 computers**
- **EIA RS-232-C and CCITT v.24 compatibility**
- **Compatible with Bell 201, 208, 209 and Milgo Modem 96 compatible synchronous modems using the same control protocol**
- **Half or full duplex operation**
- **Hardware data transfer rates to 9,600 bits per second**
- **Double character buffering**
- **Special character recognition**
- **Compatible with IBM Binary Synchronous Communications protocol**
- **Test connector and test diagnostic program**

Data Set Signals Provided:

	PIN	RS-232	v.24
Transmitted Data	2	(BA)	103
Received Data	3	(BB)	104
Request to Send	4	(CA)	105
Clear to Send	5	(CB)	106
Data Set Ready	6	(CC)	107
Signal Ground	7	(AB)	102
Received Line Signal Detector	8	(CF)	109
Transmitter Signal Element Timing (DTE) (not RS-232 Pin Out)	13	(DA)	113
*Secondary Transmitted Data	14	(SBA)	118
Transmit Clock (DCE)	15	(DB)	114
*Secondary Receive Data	16	(SBB)	119
Receive Clock	17	(DD)	115
Data Terminal Ready	20	(CD)	108.2
*Ring Indicator	22	(CE)	125
Data Signal Rate Selector (DTE)	23	(CH)	111

*Not supported by software.

Specifications

Model	30055A
Interface Level	EIA/CCITT
Operational Mode	Half or Full Duplex Modems
Data Trans. Rate	Up to 9600 BPS/hardware rate
Char. Buffering	2
Prog. Parity Generation/ Checking	None, Odd, Even
Spec. Char. Recog.	Program Selectable
Sync. Char.	Program Selectable
Power Requirements	3.5A (+5.0V) 0.095A (+12V) 0.007A (-12V)
Modem Interface Capability	Bell 201, 208, 209, and Milgo Modem 96 compatible

Product Support

Equipment supplied

Synchronous Single Line Controller Kit including one PC board (30055-60001), cable assembly (30055-60003) and test cable (30055-60005)

Software supplied

Interface Diagnostic (D434)

Documentation supplied

Installation and Service Manual (30055-90001)

Ordering Information

HP 30055A Synchronous Single Line Controller Kit

HEWLETT hp PACKARD

HP 3000 Configuration Guide for Synchronous Modems

In a geographically dispersed distributed system network the computers are linked using the DS/3000 software (HP 3000 to HP 3000) or the 2780/3780 RJE Emulation Subsystem software (HP 3000 to a mainframe), along with the HP 30055A Synchronous Single Line controller. Such systems communicate via modems over either two-wire or four-wire common carrier voice-grade circuits.

Selection of a modem is a critical factor in planning a network. A wide variety of modems is available, so this guide has been prepared to aid the user in choosing the proper unit. Hewlett-Packard recommends that the modems listed below be used. If other modems are selected, they must be functionally and electrically identical (at the system interface) with the recommended modems.

Modem selection criteria

In planning an HP 3000 network, the selection, installation, and proper functioning of common carrier or third party modems is the responsibility of the user. Hewlett-Packard accepts responsibility for maintaining hardware and software compatibility only with the modems recommended herein. To determine the correct modem for your system, the following parameters must be considered.

Operating mode: Switched network (dial-up) or leased (private) line.

Type of circuit: Two-wire (half duplex) or four wire (full duplex).

Transmission speed: 2000 bps, 2400 bps, 4800 bps, or 9600 bps.

Line conditioning: Unconditioned or conditioned.

Modem supplier: Common carrier (PTT) or third party suppliers.

A communications network's performance, in terms of throughput and responsiveness, is heavily influenced by the decisions made concerning these parameters. For low volume networks, low speed communications may be appropriate. Most users normally will select the highest performance service that meets their budgetary requirements. The five parameters are closely related, and, because of technical considerations or common carrier policy, some decisions will dictate others. In all cases it is wise to discuss these parameters in detail with your common carrier data services representative.

Operating mode

Switched network (dial-up) operation normally is advisable when communications will occur only periodically (once or twice per day) and the volume of data to be transmitted is low to moderate. Generally, only two-wire circuits are available for switched networks, with operation limited to 4800 bps or below.

Leased line service is appropriate for higher volumes of data and continuous on-line service. Since DS/3000 is designed primarily for on-line service, leased line operating mode is recommended. The choice for the 2780/3780 RJE emulation software depends upon the expected work volume.

Type of circuit

Two-wire communications circuits send/receive in one direction at a time, and to reverse the direction of transmission a "line turnaround" must be performed. Since frequent, time-consuming turnarounds are necessary, two-wire circuits should be selected only for low volume/response applications.

Four-wire circuits can send and receive simultaneously, which eliminates turnaround delays. Most leased line service is four-wire. To maintain responsiveness and the best transmission throughput, four-wire circuits are suggested.

Transmission speed

Transmission speed is the most critical decision to be made in selecting communications facilities for distributed system networks. Usually the speed of the service, including circuits and modem, is directly associated with the cost; higher speed means higher cost. Availability of service from the common carrier, the volume of traffic, and the need for responsiveness during interactive access are key factors in selecting the transmission speed.

In many areas, only leased-line service is available to 9600 bps on voice-grade circuits.

- In most countries 4800 bps leased-line service is offered.
- Some countries also allow 4800 bps service on a switched circuit (dial-up) basis, although usually with only two-wire circuits.
- Nearly all countries provide both switched and non-switched (leased line) service at 2400 bps.

For DS/3000 the user should select the highest speed of transmission available, in order to optimize the responsiveness/throughput of the network.

Line conditioning

By applying certain internal compensation to a communications circuit, the common carrier can remove noise and other degrading characteristics to improve the quality of the circuit. Special line conditioning is not always available in every area, but, fortunately, recent advances in modem electronics frequently obviate the need for line conditioning.

It is recommended that the user seek the advice of the common carrier and modem suppliers regarding line

conditioning and the class of service desired at each location in the network.

Modem supplier

Performance, availability, and cost should be considered in selecting a modem supplier. Generally, common carrier modems are furnished on a monthly rental basis, while third party modems are usually purchased, but sometimes may be leased. Costs and rates vary widely. In many countries modems are obtainable only from the common carrier.

Recommended modems

HP 3000 networks operate with the modems listed below. As an aid to configuring the recommended modems, the options for each are shown in the charts.

Users who choose other modems are responsible for working with their supplier to insure that the units are fully equivalent to the HP recommended equipment.

For Canada and the United States

Switched service (dial-up)

Bell 201C (2400 bps)
Bell 208B (4800 bps)

Leased line service

Bell 201C (2400 bps)
Bell 208A (4800 bps)
Bell 209A (9600 bps)

For International areas

Switched service (dial-up)

Use the locally approved modem compatible with CCITT recommendation V.26 bis with modulation alternative "B".

Operation with CCITT V.23 modems and Datel 2400 service using type 7 modems (in the United Kingdom) is not recommended, although locally acceptable in a few countries.

Either the user or Hewlett-Packard must demonstrate satisfactory operation with the locally supplied modem prior to HP's acceptance of responsibility for compatible operation with the supplied communications software. In many countries the RACAL/MILGO 26 LSI modem is an approved alternative to common carrier (PTT) modems. It complies with CCITT V.26 bis for switched service. Check with your HP respresentative regarding availability of switched service for DS/3000 and the 2780/3780 RJE Emulation Subsystem in your area.

Leased line service

For 2400 bps service in compliance with CCITT V.26, use RACAL/MILGO 26 LSI.

For 4800 bps service in compliance with CCITT V.27, use RACAL/MILGO MPS 48.

For 9600 bps service in compliance with CCITT V.29, use RACAL/MILGO model 96.

Other locally supplied modems which are compatible with CCITT V.26 (2400 bps), CCITT V.27 (4800 bps), or CCITT V.29 (9600 bps), and locally demonstrated as compatible with the HP 30055A and the HP communications software may also be selected. Check with your Hewlett-Packard representative regarding recommended alternatives.

201C OPTIONS AND RECOMMENDATIONS

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	Transmitter internally timed.	A1 (required)
A2	Transmitter externally timed.	
B3	Without 801 Automatic Calling Unit.	B3
B4	With 801 Automatic Calling Unit.	
C5	EIA interface	C5 (required)
C6	Contact interface.	
D7	Without automatic answer.	D8
D8	With automatic answer.	
E9	Automatic answer permanently wired.	Either*
E10	Automatic answer key-controlled.	

*If option D7 is selected, the E options have no meaning and should be ignored.

208A OPTIONS AND RECOMMENDATIONS

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	Transmitter internally timed.	A1 (required)
A2	Transmitter externally timed.	
B3	Continuous carrier.	B3
B4	Switched carrier.	
C5	Switched REQUEST TO SEND.	C6
C6	Continuous REQUEST TO SEND.	
D7	One second holdover used.	D7
D8	One second holdover not used.	
E9	With new sync.	E10 (required)
E10	Without new sync.	
F11	CC ON when analog loop test is present.	F11
F12	CC OFF when analog loop test is present.	

208B OPTIONS AND RECOMMENDATIONS

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	Transmitter internally timed.	A1 (required)
A2	Transmitter externally timed.	
B3	Without 801 Automatic Calling Unit.	B3
B4	With 801 Automatic Calling Unit.	
C5	CC OFF when analog loop test is present.	C6
C6	CC ON when analog loop test is present.	
D7	Without automatic answer.	D8
D8	With automatic answer.	
E9	Desk mounting	Either
E10	Rack or cabinet mounting.	

RACAL/MILGO 96 OPTIONS AND RECOMMENDATIONS

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
Model 21B Line	Dial back-up adapter	Optional
H2	Rack mount	Optional
Mod 14 or 16 Voice Adapter	Alternate voice	Optional
Y4	Multicarrier control	No

209A OPTIONS AND RECOMMENDATIONS

OPTION NUMBER	DESCRIPTION	RECOMMENDATION
A1	Transmitter internally timed.	A1 (required)
A2	Transmitter externally timed.	
B3	CC OFF when analog loop test is present.	B4
B4	CC ON when analog loop test is present.	
C5	Transmit timing slaved to receive timing.	C6*
C6	Transmit timing not slaved to receive timing.	
D7	Elastic Store in.	D8*
D8	Elastic Store out.	
E9	Continuous carrier.	E9
E10	Switched carrier.	
F11	Switched REQUEST TO SEND.	F12
F12	Continuous REQUEST TO SEND.	
	With alternate-voice service.	Customer choice (either)
	Without alternate-voice service.	

**C6 and D8 are correct for point-to-point 9600 baud operation. When using multiplexing and modem slaving consult the 209A manual and/or the Bell System Technical Representative for use of Elastic Store and Slaved Transmit Timing.*

HEWLETT PACKARD

CalComp Plotter Interface Subsystem

model 30126A

Features

- **For CalComp Series 565 and 702 Plotters**
- **Zip mode format supported**
- **Permits the translation of computer information into graphic form**
- **Simple subroutines callable from FORTRAN, COBOL, SPL and BASIC**

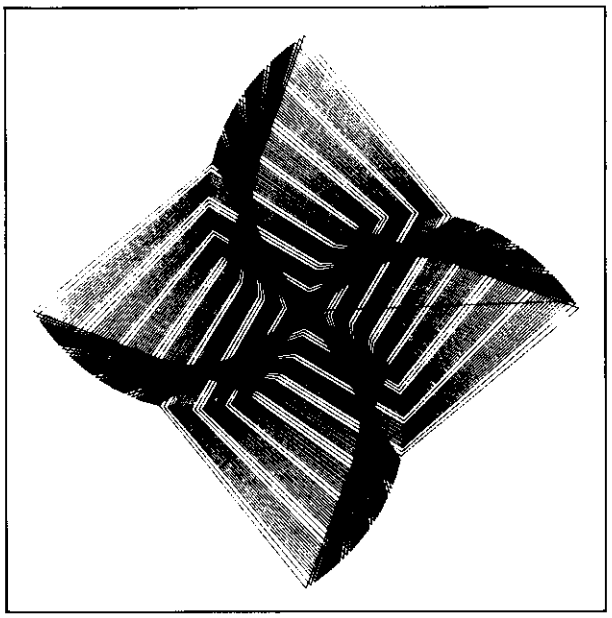
HP 30126A interfaces the HP 3000 computer with a CalComp 565 or 702 Series Plotter. Zip mode format is compatible with the software supplied. The complete interface consists of a single printed circuit board, software driver, basic plotting software and a signal cable for interconnecting the plotter and interface.

The user initiated procedures are programmed to translate computed data into distinct plotter commands necessary to direct an on-line plotter. The resulting graphic form can include graphs, three-dimensional drawings, contour maps, charts, etc., and plot annotation (ASCII alphanumeric characters and special graphic symbols). The subsystem is also responsible for file maintenance operations related to the plotter file, and input/output error-handling.

Easy to program

The basic plotting software consists of five FORTRAN callable procedures; their functions are described below:

1. PLOTS — Initialize plotter variables, initialize a user-defined plotter commands buffer, and open the plotter file.
2. PLOT — Convert X-axis and Y-axis parameters into plotter commands, manage buffering of plotter commands, and close the plotter file when the plotting sequence is completed.
3. FACTOR — Change the plot factor (the ratio of the plot physical size to the plot command size).
4. WHERE — Return the X-axis and Y-axis coordinates of the present pen position (with respect to the current origin) and return the current plot factor.



5. SYMBOL — Write plot annotation in the form of ASCII characters and special symbols.

In addition, through the courtesy of CalComp Corporation the following four additional routines are provided.

1. NUMBER — Convert a floating-point number to the appropriate decimal equivalent in order that the number may be plotted in the FORTRAN F-Type format.
2. SCALE — Examine the data values in an array, also determine a starting value and a scaling factor.
3. AXIS — Indicate the orientation and values of the plotted data points. When both the X and Y axes are needed, AXIS is called separately for each one.
4. LINE — Produce a line plot of the paired data points contained in arrays X and Y. Also compute the page coordinates and scaling factor of these points.

Program compatibility

Most programs written for the HP 3000 Series I, HP 3000CX, or original HP 3000 systems can be run without conversion on an HP 3000 Series II. Programs utilizing the BASIC "LONG" or FORTRAN "Double Precision" data type will require conversion.

System requirements

The 30126A will operate with any HP 3000 computer system.

Site preparation data

	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	HP supplies an interface card which plugs into the mainframe and draws power from it. Consult the CalComp literature for the plotter site preparation information.	
PHASES		
CURRENT PER PHASE		
CONNECTION CODE		
HEAT OUTPUT (per hour)		
WEIGHT		
SIGNAL CABLE LENGTH 565:	25 ft*	7.6 m*
702:	50 ft	15.2 m

**Up to 50 ft (15.2 m) can be special ordered.*

Installation

The 30126A Subsystem is installed by a factory-authorized Customer Engineer. Installation is included in the list price.

Manuals required

Refer to CalComp manuals for plotter operation. HP 3000 Resident Routines are described in HP 3000 Compiler Library Manual (Chapter 3), publication number 30000-90028 for HP 3000 Series II Systems. For HP 3000 Series I and Pre-Series II systems, consult the Compiler Library Manual, publication number 03000-90009.

Ordering information

HP 30126A CalComp Plotter Interface Subsystem includes interface board; signal cable for connection to 565 Series CalComp Plotter; test connector; diagnostic software.

Note: Consult the Series I or Pre-Series II Configuration diagram if ordering for an HP 3000 Series I, HP 3000CX or original HP 3000.

HP 30126A-001 CalComp Plotter Interface Subsystem. Same as above except signal cable supplied for connecting to CalComp 702 Plotters. Signal cable connectors for 565 Series Plotters are not interchangeable with cable connectors for 702 Series Plotters.

HEWLETT hp PACKARD

Interactive Display Terminals

models 2640B, 2640C, 2640N
2640S, 2641A, 2645A

The 2640 series of terminals brings to your HP 3000 an unparalleled set of features designed to complement your system in all areas of your organization

Features

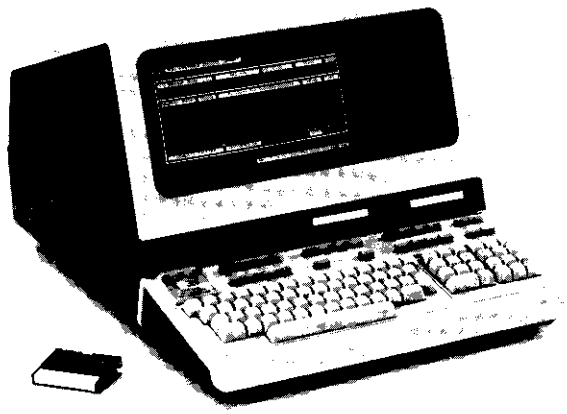
- **Enhanced high-resolution display**
- **Plug-in character sets**
- **Dynamically allocated memory**
- **Pop-in modularity and expandability**
- **Microprocessor controlled**
- **Character/block mode**
- **Self-test**
- **Full editing capability**
- **Multi-task keyboard**
- **Off-screen storage with scrolling capability**
- **Programmable protected fields**
- **Inverse video for highlighting; and optional blinking, underline, half-bright**
- **Cursor addressability and positioning control tabulation**
- **Hard copy interface**

Enhanced high-resolution display

The terminals have a 5 inch by 10 inch rectangular display providing a 1,920 character capacity in 24 lines of 80 characters per line. The characters are formed by a 7 x 9 dot matrix generated in a 9 x 15 dot character cell. The high resolution of the 7 x 9 dot matrix is enhanced by dot shifting for precise character definition, and by the use of the enlarged character cell for wide character and line separation, underlining, line descenders, and inverse video. These display features are engineered to increase clarity and ease sessions at the terminal.

Plug-in character sets

Recognizing the demand for terminals that speak many languages and fill diverse sets of needs, the terminals have the capacity to include up to four 128-character sets resident concurrently in the terminal. Adjacent characters on the display may be from any of the four character sets and are available with the optional underline, blinking and half-bright feature.



Dynamically allocated memory

Because of the efficient linking memory organization (transparent to the user) spaces to the right of the last character typed on a line are normally not stored in memory. Consequently, the basic terminal equipped with 1024 characters of display memory can store from 8 to 50 lines of information dependent on line length. Optional memory can expand this line capacity to a maximum of over 400 lines of information. Lines are viewed 24 at a time by using the roll up, roll down, next page, and previous page keys.

Pop-in modularity and expandability

The modular computer-like construction is designed for ease of service. Digital electronics are contained on printed-circuit cards that can be exchanged within the terminal; up to 14 cards can be accommodated to allow a choice of options. The combination of microprogramming and modularity means that this terminal can be expanded as new technologies and devices become available.

Microprocessor controlled

The operating characteristics of the terminal are controlled through firmware. The terminal's microprocessor manages memory allocation, data communications, keyboard scanning, and display control. This microprocessor implementation and the use of single bus architecture yield a terminal utilizing electronics and mechanics with a wide range of capabilities and potential for future enhancements.

Character/block mode

The terminals will operate character-by-character as a completely interactive terminal or are capable of operating on a block at a time. Text can be composed and edited locally thus allowing the terminal user to verify and correct data before transmission to the CPU. Editing and CPU connect times are significantly reduced by such features as: character or line insert and delete, cursor sensing and positioning control, programmable protected fields, off-screen storage with scrolling and page select capability, tabulation, transparent display control codes, 8 special function keys for user defined routines and a positionable memory protect.

Self-test

The terminals have been engineered for high reliability, ease of maintenance, testing, and rapid repair when needed. By depressing the TEST button on the keyboard the user receives a Go/No-Go indication from results of a memory test, firmware test, and display verification.

Hard-copy interface

The terminals accommodate most RS232C-compatible serial printers or any HP-manufactured printer which uses the HP parallel interface. The serial printers are connected via the 13250A interface card, while the parallel printers use the 13238A duplex register interface card. Commands to print data can be initiated locally from the terminal keyboard or remotely from the CPU under control of a user's program. The MPE operating system does not recognize hardcopy devices connected to the terminals. All control of hardcopy devices is assumed by the user's program.

Display enhancements

Specific fields can be brought to the user's attention by using any of the 16 possible combinations of inverse video, blinking, underline and half-bright to emphasize areas of the display.

Optional features

Fully integrated mass storage (2641, 45)

Benefits of mass storage: Many operations normally requiring connection to a computer system can now be done off-line with the terminal. Optional dual in-board cartridge tape units allow batching of information, and add extensive stand-alone capabilities which can significantly reduce user time; conserve both computer and communications resources; provide a tape backup; and, very importantly, allow the terminal to keep on working even when a computer is unavailable.

Mini-cartridge: Highly reliable, interchangeable mini-cartridges each provide the capacity for many hours of typing, up to 110,000 characters of storage formatted in variable length records and files. The tape units feature rapid data transfer and bi-directional high-speed search to access any file in seconds. The mini-cartridge is ideally suited for storing data, forms, programs or text, and is an excellent substitute for paper tape. The HP 3000 Series II FCOPY utility may be used to transfer files to and from mini-cartridges to other HP 3000 Series II peripherals. (Note: This feature is not available on Series I or pre-Series II models.)

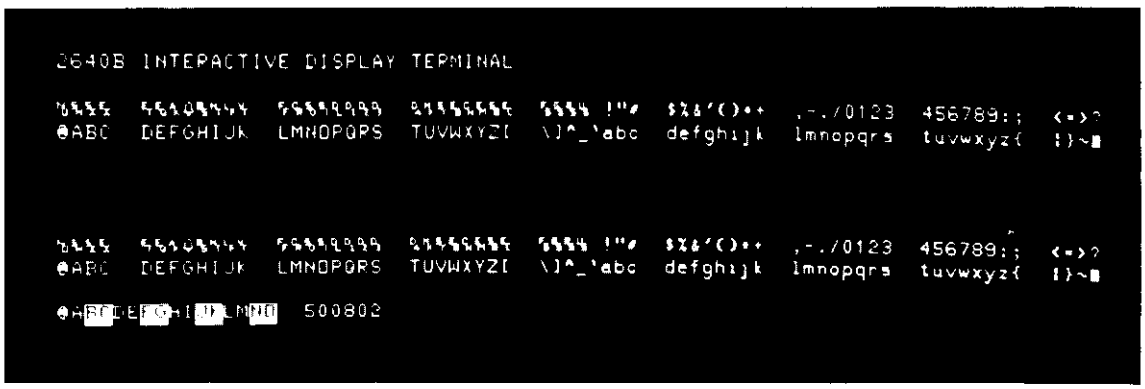
User-defined soft keys (2641, 45)

Each of the eight special function keys can be easily used to issue a user-defined string of up to 80 characters or several control sequences stored in the 2645A. This feature allows the keyboard to adapt to specialized applications, and can considerably simplify use of the keyboard and result in greater efficiency — each soft key performs the operations of several key sequences. For example, the soft keys could issue frequently used programming sequences, search for files, aid forms construction for data entry, dynamically configure the terminal, or issue instructions to the operator, computer or both.

Character sets

APL: With the 2641, the APL basic set and APL overstrike set are both available for user development and display of APL programs. The clarity and visual representation of the characters are facilitated by the 9 by 15 dot character cell. The basic set is comprised of the 96 APL graphics, 64 overstrike graphics and includes the ability to display control codes which help in debugging programs.

Also standard in the 2641A is a 64 character Roman set which is optionally expandable to include lowercase capability. This second set allows the terminal to be switched from APL to the ASCII mode where the 2641A can then double as a fully Teletype-compatible terminal.



Actual photograph of 2640B display

Math: The optional Math set is available to include equations right in the text that's composed on the screen. This feature helps to impart realism and assists in understanding technical material.

Line drawing: The optional Line Drawing set assists users in defining forms that appear like those normally filled out in the company's day-to-day operations. Now operator errors can be minimized due to the familiarity associated with the constructed forms.

Norwegian: The 2640N has the Danish/Norwegian set in place of the standard uppercase set. The non-standard characters must be handled by application programs.

Large character set: With this option, characters approximately ½ in. tall can be constructed. This is useful for warehousing operations where, for example, fork-lift drivers may have to read computer-derived instructions from a distance. Applications programs are responsible for constructing characters from supplied segments.

Cyrillic: 2640C has 128 character cyrillic set in addition to standard uppercase set. The non-standard characters must be handled by application programs.

Swedish: 2640S has 64 character Swedish (Finnish) set in place of standard uppercase set. The non-standard characters must be handled by application programs.

Specifications

General

Screen size: 5" x 10" (127 x 254 mm)

Screen capacity: 24 lines x 80 columns (1,920 characters)

Character generation: 7 x 9 enhanced dot matrix; 9 x 15 dot character cell; non-interlaced raster scan

Character size: 0.097" x 0.125" (2.46 x 3.175 mm)

Cursor: Blinking-underline

Display modes: White on black; black on white (inverse video) blinking, half-bright, underline.

Refresh rate: 60 Hz (50 Hz optional)

Tube phosphor: P4

Implosion protection: Bonded implosion panel

Memory: MOS, ROM: 22K bytes (program); RAM; standard 4096 bytes; 12 kilobytes maximum (16K including maximum data communications buffer)

Keyboard: Detachable, additional control and editing keys; ten-key numeric pad; cursor pad; multispeed auto-repeat, N-key roll-over; 4 ft. cable (1.22 m).

Cartridge tape (optional): Two mechanisms
- Read/write speed: 10 ips
- Search/rewind speed: 60 ips
- Recording: 800 bpi
- Mini cartridge: 110 kilobyte capacity (maximum per cartridge)

Data communications

Data rate: 110, 150, 300, 1200, 2400 baud, and external switch selectable (110 selects two stop bits)

Standard asynchronous communications interface: EIA standard RS232C; compatible with Bell 103A modems, Bell 202C/D/S/T modems with reverse channel, and Vadic VA3400 series modems. (Note: Bell 202S is not supported for Series I or pre-Series II models.)

Transmission modes: Full or half duplex, asynchronous

Operating modes: On-line; Off-line; Character; Block

Parity: Switch selectable; even, odd, none

Site preparation data

	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	1.3A	0.7A
CONNECTION CODE	F	F
HEAT OUTPUT (per hour)	483 btu	129 kcal
WEIGHT	50 lb	23 kg
SIGNAL CABLE LENGTH*	15 ft.	4.5 m

**Cables not included; must be ordered separately as a 13232N.*

Warranty

90 day on-site parts and labor warranty.

Hardware supplied

Terminal, keyboard plus ordered options. If tape drives ordered: two cartridges, head cleaning kit. Power cable. No data cable is supplied with the terminal or in standard HP 3000 systems. They must be ordered separately. (order 13232N from Data Terminals Division with each terminal.)

Installation

Installation of the terminal is not covered in the list price of the terminal nor in the list price of HP 3000 System models. Installation is performed by the user (manual supplied), or by a factory-authorized Customer Engineer (on a time and materials basis).

Environmental conditions

Since terminals may be used outside the immediate system area, they are not subject to the environmental specs of the system itself.

Temperature, free space ambient:
- Non-operating: -40 to +75°C (-40 to +167°F)
- Operating: 0 to +55°C (+32 to 131°F)

Humidity: 5 to 95% (non-condensing)

System requirements

Any terminal will operate with any HP 3000 computer system subject to the following constraints:

The maximum data rate is 2400 baud. Terminals on HP 3000 systems normally operate in character mode, except when accessed via DEL/3000, when block mode is employed. Users who wish to access terminals in block mode directly (i.e. not using DEL/3000) must provide their own detection and correction facilities for transmission errors. The probability of transmission errors occurring at 2400 baud is slight, and negligible at 1200 baud or lower.

Ordering information

HP 2640B Interactive Display Terminal. A low cost terminal for general purpose use on an HP 3000. Block or character mode (switch selectable); 64 character upper case Roman; 1024 bytes of storage, expandable to 8192 bytes maximum; inverse video; 110-2400 baud; RS232C; includes 2 option slots.

Option 001. 128 Character Set — Roman. Adds lower case and displayable control codes.

Option 015. 50 Hz, 230V. 13232N 15 ft. RS232 cable. Must be ordered.

13232N 15 ft. RS232 cable. Must be ordered.

HP 13231A Display Enhancements. Adds blinking, half-bright and underline; provides for addition of three 128 character sets (requires 1 option slot). (Note: Display enhancements operate under control of a user's program. The MPE operating system does not explicitly recognize special characters generated by display enhancements.)

HP 13231A-201. 64 Character Mathematic Symbol Set. Adds display of integral signs, Greek letters, etc.

HP 13231A-202. 64 Character Line Drawing Set. Adds display of continuous horizontal and vertical line segments for forms, histograms, etc.

HP 13231A-203. Large Character Set.

HP 13234A Terminal Memory Module (+4K). Adds 4096 bytes of user RAM memory (requires 1 option slot).

See separate HP 2640B data sheet for further accessories and special cables.

HP 2641A APL Display Station. For APL/3000 user on the HP 3000 Series II. Block or character mode, 128 character APL, 64 character set uppercase Roman, 64 character APL overstrike, 4096 bytes of RAM memory, optionally expandable to 12K bytes, inverse video, editing features, 8 user-defined soft keys, 110-2400 baud, RS232C, display enhancements, 5 option slots. (Note: No interface cable included).

HP 2641A-001. 128 Character Set — Roman. Adds lower case and displayable control codes.

HP 2641A-007. Integrated Dual Cartridge Tape — Mini Data Station. Adds two built-in cartridge tape transports and electronics to provide Mini Data Station capabilities (requires 2 option slots). Includes device support firmware.

HP 2641A-013. 5 Mini Cartridges.

HP 2641A-015. 50 Hz, 230V

Only one of the following options (201, 202, 203) may be ordered:

(Note: Display enhancements work only under control of user's program. The MPE operating system does not explicitly recognize special characters generated by display enhancements).

HP 2641A-201. 64 Character Mathematic Symbol Set. Adds display of integral signs, Greek letters, etc.

HP 2641A-202. 64 Character Line Drawing Set. Adds display of continuous horizontal and vertical line segments for forms, histograms, etc.

HP 2641A-203. Large Character Set.

HP 13234A Terminal Memory Module (+4K). Adds 4096 bytes of user RAM memory (requires 1 option slot).

See separate HP 2641A data sheet for further accessories and special cables.

HP 2645A Display Station. Powerful general-purpose terminal with optional off-line tape storage. Block or character mode, 64 character set uppercase Roman, 4096 bytes of RAM memory (optionally expandable to 12K bytes) inverse video, editing features, 8 user-defined soft keys, 110-2400 baud, RS232C, 7 option slots. (Note: No interface cable included.)

HP 2645A-001. 128 Character Set — Roman. Adds lowercase and displayable control codes.

HP 2645A-007. Integrated Dual Cartridge Tape — Mini Data Station. Adds two built-in cartridge tape transports and electronics to provide Mini Data Station capabilities (requires 2 option slots). Includes device support firmware.

HP 2645A-013. 5 Mini Cartridges

HP 2645A-015. 50 Hz, 230V.

HP 13231A Display Enhancements. Adds blinking, half-bright and underline; provides for addition of three 128 character sets (requires 1 option slot). (Note: Display enhancements operate under control of a user's program. The MPE operating system does not explicitly recognize special characters generated by display enhancements.)

HP 13231A-201. 64 Character Mathematic Symbol Set. Adds display of integral signs, Greek letters, etc.

HP 13231A-202. 64 Character Line Drawing Set. Adds display of continuous horizontal and vertical line segments for forms, histograms, etc.

HP 13231A-203. Large Character Set. Adds display of character segments for combination into large characters.

HP 13234A Terminal Memory Module (+4K). Adds 4096 bytes of user RAM memory (requires 1 option slot).

See separate 2645A data sheet for further accessories and special cables.

HP 2640C Cryillic Terminal. Cyrillic (Russian) version of 2640B, available with Series II systems only. 64 character uppercase Roman plus 128 character Cyrillic. 4K RAM storage, expandable to 8K bytes. Inverse video, underline, half-bright, and blinking. Capacity for two alternate character sets. 110, 150, 300, 1200, 2400 baud (switch selectable). Does not include any option slots.

HP 2640C-001. 128 Character Set — Roman.

HP 2640C-015. 50 Hz, 230V.

HP 2640C-201. Math Set.

HP 2640C-202. Line Drawing Set.

HP 2640C-203. Large Character Set.

HP 13234A Terminal Memory Module (+4K). Adds 4096 bytes of user RAM memory (requires 1 option slot).

HP 2640N Danish/Norwegian Terminal. Danish/ Norwegian version of 2640B, available with Series II systems only. 64 character Danish/Norwegian. Block or character mode. 1K bytes RAM storage (expandable to 8K bytes) 110, 150, 300, 1200, 2400 baud. Two spare slots.

HP 2640N-001. 128 Character Danish/Norwegian.

HP 2640N-015. 50 Hz, 230V.

HP 13231A Display Enhancements (uses 1 slot). Blinking, half-bright and underline.

HP 13231A-201. Math Set.

HP 13231A-202. Line Drawing.

HP 13231A-203. Large Character Set.

HP 13234A Terminal Memory Module (+4K). Adds 4096 bytes of user RAM memory (requires 1 option slot).

HP 2640S Swedish/Finnish Terminal. Swedish/Finnish version of 2640B, available with Series II systems only. 64 character Swedish/Finnish. Block or character mode, 1K bytes RAM storage (expandable to 8K bytes) 110, 150, 300, 1200, 2400 baud. Two spare slots.

HP 2640S-001. 128 Character Swedish/Finnish.

HP 2640S-015. 50 Hz, 230V.

HP 13231A Display Enhancements (1 slot). Blinking, half-bright and underline.

HP 13231A-201. Math Set.

HP 13231A-202. Line Drawing.

HP 13231A-203. Large Character Set.

HP 13234A Terminal Memory Module (+4K). Adds 4096 bytes of user RAM memory (requires 1 option slot).

TERMINALS AT A GLANCE

	2640B	2640N	2640C	2640S	2641A	2645A
Two tape cartridge drives	–	–	–	–	Optional	Optional
APL character set	–	–	–	–	Standard	–
Inverse video	Standard	Standard	Standard	Standard	Standard	Standard
Underline, blinking 1/2 brite	Optional	Optional	Standard	Optional	Standard	Optional
Math character set	Optional	Optional	Optional	Optional	Optional	Optional
Line drawing set	Optional	Optional	Optional	Optional	Optional	Optional
Large character set	Optional	Optional	Optional	Optional	Optional	Optional
Soft keys	–	–	–	–	Standard	Standard
Norwegian character set	–	Standard	–	–	–	–
Swedish/Finnish character set	–	–	–	Standard	–	–
Cyrillic character set	–	–	Standard	–	–	–
Maximum memory	8Kb	8Kb	8Kb	8Kb	12Kb	12Kb
Lowercase	Optional	Optional	Optional	Optional	Optional	Optional

HEWLETT hp PACKARD

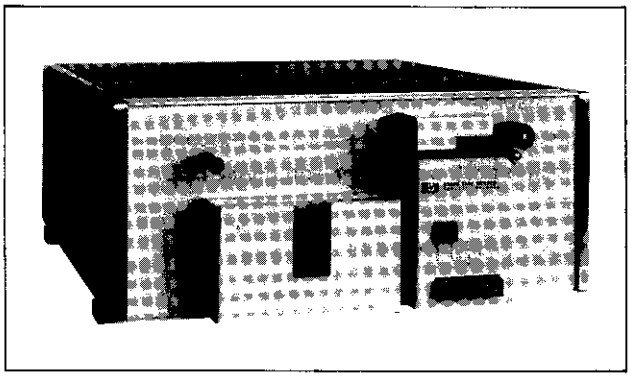
Punched Tape Reader Subsystem

model 30104A

Features

- **Reading speed to 500 characters-per-second**
- **Error-free reading of both dry and oil-base tape without adjustment**
- **Simple operation and rugged construction for long life**

The high speed of the reader permits rapid read-in while offering the economy and versatility of punched tape input. A significant advantage in reading accuracy is also provided by using a compensating sensing technique. Data reliability is enhanced as each character is read only once with no overshooting of characters. Positive feedhole control and a reliable clutch/brake mechanism ensure that the tape will stop on the character that initiates the stop. Simple operation, rugged construction and electrically-conservative design ensures long life at top performance.



Specifications

Reading speed

500 characters per second (415 characters per second when operated from 50 Hz power)

Reading technique

Photoelectric, character-by-character

Tape

Code:	8 level code
Width:	1 inch (2.54 cm)
Material:	Any material with less than 60% transmissivity

Start/stop times

Start time:	Less than 6 milliseconds
Stop time:	Less than 500 microseconds (stops on character)

Controls

Power, Load, Read, Manual Advance

Physical characteristics

Height:	7 inches (17.8 cm)
Width:	17 inches (43.2 cm)
Depth:	16 inches (40.6 cm), not including panel controls and connectors
Shipping Weight:	54 lb. (24.5 kg)
Mounting:	HP 3000 Cabinet (under an existing magnetic tape)

System requirements

The 30104A will operate with any HP 3000 computer system.

Installation

The 30104A Subsystem is installed by a factory-authorized Customer Engineer. Installation is included in the list price.

Ordering information

30104A Punched Tape Reader Subsystem, 500 cps at 60 Hz or 420 cps at 50 Hz. Includes HP 2748B Punched Tape Reader, rack mounting kit, controller/interface, device diagnostic software, and manual (30104-90001).

30104A-001 adds 56 inch HP 3000CX/Series I/Series II cabinet.

Subsystem mounted in cabinet.

30104A-002 adds 52 inch pre-3000CX cabinet.

Subsystem mounted in cabinet.

Note: Consult the Series I or pre-Series II Configuration diagram if ordering for an HP 3000 Series I, HP 3000CX, or original HP 3000.

Operating accessory available

12575C Paper Tape Winder, 115/230V/Battery.

Includes rechargeable battery.

Site preparation data

	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	2.5A	1.25A
CONNECTION CODE	I	I
HEAT OUTPUT (per hour)	683 btu	172 kcal
WEIGHT	42 lb	19.1 kg
SIGNAL CABLE LENGTH	(not applicable)	

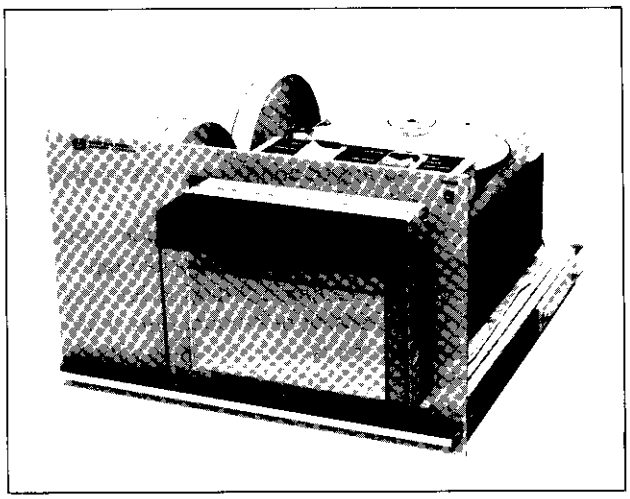
HEWLETT hp PACKARD

Tape Punch Subsystem

model 30105A

Features

- **Compact and quiet-running**
- **Punches tape at 75 characters-per-second**
- **Punches both paper tape and mylar tape**



Specifications

Punch speed

75 characters-per-second, asynchronous

Tape type

Paper, Mylar or plastic

Tape width

Standard 5 level 11/16 inch (17.5 mm) and 8 level 1 inch (25.4 mm)

Tape thickness

Paper:	0.003 to 0.005 inch (0.08 to 0.13 mm) oil-base or dry
Mylar:	0.003 to 0.004 inch (0.08 to 0.10 mm)
Plastic:	0.003 to 0.0045 inch (0.08 to 0.11 mm)

Physical characteristics

Height:	10-1/2 inches (26.7 cm)
Width:	16-3/4 inches (42.5 cm)
Depth:	21-3/16 inches (53.8 cm)
Mounting:	Fits in HP 3000 cabinet under existing magnetic tape
Shipping Weight:	47 lb (21.3 kg)

Operating controls

Power On, DC On, Tape Feed, Ext (external interrupt), Feed Holes, Code Holes

System requirements

The 30105A will operate with any HP 3000 computer system.

Installation

The 30105A Subsystem is installed by a factory-authorized Customer Engineer. Installation is included in the list price.

Ordering information

30105A Tape Punch Subsystem. Includes HP 2895B Tape Punch; controller/interface; device diagnostic software, and manual (30105-90001).

30105A-001 adds 56 inch HP 3000CX/Series I/Series II cabinet.

30105A-002 adds 52 inch pre-3000CX cabinet. Subsystem mounted in cabinet.

Note: Consult the Series I or pre-Series II Configuration diagram if ordering for an HP 3000 Series I, HP 3000CX, or original HP 3000.

Operating supplies available

Extra Tape (Order by Part No.; appropriate discount for large quantities)

Paper Tape, 1 inch wide (2.54 cm), 1000 ft. roll (304.8 m)
HP Part No. 9280-0063

Mylar Tape, 1 inch wide (2.54 cm), 500 ft. roll (152.4 m)
HP Part No. 0460-0747

Site preparation data

	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	2A	1A
CONNECTION CODE	I	I
HEAT OUTPUT (per hour)	683 btu	172 kcal
WEIGHT	35 lb	15.9 kg
SIGNAL CABLE LENGTH	(not applicable)	

HEWLETT hp PACKARD

Card Reader Subsystem

model 30106A

Features

- **Reads 600 punched cards per minute**
- **Vacuum card picking**
- **Slant-top design for smooth card flow**
- **Straight-through card-track for long card life**
- **Automatic feed**
- **1000 card hopper/stacker**

The HP 30106A Subsystem provides dependable medium speed card reading capability. A vacuum pick mechanism is used in conjunction with riffle air for ease of card picking and minimum card wear. This technique also permits extremely high tolerance to damaged or worn cards. The card track is very short so that at no time is more than one card in motion.

The many checking features of the reader insure safe, dependable operation. These include light/dark check, motion check, pick check for stapled cards, and hopper checks.

Specifications

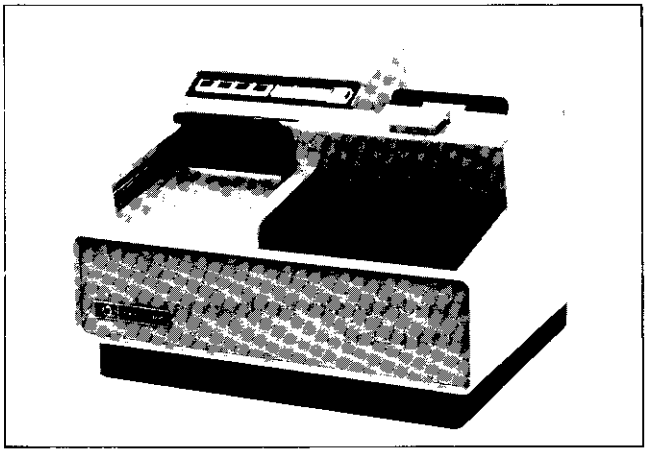
CARD RATE:	600 cards per minute
CARD TYPE:	Standard 80-column EIA card
HOPPER/STACKER CAPACITY:	1000 cards
LIGHT SOURCE:	Infrared light emitting diodes
READ STATION:	Photo transistor, 12 bits simultaneously
CONTROLS:	Stop, Reset, End of File, Power
INDICATORS:	Read Check, Motion Check, Pick Check, Hopper/Stacker

Data formatting

The HP 3000 interface controller provides Hollerith to ASCII conversion with packing and column binary conversion (each column plus four leading zeros packed into two bytes).

Physical characteristics

Height:	15.5 inches (39.4 cm)
Width:	23-1/16 inches (58.6 cm)
Depth:	18 inches (45.7 cm)
Shipping Weight:	100 lbs (45.4 kg)



System requirements

The 30106A will operate with any HP 3000 computer system.

Installation

The 30106A Subsystem is installed by a factory-authorized Customer Engineer. Installation is included in the list price.

Ordering information

The 30106A Card Reader Subsystem includes HP 2893A Card Reader, controller/interface, device diagnostic software, and 2893A card reader manual (#30106-90001).

Site preparation data

	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	5.4A*	2.7A**
CONNECTION CODE	A	A
HEAT OUTPUT (per hour)	1230 btu	310 kcal
WEIGHT	75 lb	34 kg
SIGNAL CABLE LENGTH***	25 ft	7.6 m

* *20A surge*
** *10A surge*
*** *Up to 500 ft (152 m) can be special ordered.*
NOTE: HP does not supply a table for this device.

HEWLETT hp PACKARD

Card Reader Punch Subsystem

model 30119A

Features

- **On-line 80-column card reading, card punching, and card printing**
- **Read, punch, and print functions independently controlled by the computer system**
- **Individual data storage buffers for each function**
- **Dual input hoppers and output stackers selectable under program control**
- **Provides software-driver plus hardware interface for use with HP 3000 computers**

The HP 30119A provides complete punched card I/O capability in a single peripheral device, fully buffered, on-line 80-column card reading, punching, and printing capabilities for use with HP 3000 computers. Off-line data recorder (keypunch) capability is optionally available. Reading rate is 175 to 200 cards per minute. Punch/print rate is 45 to 75 cards per minute, depending on the number of columns involved. A fast slew rate allows rapid skipping of columns and fields not requiring punching or printing.

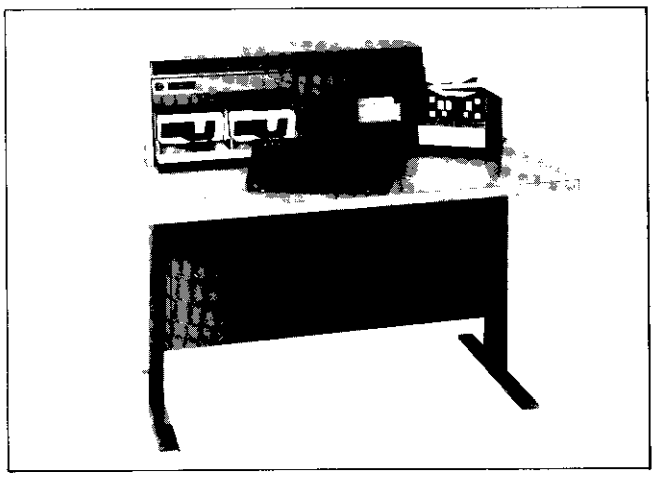
Separately buffered and independently controlled read, punch, and print functions may be utilized. This feature allows operations such as verification of previously punched cards, printing of information different from that punched, or duplication of existing cards.

Primary and secondary input hoppers are provided with capacities of 600 and 400 cards respectively. Under program control, cards may be selected from either input hopper and directed to either 400-card output stacker following reading, punching, or printing. This feature eliminates the need for interfiling of blank cards in decks to be duplicated, provides for automatic separation of original and duplicate cards, and allows for sort/merge operations under control of user's programs. Input and output punched code format is Hollerith.

The printer employs a modified ASCII 64-character set as standard. A 64-character Swedish/Finnish character set can be ordered as a special option.

Off-line features (optional configuration 002)

- Off-line data recorder capability
- Expanded operator control panel
- Moveable, light-touch keyboard
- Memory buffering of keyed data



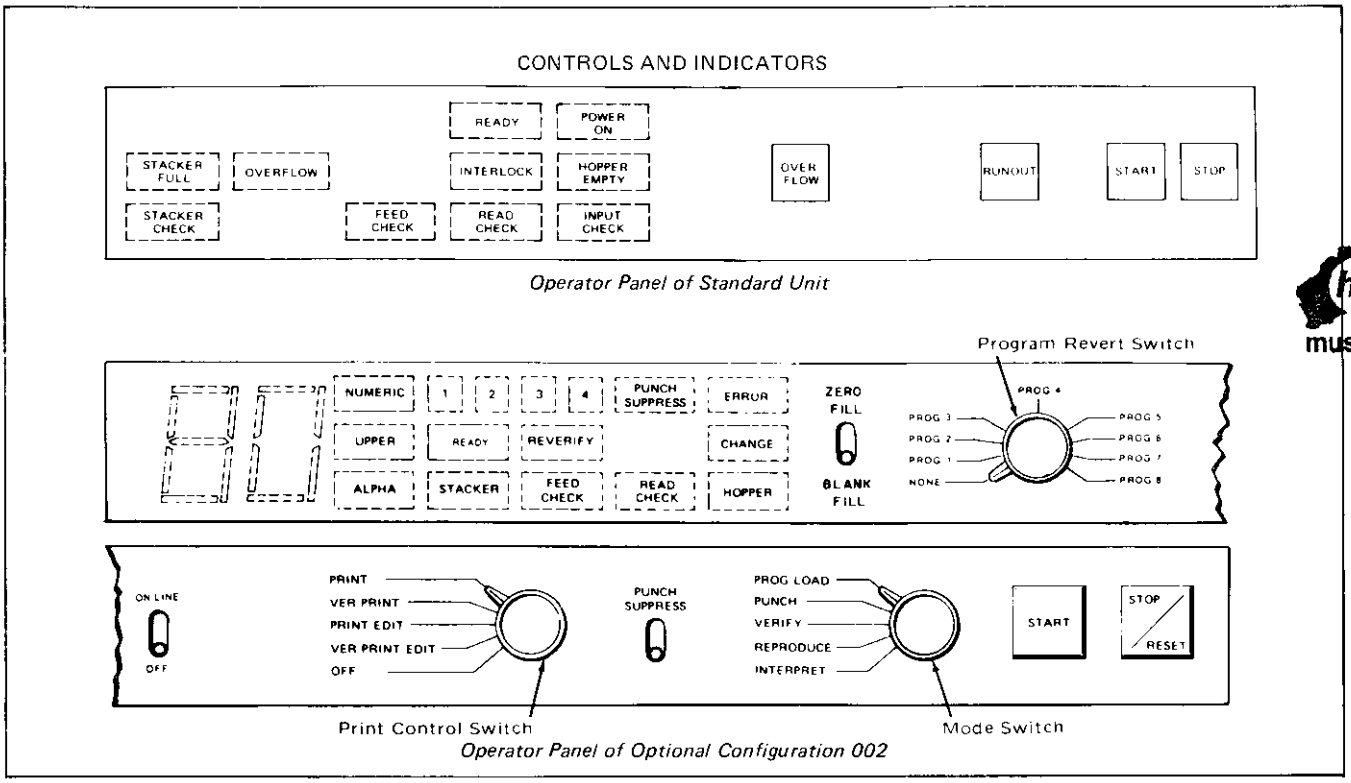
- Card format program storage
- Automatic card remake cycle during verification

Selection of Optional Configuration 002, provides the user with the following powerful off-line capabilities:

- Complete off-line preparation and on-line input/output operations in a single unit, increasing the cost effectiveness of the subsystem.
- A comprehensive control panel allows the operator to select ON-LINE (computer controlled) operation or OFF-LINE (operator controlled) functions. OFF-LINE functions include card format program preparation, program loading, punching, verifying, reproducing, or printing. Included are illuminated indicators for machine status, error and column number.
- Keyed data is stored in an 80-character buffer memory prior to punching or printing. Backspace and Erase keys may be used to edit this data by character, field, or record.

Control programs may be prepared by the operator. These programs define the format for various card operations by designating field boundaries, data type for each field (alpha or numeric) and columns to be skipped. Memory is provided in the unit for storage of up to 4 programs, each of which is keyboard selectable. Reversion to a designated program is automatic following temporary selection of any other program.

When an error has been corrected during verification, the errored card is automatically placed in the unused stacker and a blank card fed and punched with the corrected data.



Operator Panel of Standard Unit

Operator Panel of Optional Configuration 002

Specifications

Code compatibility

Hollerith (ANSI X3.26-1970)

Character set (printer)

Uppercase modified ASCII standard

Uppercase Swedish/Finnish available as special order

Site preparation data

	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	3.7A	1.85A
CONNECTION CODE	A	A
HEAT OUTPUT (per hour)	1450 btu	365 kcal
WEIGHT	250 lb	113 kg
SIGNAL CABLE LENGTH	50 ft	15.2 m

Performance

Card Type: 80 column

Reading Rate: 200 cards per minute

Punching and/or Printing Rate: 45-75 cards per minute depending on number of columns

Input Hopper Capacity, Primary: 600 cards

Secondary: 400 cards

Output Stacker Capacities, both: 400 cards

Physical characteristics

Height: 40 inches (102 cm)

Width: 42 inches (107 cm)

Depth: 27 inches (69 cm)

Approximate Shipping Weight: 350 lb (158.9 kg)

System requirements

The 30119A will operate with any HP 3000 computer system.

Installation

The 30119A subsystem is installed by a factor-authorized Customer Engineer. Installation is included in the list price.

Ordering information

30119A Card Reader Punch Subsystem.

Includes HP 2894A Card Reader Punch; 30219A universal interface package, consisting of interface card and cable; device diagnostic software.

30119A-002: Adds off-line panel and keyboard

(Note: All 30119A subsystems must be ordered with option -002).

30119A-015: 220V, 50 Hz operation.

Operating supplies provided

9320-1430: Box of 2000 80-column cards, 2 boxes supplied

9260-0373: Ink Cartridge, 2 supplied

1535-3089 Card Removal Tool (supplied with HP 2894A)

HEWLETT hp PACKARD

Optical Mark Reader

model 7260A

The 7260A Optical Mark Reader offers mark sense document reading capability for terminals of an HP 3000 computer system.

Features

- **Single document can be used as source document and for data entry.**
- **Reads marks made by ordinary soft lead pencil.**
- **Reads standard punched cards.**
- **ASCII and Column Image reading formats.**
- **Switchable off line operation with terminals.**
- **Select hopper available.**
- **Data retransmission capability.**
- **FORTRAN, BASIC, COBOL, SPL callable.**
- **Mixed marked/punched cards.**

The 7260A Optical Mark Reader saves data preparation time and prevents errors by using one functional card for both source document and data entry. The data may be marked with an ordinary soft lead pencil, eliminating the need for special marking pencils or keypunch operations. An added advantage is easy correction of errors —mistakes are simply erased.

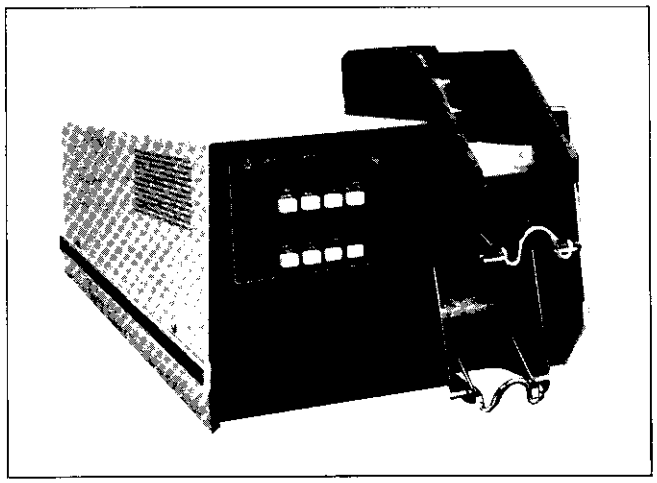
Each form may contain pencil marks and any combination of prepunched holes and/or preprinted marks.

Customized forms

Any number of columns from one to 96 may be read. Many variations in layout and color may be used to produce a form. Different colors may be used to visually identify different forms or sections on a form. Clock marks allow vertical columns to be positioned where desired on the form. An optional Select Hopper (Option 002) is available which allows selected cards to be fed into a separate hopper under program control.

Data entry right at the source

Applications are unlimited because the Optical Mark Reader needs only the most common of data entry devices — pencil and paper. A doctor can record his patient's test results right at bedside on a single form, then use it for both his record and computer input.



Custom forms can be designed for the foreman to do labor reporting, the Q.A. inspector for his tests, the teacher for grading exam papers, or for the finance department's payroll needs. Other applications include inventory control, production control, and warehousing. Computer-printed cards provide excellent turnaround documents that can be pencil-marked before return.

A terminal oriented document reader

The 7260A Optical Mark Reader is a serial ASCII device. The unit is designed for remote applications via full duplex modems or hard wired connection to the HP 3000. The HP 3000 has full control over the 7260A. By adding a 7260A to a terminal on the same port of the HP 3000, a user is able to supply input from a medium other than the keyboard, saving on line computer time. The terminal can be muted when the reader is transmitting data to the HP 3000.

Multiple data rates

Forms can be read at a rate up to 300 cards per minute. Card feed rate depends on the amount of data to be read on each card and the data transmission rate. Rates of 110, 150, 300, 1200, and 2400 baud can be selected. By proper use of end of record marks, only data marks on cards will be read, trailing spaces will be ignored, thus optimizing data transmission.

ASCII or IMAGE reading modes

In the ASCII mode, the card form marks (or punched holes) are interpreted as standard 128 character Hollerith code and the data is transmitted in 7-level ASCII code with even parity. In Image mode, the Optical Reader transmits a two character representation of each column of data. This permits all 4096 possible combinations of marks to be read. Switching between ASCII or Image mode can be done under program control.

Operating mode

The HP 3000 supports demand mode operation of the HP 7260A in conjunction with the following terminals: HP 2640A, HP 2640B, HP 2644A, HP 2762A, and HP 2762B.

The maximum number of 7260A Optical Mark Readers that can transmit data to the computer simultaneously is one of the listings in the table below.

1 unit operating at 2400 baud
1 unit operating at 1200 baud and 2 units at 300 baud
1 unit operating at 1200 baud and 4 units at 150 baud
5 units operating at 300 baud
8 units operating at 150 baud

Because the 7260A is used in conjunction with a terminal (in session mode) it cannot be used as a job accepting device.

System requirements

The 7260A will operate with any HP 3000 computer system.

Site preparation data

	USA (60 Hz)	FOREIGN (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	1-2A	0.6A
CONNECTION CODE	A	A
HEAT OUTPUT (per hour)	460 btu	116 kcal
WEIGHT	54 lb	24.5 kg
SIGNAL CABLE LENGTH *	7.5 ft	2.3 m

** The 7260A is usually connected to an adjacent terminal. Extender cables are available.*

Specifications

Forms:	Standard tab card size 8.26 x 18.73 cm to 8.26 x 28.26 cm. Refer to the "Hewlett-Packard OMR Tab Card Specifications" (5952-5546).
Hopper Capacity:	450-card input; 450-card output.
UL Approval:	The unit has U.L. approval, CSA approval pending, and meets IEC specifications.
Controls:	Line Switch, Ready, Stop, Terminal Mute, Single Pick, Continuous Pick (not used with the HP 3000), Line/Local, and Full/Half
Indicators:	Ready, Pick Fail
Interface:	The unit uses Electronic Industries (EIA) RS232C Specification.

HP 3000 Programmable Commands	Returned status in event of malfunction
Demand - Single Pick	Ready
Retransmit	Pick Fail
Select (Opt. 002)	Hoppers Bad
Stop	Select Fail (Opt. 002)
Bell (Opt. 004)	Select Successful (Opt. 002)
Image ON	Not Ready
Image OFF	

Ordering information

HP 7260A Optical Mark Reader. Includes 7260A optical mark reader, 115V/60 Hz, operating manual, card weight, and dust cover.

HP 7260A-002 Selector Hopper. Adds second hopper.

HP 7260A-003 Encoder. Adds capability to read cards without clock marks.

HP 7260A-004 Bell. Adds audible event indicator.

HP 7260A-005. Changes power to 220/240 Vac.

HP 7260A-006. Changes power to 50 Hz.

HP 7260A-300. Adds operating documentation for HP 3000.

Software supplied with HP 3000 Series II only:

7260A Input/Output Procedure	:FCARD
7260A Application Package and Verifier	:HP 7260A

HEWLETT hp PACKARD

Line Printer

model 2607A

Features

- **Prints 132 columns at 200 lines per minute with 64-character set**
- **Prints 132 columns at 165 lines per minute with 128-character set**
- **Clear dot pattern characters on one original and five carbon copies**
- **64-character ASCII set, standard**
- **128-character set, optional**
- **High-reliability comb printing mechanism**
- **Eight-channel vertical format unit**
- **Convenient paper loading**
- **Completely integrated with HP 3000 computer systems**

The standard device is a 64-character dot matrix printer, producing an original and five clearly legible carbon copies. A unique comb printing mechanism with few moving parts produces a full 132-column line at a rate of 200 lines-per-minute. The printing rate is constant regardless of line length.

An optional 128-character set includes lowercase letters and 32 control codes. The full character set is completely transparent, printing a unique symbol for each ASCII code. The lowercase characters provide full text processing capabilities, thus making possible the generation of reports and specifications. The 32 control characters are printed with standard ANSI symbols, providing an excellent capability for analyzing terminal and data communication programs.

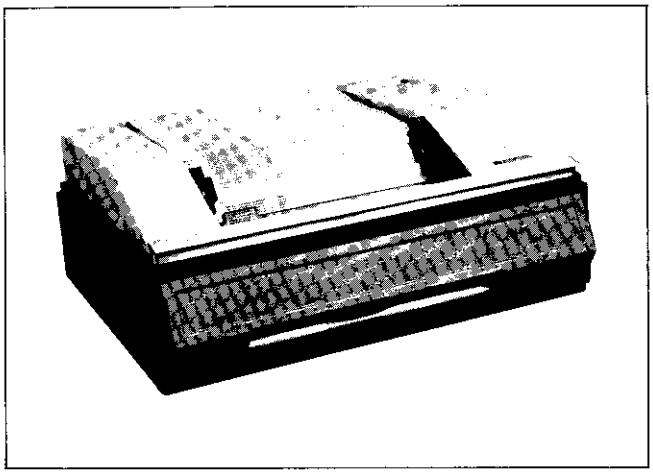
Also featured is an eight-level vertical format unit. The user may employ a standard format control tape supplied, or produce special format control tapes through the use of a tape format kit and the printer's built-in punch. The control tape is read by an eight-channel optical reader. The vertical format unit increases printing throughput of invoices, statements, reports and other forms.

Specifications

(Assumes 20% duty cycle)

Printing speed

200 lines per minute (64 character set with a special symbol for control characters)
165 lines per minute (128 character set when printing lines containing lower case characters or control codes)



Characters per line

132

Character style

5 x 7 dot pattern
5 x 9 for lowercase and control codes

Character size

5 x 7: 0.062 inches x 0.097 inches (1.6 mm x 2.5 mm)
5 x 9: 0.062 inches x 0.125 inches (1.6 mm x 3.2 mm)

Character pitch

Vertical: 6 or 8 lines per inch
Horizontal: 10 characters per inch, no overprint

Vertical format unit

8-channel optical tape reader
Integral punch and die for tape preparation

Forms specifications

Type: Continuous, fanfold, sprocket feed
Width: 4 to 14-7/8 inches (10 to 37.7 cm), including sprocket margins

Single Part: 15 to 25-pound paper stock
Multiple Part: 11.5-pound 1st part, 11.5-pound for each of 5 copies

Maximum Pack Thickness: 0.024 inches (0.61 mm)
Form Length:
Standard format tape, 6 lines per inch: 11 inches (27.9 cm)
Custom format tape, 6 lines per inch: to 15-5/6 inches (40.2 cm) in 1/6 inch (4.2 mm) increments
Custom format tape, 8 lines per inch: to 15-1/2 inches (39.4 cm) in 1/2 inch (12.7 mm) increments

Character sets

Standard: 64 characters (conforms to ASCII). Lower case characters are printed in uppercase.

@ – at, each	(– left parenthesis
A-Z – alphabet	) – right parenthesis
[– left bracket	* – asterisk
\ – left slash	+ – plus sign
] – right bracket	' – apostrophe
△ – caret	- – minus sign
_ – lowest row of dots	. – period
– one space	/ – right slash
! – exclamation mark	0-9 – decimal digits
" – double quote	: – colon
# – number	; – semicolon
$ – dollar sign	< – less than
% – percentage	= – equal sign
& – ampersand	> – greater than
, – comma	? – question mark

Plus: (| |) – a unique symbol whenever a control code is represented.

Optional

Full 128 characters (ASCII)
All the above characters plus:
a-z – alphabet (lowercase)
| – vertical line
~ – tilde
{ – opening left brace
} – closing right brace
32 control codes (different ANSI symbols represent each control code, such as line feed, carriage return, bell, etc.,)

Paper advance

3.2 inches/second (8 cm/second)

Controls and indicators

ON – applies operating power
PRINT – places printer on-line
FORM FEED – advances paper to top of form
LINE FEED – advances paper one line
8LPI – selects either 6 or 8 line-per-inch spacing. A matching VFU tape will synchronize the forms to the VFU.
PAPER OUT DETECTION – sounds audio alarm. Form is automatically completed before printer is halted.

Site preparation data

	USA (60 Hz)	FOREIGN (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	7A	3.5A
CONNECTION CODE	A	A
HEAT OUTPUT (per hour)	2500 btu	630 kcal
WEIGHT	260 lb	118 kg
SIGNAL CABLE LENGTH *	50 ft	15.2 m

**Up to 500 ft (152 m) can be special ordered.*

Physical characteristics

Cabinet Dimensions (including stand)
Height: 40 inches (102 cm)
Width: 28 inches (71 cm)
Depth: 23 inches (58 cm)
Mounting: Printer may be removed from stand for table-top use.

Throughput data

Duty cycle: 20%
Print cycle: 40%
(333 pages per hour for heavy print period, 533 pages average throughput/day). Refer to "A Guide to Hewlett-Packard Printers" for detailed performance data.

System requirements

The 2607A will operate with any HP 3000 computer system. Must also specify 30209A interface.

Installation

Any 2607A with option 300 includes installation by a factory authorized Customer Engineer.

Ordering information

HP 2607A Line Printer. Includes 200 lpm line printer, 132 columns, 64 character set, 115V/60Hz; stand and form shelf; 7.5 ft (2.3m) power cable; operating supplies including ribbon, standard form tape, and vertical form tape kit; operator's manual.
HP 2607-001. Replaces 64 character set with 128 character set.
HP 2607-015. Changes power to 230V/50 Hz.
HP 2607-300. HP 3000 Interface signal cable and service manual.
30209A Line Printer Controller.

Ordering example

To add a 200 lpm line printer with standard capabilities to an HP 3000, the following products should be ordered:
HP 30209A Line Printer Controller
HP 2607A Line Printer
HP 2618A-300 HP 3000 Interface cable and service manual.

Note: Consult the Series I or pre-Series II Configuration diagram if ordering for an HP 3000 Series I, HP 3000CX, or original HP 3000.

Operating supplies available

- [1] Vertical Format Unit Tape Kit. Permits user to punch format tape, 8LPI, 88 line page. Includes 25 self-adhesive splices, laminated tape – 20 ft. (6.1 m), alignment fixture. HP Part No. 1150-0897
- [1] Pre-punched HP Standard Format Tape (66-line page, 6 lpi). HP Part No. 1535-2655
- [1] Ribbon, black ink. HP Part No. 0282-0531
- Paper, fanfold, 15 lb. bond, green bar. HP Part No. 9320-1659

[1] Supplied with initial order

HEWLETT hp PACKARD

Line Printer

model 2613A

Features

- **Prints 136 columns of 64 characters at 300 lines per minute**
- **Prints 136 columns at 240 lines per minute with 96 character set**
- **12-channel vertical forms control**
- **Clear, crisp printout**
- **Multiple copies – prints up to 6-part forms**
- **64-character or 96-character ASCII available**
- **6 or 8 lines per inch – operator selectable**

The HP 2613A Line Printer represents an optimized combination of high print quality, moderate speed, and low price in a drum printer. This unit is ideally suited to applications requiring a medium speed printer.

The unit attains a print rate of 300 lines per minute when printing a full 64-character set in a 136-column format. Print rate is 240 lines per minute for 96-character set configurations.

A 12-channel Vertical Format Unit allows convenient and efficient printing in predetermined formats such as business forms. The VFU uses industry standard control tapes. Under program control the VFU may be commanded to slew to the next hole in a given channel of the tape or to slew an absolute number of lines from 0 to 15.

A switch allows the operator to choose 6 or 8 lines per inch (60 or 80 lines/page respectively). A matching VFU tape will synchronize the forms to the VFU.

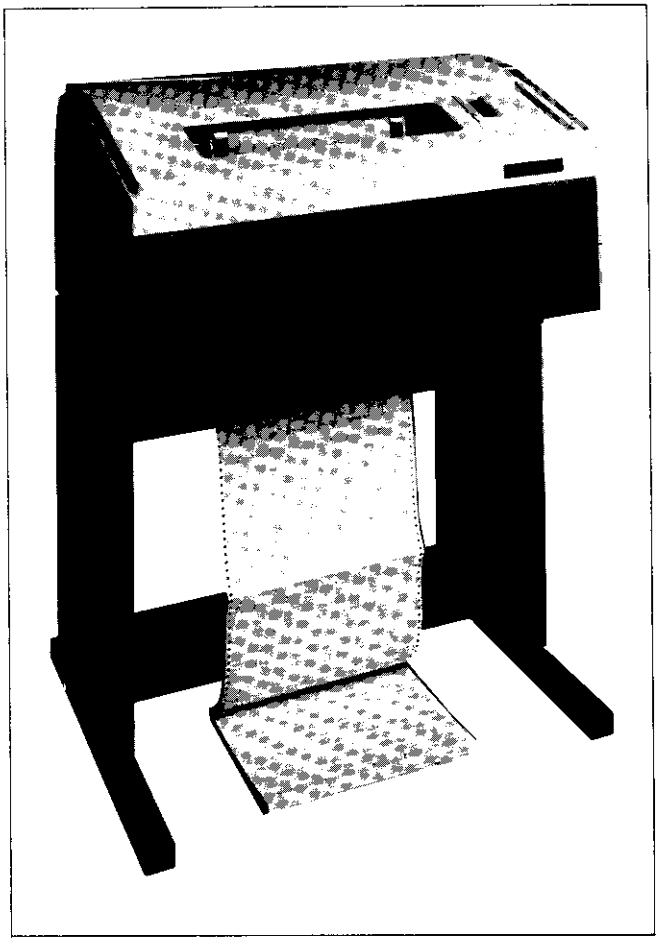
An ASCII 64-character set is standard with 96-character ASCII optional.

Six part forms are easily handled by the HP 2613A. Forms alignment is simplified by horizontal and vertical paper alignment guides. Fine vertical paper alignment adjustments can be made while printing. A paper receptacle is provided.

Differential line drivers allow the printer to be located up to 500 feet from the computer for flexibility of installation design.

Paper and ribbon loading are facilitated by a swing hinge which allows the drum-gate to be opened 90 degrees.

All EDP category safety requirements are met for equipment listing by Underwriters Laboratories.



Specifications

(Assumes 20% duty cycle)

Paper feed

One set of pin tractors above drum, friction paper tensioner below drum

Line Advance: 50 milliseconds
Slew Rate: 20 inches (50.8 cm) per second

Paper dimensions

Standard fanfold, edge punched paper 4 inches (10.2 cm) to 16 inches (40.6 cm) wide

Paper type

Single copy, 15 lb. bond minimum weight
Multi-copy up to 6 parts, 12 lb. bond with single shot carbon

Vertical format unit

Number of Channels: 12
Addressing: Slew to next hole in channel "n" or slew 0 to 15 lines

Character drum

Characters per Line: 136
Character Type: Open Gothic
Symbol Size (Typical): 0.095 inch (2.4 mm) high
0.064 inch (1.65 mm) wide
Character Code: ASCII
Standard 64 Character Set:

@ - at, each	# - number	- - minus sign
A-Z - alphabet	$ - dollar sign	. - period
[- left bracket	% - percentage	/ - right slash
\ - left slash	& - ampersand	0-9 - decimal digits
] - right bracket	, - comma	: - colon
^ - caret	(- left parenthesis	; - semi-colon
_ - underscore	) - right parentheses	< - less than
(BLANK) - one space	* - asterisk	= - equal sign
! - exclamation mark	+ - plus sign	> - greater than
" - double quote	' - apostrophe	? - question mark

Optional 96 Character Set Adds the Following:

` - grave accent	| - vertical line
a-z - alphabet	~ - tilde
{ - left brace	- space (delete)
} - right brace	

Physical characteristics

Height: 45 inches (114.5 cm)
Width: 33 inches (83.8 cm)
Depth: 22 inches (55.9 cm)
Weight
Net: 340 lb. (154.2 kg)
Shipping: 365 lb. (165.6 kg)

Printing speeds

Char. Set	Drum Speed	136 Char. Line Per Minute
64	1200	300
96	800	240

Site preparation data

	USA (60 Hz)	FOREIGN (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	10A**	5A***
CONNECTION CODE	A	A
HEAT OUTPUT (per hour)	1800 btu	454 kcal
WEIGHT	340 lb	155 kg
SIGNAL CABLE LENGTH *	50 ft	15.2 m

**Up to 500 ft (152 m) can be special ordered.*
***22A surge*
****11A surge*

Throughput data

Duty cycle: 20%
Print cycle: 40% (per page)
(425 pages/hour for heavy print periods. 681 pages/8 hour day). Refer to "A Guide to Hewlett-Packard Printers" for detailed performance data.

System requirements

The 2613A will operate with any HP 3000 computer system. Must also specify 30209A interface.

Installation

Any 2613A with option 300 includes installation by a factory authorized Customer Engineer.

Ordering information

HP 2613A Line Printer. Includes 300 lpm line printer, 64 character set, 136 columns, 115V/60 Hz; VFU tapes (6 and 8 lines/inch); printer ribbon; operator's manuals.

HP 2613A-001. Replaces 64 character set with 96 character set. Print speed 240 lpm, 136 columns, 115V/60 Hz.

HP 2613A-002 adds 64 character set using OCR-B font. "Slug" character in place of backslash for use with optical mark reader.

HP 2613A-003 adds 96 character set in OCR-B as above.

HP 2613A-015. Changes power to 230V/60 Hz.

HP 2613A-016. Changes power to 230V/50 Hz and enhances drum to 96 characters. Print speed 240 lpm, 136 columns.

HP 2613A-300 HP 3000 Interface signal cable and service manual.

HP 30209A Line Printer Controller.

Ordering example

To add a 300 lpm line printer with standard capabilities to the HP 3000, the following products should be ordered:
HP 30209A Line Printer Controller
HP 2613A Line Printer
HP 2613A-300 HP 3000 Interface signal cable and service manual.

Note: Consult the Series I or pre-Series II Configuration diagram if ordering for an HP 3000 Series I, HP 3000CX, or original HP 3000.

Operating supplies available

9282-0545 Printer Ribbon
9320-1659 Paper stock, single part 14.87 x 11 inches (37.8 x 27.9 cm) green bar, 3000 pages per box.

Contact your HP Sales Office for other available stock. Sufficient paper is supplied with the printer for installation testing. User should order operating quantities in advance of installation.

HEWLETT hp PACKARD

Medium Speed Line Printer

model 2617A

Features

- **Prints 136 columns of 64 characters at 600 lines per minute**
- **Prints 136 columns of 96 characters at 436 lines per minute**
- **12 channel Vertical Forms Control**
- **Clear, crisp printout**
- **Single through 6 part forms**
- **64 or 96-character ASCII drums**
- **6 or 8 lines per inch — operator selectable**

The HP 2617A represents an optimized combination of high print quality, speed and low price in a drum printer subsystem. This unit is ideally suited for applications requiring a medium speed printer in an HP 3000 computer system.

The HP 2617A attains a print rate of 600 lines per minute when printing a full 64 character set in a 136 column format. Print rate is 436 lines per minute for 96 character set configurations.

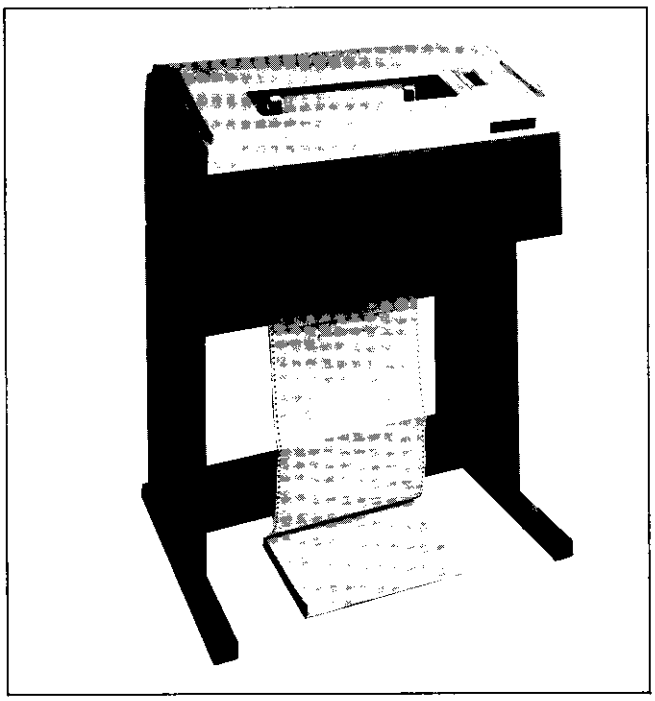
A 12 channel Vertical Format Unit allows convenient and efficient printing in pre-determined formats such as business forms. The VFU uses commonly available control tapes. Under program control the VFU may be commanded to slew to the next hole in a given channel of the tape or to slew an absolute number of lines from 0 to 15. Two VFU channels can be monitored by the computer from user-written SPL procedures. This feature may be used to further simplify forms control programming.

A switch allows the operator to choose 6 or 8 lines per inch. An appropriate VFU tape should be mounted on the printer.

Six part forms are easily handled by the HP 2617A. Forms alignment is simplified by horizontal and vertical paper alignment guides. Fine vertical paper alignment adjustments can be made while printing. A paper receptacle is provided on the rear of the printer.

Operation at high paper rates and low humidity is aided by inclusion of an electronic static eliminator.

An ASCII 64 character set is standard with 96 character ASCII optional. Special character sets including non



English language and OCR fonts are available as specials. Consult your local HP Sales Representative for information. This printer meets all safety requirements for listing by Underwriters Laboratories in the EDP equipment category.

Specifications

(Assumes 40% duty cycle)

Paper feed

One set of pin tractors above drum, friction paper tensioner below drum.
Line Advance: 25 milliseconds
Slew Rate: 25 inches (63.5 cm) per second

Paper dimensions

Standard fanfold, edge punched paper
4 inches (10.2 cm) to 16 inches (40.6 cm) wide

Paper type

Single copy, 15 lb. bond minimum weight
Multi-copy up to 6 parts, 12 lb. bond with single shot carbon

Vertical format unit

Number of channels: 12
Addressing: Slew to next hole in channel n or slew 0 to 15 lines
Status Channels: 9 and 12 may be read back by user programs to determine form position

Character drum

Characters per line: 136
Symbol Size (Typical): 0.095 inch (2.4 mm) high
0.065 inch (1.65 mm) wide
Character Code: ASCII
Standard 64 Character Set:

@ - at, each	# - number	- - minus sign
A-Z - alphabet	$ - dollar sign	. - period
[- left bracket	% - percentage	/ - right slash
\ - left slash	& - ampersand	0-9 - decimal digits
] - right bracket	, - comma	: - colon
^ - caret	(- left parenthesis	; - semi-colon
_ - underscore	) - right parentheses	< - less than
(BLANK) - one space	* - asterisk	= - equal sign
! - exclamation mark	+ - plus sign	> - greater than
" - double quote	' - apostrophe	? - question mark

Optional 96 Character Set Adds the Following:

` - grave accent	| - vertical line
a-z - alphabet	~ - tilde
{ - left brace	- space (delete)
} - right brace	

Note: Underscore replaced by baseline in 96 character set.

Dimensions

Width: 33 inches (83.8 cm)
Depth: 26 inches (66 cm)
Height: 45 inches (114.5 cm)
Shipping Weight: 415 pounds (188.2 kg)

Printing speeds

Char. Set	Drum Speed	136 Char. Line Per Minute
64	800	600
96	533	436

Throughput data

Duty cycle: 40%
Print cycle: 40% per page
850 pages/hour for heavy print periods; 2747 pages average throughput/8 hour day. Refer to "A Guide to Hewlett-Packard Printers" for detailed performance data.

System requirements

The 2617A will operate with any HP 3000 computer system. Must also specify 30209A interface.

Installation

Any 2617A printer with option 300 includes installation by a factory authorized Customer Engineer.

Ordering information

HP 2617A Line Printer. Includes 600 lpm line printer, 64 character set, 136 columns, 115V/60 Hz; 12 ft (3.66m) power cable; VFU tapes (6 and 8 lines/inch); printer ribbon; operator's manual.

HP 2617A-001. Replaces 64 character set with 96 character set. Printing speed 436 lpm, 136 columns, 115V/60 Hz.

HP 2617A-002 adds 64 character set using OCR-B font. "Slug" character in place of backslash for use with optical mark reader.

HP 2617A-003 adds 96 character set in OCR-B as above.

HP 2617A-015. Changes power to 230V/50 Hz.

HP 2617A-016. Changes power to 230V/50 Hz and enhances drum to 96 characters. Print speed 436 lpm. 136 columns.

HP 2617A-300 HP 3000 Interface signal cable and service manual.

HP 30209A Line Printer Controller.

Ordering example

To add a 600 lpm line printer with standard capabilities to the HP 3000, the following products should be ordered:
HP 30209A Line Printer Controller
HP 2617A Line Printer
HP 2617A-300 HP 3000 Interface signal cable and service manual.

Note: Consult the Series I or pre-Series II Configuration diagram if ordering for an HP 3000 Series I, HP 3000CX, or original HP 3000.

Operating supplies available

9282-0545 Printer Ribbon
9320-1659 Paper stock, single part 14.87 x 11 inches (37.8 x 27.9 cm) green bar, 3000 pages per box.

Contact your HP Sales Office for other available stock. Sufficient paper is supplied with the printer for installation testing. User should order operating quantities in advance of installation.

Site preparation data

	USA (60 Hz)	FOREIGN (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	10A	5A
CONNECTION CODE	A	A
HEAT OUTPUT (per hour)	2335 btu	589 kcal
WEIGHT	370 lb	168 kg
SIGNAL CABLE LENGTH *	50 ft	15.2 m

**Up to 500 ft (152 m) can be special ordered.*

HEWLETT hp PACKARD

High Speed Line Printer

model 2618A

Features

- **Prints 132 columns at rates up to 1800 lines per minute with 64-character set**
- **Prints 132 columns at rates up to 925 lines per minute with 96-character set.**
- **Dual speed drum for high quality printout**
- **12-channel vertical forms control**
- **Simplified control panel and front paper loading for operator convenience**
- **6 or 8 lines per inch — operator selectable**
- **Both 64-character and 96-character ASCII available**
- **Multiple copies — prints up to 6-part forms**
- **Electronic static eliminator for improved forms stacking**

The HP 2618A provides high speed, high quality printed output, and quiet operation for HP 3000 systems. This printer is ideally suited for applications requiring high printing speed.

With a 64-character set, this unit prints at 1250 lines per minute. When printing a subset of 36 consecutive characters, 1800 lines per minute is achieved. Printing rate is independent of line length.

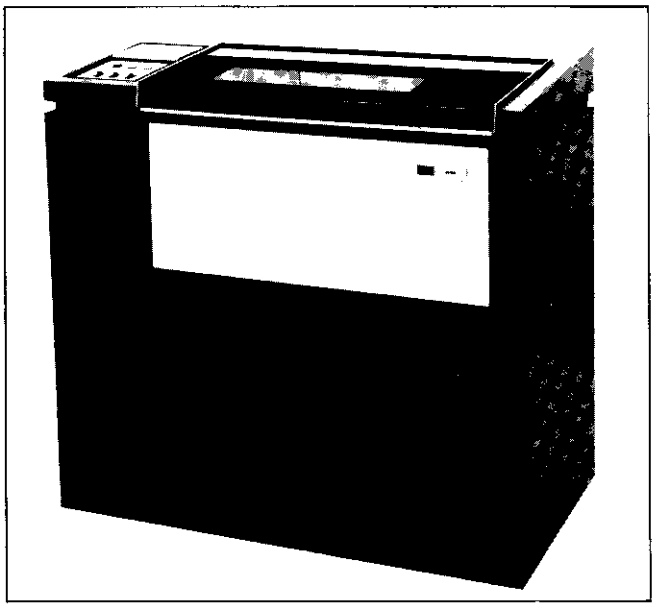
Two operator selectable drum speeds are incorporated. The higher rpm provides maximum printing speeds while the lower rpm provides enhanced print quality. Data is stored in a full line buffer prior to printing.

A 12-channel Vertical Format Unit uses industry standard control tapes. Under program control, the VFU may be commanded to slew to the next hole in a given channel of the tape or to slew an absolute number of lines from 1 to 15.

A single adjustment allows the operator to choose 6 or 8 lines per inch. A matching VFU tape will synchronize the forms to the VFU.

An ASCII 64-character set is standard and an ASCII 96-character set is optional.

Six-part forms are easily handled by the printer. Forms alignment is simplified by horizontal and vertical paper alignment guides. Fine vertical paper alignment adjustments can be made while printing.



Printer controls have been minimized and are easy to read. A swing hinge allows the drum-gate to be opened 90 degrees to facilitate both paper and ribbon loading.

An electronic static eliminator is provided to counteract charge build-up on forms.

Specifications

(Assumes 40% duty cycle)

Paper feed

Two sets of pin tractors
Line Advance: 14 milliseconds (maximum)
Slew Speed: 35 inches (89 cm) per second

Paper dimensions

Standard fanfold, edge punched paper 4 to 19 inches wide. (10.2 cm to 48.3 cm).

Paper type

Single copy, 18 lb. bond minimum weight.
Multi-copy up to 6 parts, 12 lb. bond with single-shot carbon.

Vertical format unit

Number of Channels: 12
Addressing: Slew to next hole in channel "n" or slew 0 to 15 lines

Character drum

Characters per Line: 132
Character Type: Open Gothic
Symbol Size (Typical): 0.095 inch (2.4 mm) high
0.065 inch (1.65 mm) wide
Character Code: ASCII
Standard 64 Character Set:

@ - at, each	# - number	- - minus sign
A-Z - alphabet	$ - dollar sign	. - period
[- left bracket	% - percentage	/ - right slash
\ - left slash	& - ampersand	0-9 - decimal digits
] - right bracket	, - comma	: - colon
^ - caret	(- left parenthesis	; - semi-colon
_ - underscore	) - right parentheses	< - less than
(BLANK) - one space	* - asterisk	= - equal sign
! - exclamation mark	+ - plus sign	> - greater than
" - double quote	' - apostrophe	? - question mark

Optional 96 Character Set Adds the Following:

` - grave accent	| - vertical line
a-z - alphabet	~ - tilde
{ - left brace	- space (delete)
} - right brace	

Physical characteristics

Height: 46 inches (116.8 cm)
Width: 48.5 inches (123.2 cm)
Depth: 36.5 inches (92.7 cm)
Weight: Net: 800 lb. (362.9 kg)
Shipping: 900 lb. (409 kg)

Printing speeds

Characters On Drum	Drum Speed Switch Position	#Consecutive Characters Printed	Printer Speed Lines/Minute 132 Columns
64	1800	1-36/37-64	1800/1250
64	1200	1-46/47-64	1200/925
96	1200	1-67/68-96	1200/925
96	800	1-76/77-96	800/675

Site preparation data

	USA (60 Hz)	FOREIGN (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	17A**	8.5A***
CONNECTION CODE	D	D
HEAT OUTPUT (per hour)	6600 btu	1663 kcal
WEIGHT	800 lb	363 kg
SIGNAL CABLE LENGTH *	50 ft	15.2 m

**Up to 500 ft (152 m) can be special ordered.*
***50A surge.*
****25A surge.*

Throughput data

Duty cycle: 40%
Print cycle: 40% per page
(1610 pages/hour for heavy print period. 5144 pages average throughput/day). Refer to "A Guide to Hewlett-Packard Printers" for detailed performance data.

System requirements

The 2618A will operate with any HP 3000 computer system. Must also specify 30209A interface.

Installation

Any 2618A printer ordered with option 300 includes installation by a factory authorized Customer Engineer.

Ordering information

HP 2618 Line Printer. Includes 1250 lpm line printer, 64 character set, 132 columns, 115V/60Hz; 12 ft (3.66m) printer ribbon; VFU tape (6 lines/inch, 60 lines/page); and an operator's manual.

HP 2618A-001. Replaces 64 character set with a 96 character set. Printing speed 925 lpm, 132 columns, 115V/60 Hz.

HP 2618A-002 adds 64 character set using OCR-B font. "Slug" character in place of backslash for use with optical mark reader.

HP 2618A-003 adds 96 character set in OCR-B as above.

HP 2618A-015. Changes power to 230V/50 Hz.

HP 2618A-016. Changes power to 230V/50 Hz and print drum to 96 characters. Print speed 925 lpm, 132 columns.

HP 2618A-300 HP 3000 Interface signal cable and service manual.

HP 30209A Line Printer Controller

Ordering example

To add a 1250 lpm line printer with standard capabilities to an HP 3000, the following products should be ordered:
HP 30209A Line Printer Controller
HP 2618A Line Printer
HP 2618A-300 HP 3000 Interface cable and service manual.

Note: Consult the Series I or pre-Series II Configuration diagram if ordering for an HP 3000 Series I, HP 3000CX, or original HP 3000.

Operating supplies available

9282-0543: Printer Ribbon
9320-1659: Paper Stack, single part, 14.87 x 11 inches (37.78 x 27.94 cm) green bar, 3000 pages per box.

Contact your HP Sales Office for other available stock. Sufficient paper is supplied with the printer for installation testing. User should order operating quantities in advance of installation.

HEWLETT hp PACKARD

Cartridge Disc Subsystem

model 13180B

Features

- **Software selectable dual application:**
  14.75 million byte general purpose storage
  4.43 million bytes for high speed system disc
- **Fast access moving-head disc**
- **937.5k byte/second transfer rate (peak)**
- **Free-standing**

The HP 13180B Cartridge Disc Subsystem offers a new standard in high performance moving-head discs for both system swapping and data storage.

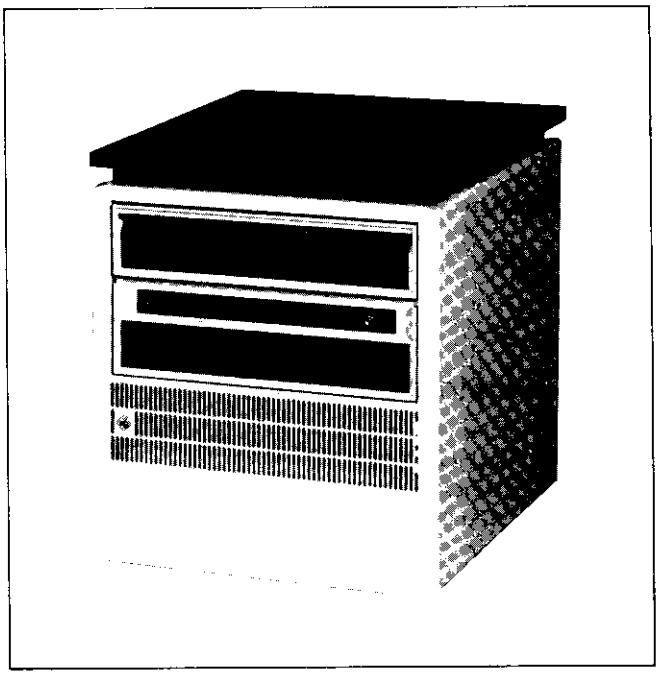
Capacity

The unit's capacity can be selected through software: 4.42 Mbytes (120 cylinders) for use as a high-speed system disc or 14.75 Mbytes (400 cylinders) for general use. As many as eight disc drives may be used with a single controller.

The unit includes a front-loading cartridge with two data surfaces and a fixed disc with one data surface and one servo surface. MFM (Modified Frequency Modulation) recording is used with 4680 bpi and a track density of 192 tpi.

Performance

A voice coil head positioner offers fast seek-times. Times, including head settling time: track-to-track is 5 ms (avg.); average random is 25 ms; maximum stroke is 45 ms. The 3600 RPM spindle speed yields an average rotational delay of 8.3 ms, which coupled with high bit density results in a peak data rate of 937.5k byte/second. The average transfer rate for a track is 737.3k byte/second.



Specifications

Capacity (software selectable)

	Data Bytes for 14.75 Mb System	Data Bytes for 4.42 Mb System
Sector	256	256
Track	12,288	12,288
Surface	4,915,200	1,474,560
Cartridge	9,830,400	2,949,120
Drive	14,745,600	4,423,680

Recording Surfaces: 3
Discs: 2

Recording (modified frequency modulation)

4680 bits/inch on inner track, 192 tracks/inch;
400 tracks/surface

Actuator

Voice coil actuator with track follower servo and velocity feedback.

Data access

Rotational Speed: 3600 RPM
Seek Time: Track-to-track 5 ms (avg)
Average Random 25 ms
Maximum Stroke 45 ms (mas.)
Average Rotational Delay: 8.3 ms
Data Transfer Rate
8-bit bytes/second: 937.5k byte/sec
Track average: 737.3k byte/sec

Power requirements

100, 120, 220, 240V, all +5%, -10%
Single phase, 47 to 66 Hz
7905A 550 watts per subsystem

Environmental conditions

Operating Temperature: +18° to +25°C (64 to 77°F)
Non-Operating: -40°C to +50°C (-40°F to +122°F)
Relative Humidity: 8% to 80% non-condensing;
wet bulb temperature 25.5°C (≤78°F)
Storage Relative Humidity: 5% to 95%, non-condensing
Altitude:
Operating: Sea Level to 10,000 ft.
Non-Operating: 1000 ft. below sea level to 50,000 ft.
Heat Dissipation: 1877 btu/hr (473 kilocalories/hr)

Physical characteristics

Height:	28.25 in. (71.8 cm)
Width:	21.78 in. (55.3 cm)
	17.38 in. (44.14 cm) behind panel
Depth:	31.25 in. (79.1 cm)
	26.81 in. (68.10 cm) behind panel
Weight:	265 lbs. (120.2 kg)

Each drive is separately mounted in its own cabinet

System requirements

The 13180B disc subsystem will operate with any HP 3000 computer system.

Installation

The subsystem is installed by a factory-authorized Customer Engineer. Installation is included in the list price.

Ordering information

HP 13180B Cartridge Disc Subsystem. Includes 14.75 megabyte HP 7905 Cartridge Disc Drive, 25 ft. (7.6 m) data cable, 8 ft (2.44 m) multi-unit cable, 10 ft (3 m) AC power cable, disc cartridge, and cabinet.

HP 13180B-001 Cartridge Disc Subsystem.* Includes 14.75 megabyte HP 7905 Cartridge Disc Drive, 10 ft (3 m) AC power cable, 25 ft (7.6 m) data cable, 18 ft (5.5 m) controller interface cable, disc cartridge, and cabinet.

**To be ordered with first drive in a low profile cabinet. This option should be used even if existing system already has one or more HP 7905 drives rack-mounted in system bays.*

HP 30229A Cartridge Disc Controller.

HP 30030B Selector Channel. Includes port controller and selector channel logic. For HP 3000 Series II systems.

HP 30030A Selector Channel. Includes port controller and selector channel logic for HP 3000 Series I and pre-Series II models.

Ordering example

To add cartridge disc capability to an HP 3000 Series I or Series II, the following product should be ordered:

HP 30030B Selector Channel for Series II (HP 30030A for Series I)

HP 30229A Cartridge Disc Controller

HP 13180B-001 Cartridge Disc Drive

To order an add-on cartridge disc drive for an HP 3000 Series I or Series II, the following products should be ordered:

HP 13180B Cartridge Disc Drive.

Note: Consult the Series I or pre-Series II Configuration diagram if ordering for an HP 3000 Series I, HP 3000CX, or original HP 3000.

Configuration notes

A Selector Channel is required (HP 30030B for HP 3000 Series II or HP 30030A for Series I or pre-Series II systems). One controller and selector channel may be used per system.

Up to 8 drives may be included on one interface controller.

Subsystems include necessary hardware and software for integration with any HP 3000 system and the device diagnostic software.

HEWLETT hp PACKARD

50 Megabyte Disc Drive

models 7920A
7920S

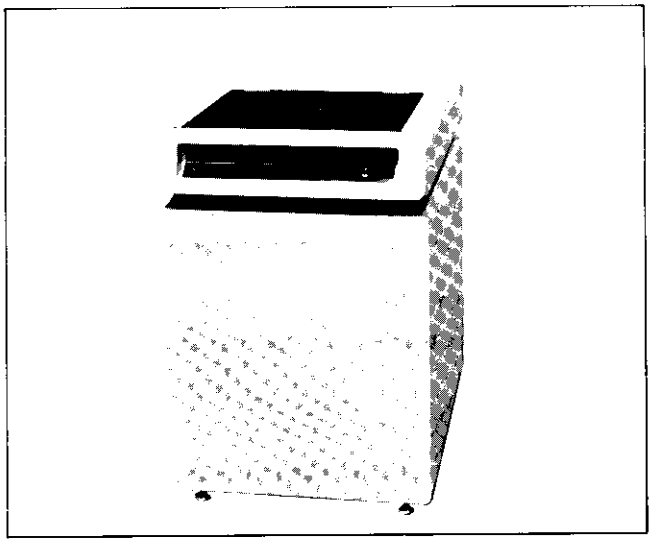
Features

- **50M bytes of formatted data**
- **Fast-access, track-following technology**
- **Advanced serviceability features**
- **Constant spindle speed, independent of line frequency**
- **Extended maintenance periods through use of prefilter**
- **Exceptionally fast stop/startup speed**
- **Microprocessor-based controller with hardware error correction for enhanced data reliability**
- **Up to eight drives can be connected to the 30229A HP 3000 system controller**

The 7920A Disc Drive is Hewlett-Packard's newest offering in a family of disc drives. The 7920A provides for exceptionally high performance fast access storage of formatted information.

The 7920A features a disc pack having three data platters and two protective platters (upper and lower). This configuration allows for the safe handling of valuable data. Of the three data platters (six surfaces) one surface is used for servo information to control the precise positioning of the actuator mechanism. The remaining five surfaces are used for data storage at 10M bytes (formatted) per surface for a total of 50M bytes. The incorporation of positioning information in the data area provides for accurate track positioning over wide temperature variations. This also provides for automatic temperature compensation.

The controller, 30229A, provides for connection of up to eight disc drives. The eight drives may be any combination of 7920A's and 7905A's. Eight 7920A Disc Drives yield a storage capacity of 400M bytes using a single controller. A voice-coil head positioner offers exceptionally fast seek times. Average track-to-track seek time is 5 ms; average random seek time is 25 ms; maximum seek time is 45 ms. The 3600 RPM spindle speed yields an average rotational delay (latency) of only 8.3 ms, and, coupled with high bit density, provides a data transfer rate of 937.5k bytes/second.



Automatic error correction and detection

The Error Correction Code (ECC) hardware increases data reliability and system availability by reducing the effects of media errors.

The ECC hardware and algorithm are together capable of correcting one single burst data error per sector, if the error is of length ≤ 32 bits. Every single-burst data error of length > 32 bits but ≤ 48 bits will be detected without being miscorrected. For burst-errors of length > 48 bits, 99.999% are detected.

If the controller detects an error within a sector, it notifies the CPU at the end of that sector. The CPU then requests the location (displacement) of the error within the sector and three words of mask which are used to correct the record now in CPU memory. The controller calculates these masks from information accumulated in special registers. The three words are merged with data in CPU main memory to obtain a corrected record.

Specifications

Dimensions

Height:	32.5 in (82.5 cm)
Width:	19.65 in. (50 cm)
Depth	32 in. (81.3 cm)
Shipping Weight:	345 lb. (157 kg.)

Seek time

Track-to-Track:	5 ms average
Average random:	25 ms
Maximum stroke:	45 ms, maximum

Capacity

815 tracks
48 sectors/track
2 bytes/word
256 bytes/sector
12,288 bytes/track
10 X 10^6 bytes/surface
50 X 10^6 bytes/drive

Rotation

Speed: 3600 rpm
Average rotational delay: 8.3 ms

Recording characteristics

Bits/inch (inside track): 4680
Tracks/inch: 384
Tracks/surface: 815 (plus a maximum of 8 spares)

Site preparation data

	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	6A	3A
CONNECTION CODE	C	E
HEAT OUTPUT (per hour)	2200 btu	554 kcal
WEIGHT	315 lb	142 kg

CABLE LENGTHS:

Up to eight disc drives may be daisy-chained to a controller. The cable length from the controller to the first drive is 18 ft. (5.5 m.). The cable length between disc drives is 8 ft. (2.4 m.).

In addition, each drive also has a cable back to the controller. The length of this cable for each drive is 50 ft. (15.2 m.).

The maximum cumulative length of daisy-chained cable is 74 ft. (22.5 m.). Longer cables may be special ordered, but this is not advised.

Data transfer rate

Bits/second: 7,500,000
k-bytes/second: 937.5

Actuator

Voice coil actuator with velocity feedback, position feedback from top surface of the middle platter.

Disc pack interchangeability

Any disc pack written on any 7920A within system operating specifications may be read on any other 7920A operating within that range.

Switches and indicators

The front operator's panel has five backlit indicators: Unit Select, Drive Ready, Read Only, Door Unlocked, and Drive Fault. There is one switch: Run/Stop.

A Format switch is provided for protection of the sector address field. A group of eight LED indicators light if the internal fault detection circuitry detects a fault condition. This advanced serviceability feature facilitates troubleshooting and reduces the time to diagnose and repair failures.

In the event of power failure, heads are retracted and carriage locked using energy from the filter capacitors, supplemented by the spindle motor acting as a generator.

Ordering information

The HP 3000 Series I and Series II Models 6 and 8 each include a single 7920A disc drive, a selector channel, and a controller for up to eight drives. To order drives 2 through 8:

7920S	Add-on 7920 disc drive. Includes drive, pack, and cables.
7920S-01	First drive (standard on models 6 and 8).
7920S-15	230V, 50 Hz
13395A	A pair of add-on 7920 disc drives. Includes two drives, two packs, and cables.
13395A-50	Extra 7920S disc drive.
13395A-15	230V, 50 Hz
13394A	Additional disc pack.

Installation

The 7920A and 7920S disc drives are installed by a factory-authorized Customer Engineer. Installation is included in the list price and includes unpacking, cabling, power up, and diagnostics. System regeneration is done by the customer or can be performed by Hewlett-Packard on a time and materials basis.

System requirements

The 7920A and 7920S will operate on any HP 3000 computer system which includes a selector channel and a 30229A controller (note that this is the same controller as used for the HP 7905A disc drives).

HEWLETT hp PACKARD

Digital Magnetic Tape Drives

7970B, 7970E

Features

- **Fast data transfer — up to 36k bytes/sec (NRZI) — up to 72k bytes/sec (phase encoded)**
- **9-track configuration**
- **800 bits/cpi (315 cm), NRZI electronics**
- **1600 bits/cpi (630 cm), phase encoded data electronics**
- **45 ips (114 cm/s) read/write, 160 ips (406 cm/s) rewind/fast forward**
- **Dynamic braking**
- **Up to 10½ inch (26.7 cm) reels**
- **IBM/ANSI compatible**

Hewlett-Packard Digital Magnetic Tape Units are high performance, reliable magnetic tape drives for use in an HP 3000 computer system. IBM compatible NRZI recording mode is used at a density of 800 cpi. High packing density and data transfer rates are achieved by using ANSI-compatible 1600 cpi phase encoded data electronics. Data written on any IBM or ANSI-compatible equipment can be read. Four tape drives can be operated from a single controller.

Reel motors provide direct drive, eliminating troublesome belts and pulleys. Tape tensioning is performed by photo-resistive controlled tension arms, eliminating the need for vacuum system components. Head assemblies consist of read stack, write stack and full width erase head. The Tape Units are recognized under the component program of Underwriters Laboratories.

Specifications

Number of tracks

Nine

Read/write speed

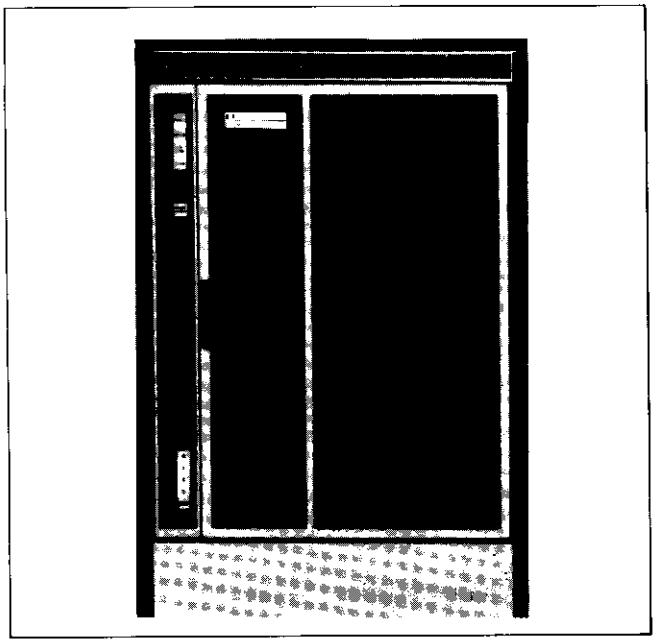
45 ips (114 cm/s)

Density

800 bits/cpi (315 cm), NRZI electronics (7070B)
1600 bits/cpi (630 cm), phase encoded electronics (7970E)

Data transfer rate

36,000 characters per second maximum, NRZI electronics (7970B)



72,000 characters per second maximum, phase encoded electronics (7970E)

Write enable

Supply reel write enable ring and switch
Ring removal precludes writing

Reel diameter

Up to 10½ inches (26.7 cm)

Tape (Computer Grade)

Width: 0.5 inches (12.7 mm)
Thickness: 1.5 mils (0.038 mm)

Rewind speed

160 ips (406 cm/s)

Start/stop times

8.33 ms (read-after-write) at 45 ips (114 cm/s)

EOT and BOT reflective strip detection

Photoelectric, IBM compatible

Operator control panel

Reset Switch: Stops tape travel in any mode and returns unit to local control

Rewind Switch: Rewinds tape at 160 ips (114 cm/s)

On-Line Switch: Places unit under remote control

Load Switch: Initiates loadpoint (BOT) search

Write Enable Indicator: Illuminated when write enable ring is installed on the supply reel

Physical characteristics

Note: The 7970B/E is racked in a standard HP 3000 cabinet. The following specifications apply to the tape drive only.

Height:	24 inches (61 cm)
Width:	19 inches (48.3 cm)
Depth:	12 inches (30.5 cm) from mounting surface
Overall Depth:	16 inches (40.7 cm)
Mounting:	Fits in HP 3000 cabinet
Shipping Weight:	190 lbs (86.2 kg)

Configuring information

800 bpi and 1600 bpi drives can be mixed on the same controller provided the first 1600 bpi drive is a master (7970E options 300, 302, 304, or 305). Drives are racked in a cabinet that must be joined to the computer system.

System requirements

The 7970B/E will operate with any HP 3000 computer system.

Installation

The 7970B/E tape drives with 300 series options are installed by a factory authorized Customer Engineer. Installation is included in the list price.

Ordering information

7970B 9 Track, 800 bpi NRZI Format:

HP 7970B Digital Magnetic Tape. Includes 7970B Digital Magnetic Tape Drive (9 track, 800 bpi, 45 ips, NRZI electronics).

HP 7970B-300. Adds 56 inch high cabinet, HP 3000 multi-unit cable, 2400 ft (731 mm) reel of tape, and documentation.

HP 7970B-302. Adds 52 inch high cabinet, HP 3000 multi-unit cable, 2400 ft (731 mm) reel of tape, and documentation.

HP 7970B-304. Adds 56 inch high cabinet, HP 3000 Controller interface cable, 2400 ft (731 mm) reel of tape, and documentation.

HP 7970B-305. Adds 52 inch high cabinet, HP 3000 Controller interface cable, 2400 ft (731 mm) reel of tape, and documentation.

7970E 9 Track, 1600 bpi Phase Encoded Format:

HP 7970E Digital Magnetic Tape. Includes HP 7970E Digital Magnetic Tape Drive (9 track, phase encoded, 1600 cpi).

HP 7970E-300. Adds 56 inch high cabinet, master multi-unit cable, 2400 ft (731 mm) reel of tape, master drive options, and documentation.

HP 7970E-301. Adds 56 inch high cabinet, slave multi-unit cable, 2400 ft (731 mm) reel of tape, slave drive options, and documentation.

HP 7970E-302. Adds 52 inch high cabinet, master multi-unit cable, 2400 ft (731 mm) reel of tape, master drive options, and documentation.

HP 7970E-303. Adds 52 inch high cabinet, slave multi-unit cable, 2400 ft (731 mm) reel of tape, slave drive options, and documentation.

HP 7970E-304. Adds 56 inch high cabinet, HP 3000 Controller interface cable, 2400 ft (731 mm) reel of tape, master drive options, and documentation.

HP 7970E-305. Adds 52 inch high cabinet, HP 3000 Controller interface cable, 2400 ft (731 mm) reel of tape, master drive options, and documentation.

Magnetic Tape Controller:

HP 30215A Magnetic Tape Controller.

Ordering example

To order an add-on 1600 bpi magnetic tape drive, a controller, and an 800 bpi tape drive, the following products should be specified:

HP 30215A Magnetic Tape Controller

HP 7970E Digital Magnetic Tape Drive (9 track, 1600 bpi).

HP 7970E-304. Adds 56 inch high cabinet, master multi-unit cable, reel of tape, master drive options, and documentation.

HP 7970B Digital Magnetic Tape Drive (900 track, 800 bpi).

HP 7970B-300. Adds 56 inch high cabinet, HP 3000 Controller interface cable, reel of tape, and documentation.

Notes:

One drive must be a master.

Master/slave electronic relationship: Two masters on the same controller offer greater redundancy than a master and a slave. With the master/slave relationship, the slave shares the master's electronics; the slave will not function if the master is not operative. With a master/master relationship, if the first master is not operative it does not affect the second master's performance.

All options with 52" cabinets are for pre-3000CX models; options with 56" cabinets are for HP 3000CX, Series I and Series II models.

Consult the Series I or pre-Series II Configuration diagram if ordering for an HP 3000 Series I, HP 3000CX, or original HP 3000.

Site preparation data

	USA (60 Hz)	NON-USA (50 Hz)
VOLTAGE	115	230
PHASES	1	1
CURRENT PER PHASE	3.4A	1.7A
CONNECTION CODE	I	I
HEAT OUTPUT (per hour)	1400 btu	350 kcal
WEIGHT	290 lb*	129 kg*
SIGNAL CABLE LENGTH	(not applicable)	

**Includes cabinet.*

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HP 3000 Series I
System Peripherals and Software

A complete selection of peripheral devices and software packages is available to tailor your HP 3000 Series I System to your applications. The following is a list of standard and optional hardware and software.

Standard hardware

Two system bays
Interactive system console
System table
Central processing unit
Input/output processor
128k bytes of memory
Multiplexer channel
Asynchronous terminal controller
High speed selector channel
50 megabyte disc drive
Magnetic tape drive

Standard software

MPE-C
SPL/3000
EDIT/3000
SORT/3000
FCOPY/3000
TRACE/3000
Compiler library

Optional hardware

Terminals

2640B and 2645A Interactive display terminals

Communications

30126A CalComp plotter interface subsystem

Peripherals

30104A Punched tape reader subsystem
30105A Tape punch subsystem
30106A Card reader subsystem
30119A Card reader punch subsystem
7260A Optical mark reader
2607A Line printer
2613A Line printer
2617A Medium speed line printer
2618A High speed line printer
13180B Cartridge disc subsystem
7920A 50 Megabyte disc drive
7970B/E Digital magnetic tape drives

Optional software

Software programming languages

32213B COBOL/3000 Compiler
32104A RPG/3000 Compiler
32102B FORTRAN/3000 Compiler
32111A BASIC/3000 Interpreter and Compiler

Software application systems

32206A DEL/3000 data entry library
32235A IMAGE/QUERY data base management
30130D 2780/3780 Emulation software
32205B Scientific library
32900A SIS/3000 student information system
32207A INDEX/3000

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HP 3000 Series II
System Peripherals and Software

A complete selection of peripheral devices and software packages is available to tailor your HP 3000 Series II System to your applications. The following is a list of standard and optional hardware and software.

Standard hardware

Two system bays (model 6)
Three system bays (model 8)
Interactive system console
System table
Central processing unit
Input/output processor
128k bytes of memory (model 6)
320k bytes of memory (model 8)
Multiplexer channel
Asynchronous terminal controller
High speed selector channel
50 megabyte disc drive
Magnetic tape drive

Standard software

MPE II
SPL/3000
EDIT/3000
SORT/3000
FCOPY/3000
TRACE/3000
Compiler library

Optional hardware

Terminals

2640B/N/C, 2641A, and 2645A Interactive display terminals

Communications

30126A CalComp plotter interface subsystem

Peripherals

30104A Punched tape reader subsystem
30105A Tape punch subsystem
30106A Card reader subsystem
30119A Card reader punch subsystem
7260A Optical mark reader
2607A Line printer
2613A Line printer
2617A Medium speed line printer
2618A High speed line printer
13180B Cartridge disc subsystem
7920A 50 Megabyte disc drive
7970B/E Digital magnetic tape drives

Optional software

Software programming languages

32213C COBOL/3000 Compiler
32104A RPG/3000 Compiler
32102B FORTRAN/3000 Compiler
32111A BASIC/3000 Interpreter and Compiler
32105A APL/3000 Language Subsystem

Software application systems

32206A DEL/3000 data entry library
32235A IMAGE/QUERY data base management
30103E 2780/3780 Emulation software
32109A Distributed Systems/3000 software
32205B Scientific library
32900A SIS/3000 student information system
32208A KSAM/3000

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HP 3000 Series I Manuals

Each HP 3000 Series I customer receives a complete set of appropriate manuals with delivery of a computer system. Additional copies of manuals can be shipped prior to delivery of the system by ordering the appropriate part number.

Ordering Information

30321A Standard Manuals Package contains the following manuals:

Using the HP 3000: A Guide for the Terminal User	03000-90121
Series I General Information Manual	30000-90091
Commands Reference Manual	30000-90088
Intrinsics Reference Manual	30000-90087
Segmenter Reference Manual	30000-90011
Console Operator's Guide	30000-90090
Systems Manager/System Supervisor Manual	30000-90089
SPL Reference Manual	30000-90024
SPL Textbook	30000-90025
TRACE/3000 Reference Manual	03000-90015
SORT/3000 Reference Manual	32214-90001
FCOPY/3000 Reference Manual	03000-90064
EDIT/3000 Reference Manual	03000-90012
Compiler Library Reference Manual	03000-90009
MPE System Utilities Manual	32000-90008
HP 3000 Software Pocket Guide	03000-90126
System Reference Manual	03000-90019

Optional Manuals

30321A-600

- BASIC/3000 Compiler Reference Manual (32103-90001)
- BASIC/3000 Interpreter Reference Manual (03000-90008)
- BASIC for Beginners (03000-90025)
- BASIC Pocket Guide (03000-90050)

30321A-601

- FORTRAN/3000 Reference Manual (32102-90001)
- Scientific Library Reference Manual (03000-90010)

30321A-602

- IMAGE/3000 Reference Manual (30000-90041)
- QUERY/3000 Reference Manual (30000-90042)
- COBOL/3000 Reference Manual (32213-90001)
- RPG/3000 Reference Manual (32104-90001)
- RPG/3000 Listing Analyzer (32104-90003)
- DEL/3000 Manual (30000-90050)
- INDEX/3000 Reference Manual (30000-90095)

30321A-603

All but the following manuals deleted:

- Intrinisics Reference Manual (30000-90087)
- Commands Reference Manual (30000-90088)
- Systems Manager/Systems Supervisor Manual (30000-90089)
- Console Operator's Guide (30000-90090)
- MPE System Utilities Manual (32000-90008)

HEWLETT hp PACKARD

HP 3000 Series II Manuals

model 30381A

Each HP 3000 Series II customer receives a complete set of appropriate manuals with delivery of a computer system. Additional copies of manuals can be shipped prior to delivery of the system by ordering the appropriate part number.

Ordering information

30381A Standard Manuals Package contains the following manuals:

Using the HP 3000: A Guide for the Terminal User	03000-90121
Series II General Information Manual	30000-90008
Commands Reference Manual	30000-90009
Intrinsics Reference Manual	30000-90010
Segmenter Reference Manual	30000-90011
Debug/Stack Dump Reference Manual	30000-90012
Console Operator's Guide	30000-90013
Systems Manager/Systems Supervisor Manual	30000-90014
Error Message And Recovery Manual	30000-90015
Index to MPE Reference Manuals	30000-90045
SPL Reference Manual	30000-90024
SPL Textbook	30000-90025
TRACE/3000 Reference Manual	03000-90015
SORT/3000 Reference Manual	32214-90001
SPL Pocket Guide	32100-90001
FCOPY/3000 Reference Manual	03000-90064
EDIT/3000 Reference Manual	03000-90012
Compiler Library Reference Manual	30000-90028
MPE System Utilities Manual	30000-90044
HP 3000 Software Pocket Guide	30000-90049
System Reference Manual	30000-90020
Machine Instruction Set Reference Manual	30000-90022
Instruction Decoding Pocket Guide	30000-90057
Using Files	03000-90102

Optional manuals

30381A-600
- BASIC/3000 Compiler Reference Manual (32103-90001)
- BASIC/3000 Interpreter Reference Manual (30000-90026)
- BASIC for Beginners (03000-90025)
- BASIC Pocket Guide (03000-90050)

30381A-601
- FORTRAN/3000 Reference Manual (30000-90040)
- FORTRAN Pocket Guide (32102-90002)
- Scientific Library Reference Manual (30000-90027)

30381A-602
- IMAGE/3000 Reference Manual (30000-90041)
- QUERY/3000 Reference Manual (30000-90042)
- COBOL/3000 Reference Manual (32213-90001)
- RPG/3000 Reference Manual (32104-90001)
- RPG/3000 Listing Analyzer (32104-90003)
- DEL/3000 Manual (30000-90050)
- KSAM/3000 Reference Manual (30000-90079)

Pricing Guide

PRODUCT NUMBER	OPTION	DESCRIPTION	PRICE	MONTHLY MAINT. CHARGE
32420A		**HP 3000 Series I Computer System.** 120/208V, 60 Hz, 3-phase; 128 kb memory, 50 Mb disc, 1600 bpi mag tape, 2640B console, 2 system cabinets, and table.		
	050	Deletes isolation transformer		*
	103	Add 103 modem capability		
	110	Add 103/202C type modem control to asynchronous terminal controller		
	130	Replace 1600 bpi mag tape unit with 800 bpi mag tape unit		
	300	Add 10 extra I/O slots		
30306A		**Upgrade to HP 3000 Series II Model 6.** For HP 3000, HP3000CX, and HP 3000 Series I systems. 120/208V, 60 Hz, 192 kb memory.		*
	001	Add one 30310A power supply. Needed to upgrade Series I to Series II.		*
	015	230V, 50 Hz single-phase operation, deletes isolation transformer.		*
	050	Deletes isolation transformer		*
	132	Upgrade existing selector channel (30030A) to Series II compatible selector channel (30030B) *Note: This is not a complete, new selector channel.*		*
	150	Add one Series II style peripheral cabinet (29402B)		*
	152	Terminal Controller Upgrade. Upgrade early version asynchronous terminal controller board (30060 – 60001) to present board (30032B-003) *Note: 30060 – 60001 board will be found on only a few early HP 3000 systems. This option is not required for Series I or most existing HP 3000 and HP 3000CX computers.*		*
		Trade-in Allowances (applied against purchase of 30306A). These allowances are for returned parts when upgrading a Series I or pre-Series II system to an HP 3000 Series II system.		
	200	128 kb Series I or pre-Series II parts returned		
	201	96 kb pre-Series II parts returned		
	202	Series I or pre-Series II selector channel printed circuit assemblies (2 boards) Credit against monthly maintenance charge during warranty of upgraded HP 3000 system.		
	501	Expand memory to 256 kb		*
	502	Expand memory to 320 kb		*
	503	Expand memory to 384 kb		*
	504	Expand memory to 448 kb		*
	505	Expand memory to 512 kb		*

* *The monthly maintenance charge should be recalculated on the basis of a new system.*

PRODUCT NUMBER	OPTION	DESCRIPTION	PRICE	MONTHLY MAINT. CHARGE
30409C		**Upgrade to HP 3000 Series II Model 8.** For HP 3000, HP 3000CX, and HP 3000 Series I systems. 120/208V, 60 Hz, 3-phase, 320 kb memory.		*
	001	Add one 30310A power supply. Needed to upgrade Series I to Series II.		*
	015	230V, 50 Hz single-phase operation, deletes isolation transformer.		*
	050	Deletes isolation transformer		*
	132	Upgrade existing selector channel (30030A) to Series II compatible selector channel (30030B) *Note: This is not a complete, new selector channel.*		*
	150	Add one Series II style peripheral cabinet (29402B)		*
	152	Terminal Controller Upgrade. Upgrade early version asynchronous terminal controller board (30060 – 60001) to present board (30032B-003) *Note: 30060 – 60001 board will be found on only a few early HP 3000 systems. This option is not required for Series I or most existing HP 3000 and HP 3000CX computers.*		*
		Trade-in Allowances (applied against purchase of 30409C). These allowances are for returned parts when upgrading a Series I or pre-Series II system to an HP 3000 Series II system.		
	200	128 kb Series I or pre-Series II parts returned		
	201	96 kb pre-Series II parts returned		
	202	Series I or pre-Series II selector channel printed circuit assemblies (2 boards) Credit against monthly maintenance charge during warranty of upgraded HP 3000 system.		
	503	Expand memory to 384 kb		*
	504	Expand memory to 448 kb		*
	505	Expand memory to 512 kb		*
32416A		**HP 3000 Series II Model 6 Computer System.** 120/208V, 60 Hz, 3-phase; 128 kb memory, 50 Mb disc, 1600 bpi mag tape, 2640B console, 16 port asynchronous terminal controller, 2 system cabinets, and table.		
	015	230V, 50 Hz single-phase operation. Isolation transformer not supplied.		
	050	Deletes isolation transformer.		*
	110	Add 103/202 type modem control to asynchronous terminal controller		
	130	Replace 1600 bpi mag tape unit with 800 bpi mag tape unit		
	500	Expand memory to 192 kb		
	501	Expand memory to 256 kb		
	502	Expand memory to 320 kb		
	503	Expand memory to 384 kb		
	504	Expand memory to 448 kb		
	505	Expand memory to 512 kb		

* *The monthly maintenance charge should be recalculated on the basis of a new system.*

PRODUCT NUMBER	OPTION	DESCRIPTION	PRICE	MONTHLY MAINT. CHARGE
32418A		**HP 3000 Series II Model 8 Computer System.** 120/208V, 60 Hz, 3-phase; 320 kb memory, 50 Mb disc, 1600 bpi mag tape, 2640B console, 16 port asynchronous terminal controller, 3 system cabinets, and table.		
	015	230V, 50 Hz single-phase operation, Isolation transformer not supplied.		
	050	Deletes isolation transformer.		*
	110	Add 103/202 type modem control to asynchronous terminal controller		
	130	Replace 1600 bpi mag tape unit with 800 bpi mag tape unit		
	503	Expand memory to 384 kb		
	504	Expand memory to 448 kb		
	505	Expand memory to 512 kb		
30408A		**Upgrade for Series II Model 5, 6, or 7.** Converts to a system similar to a Model 8. Includes memory expansion kit to accommodate up to 512 kb of memory, additional cabinet for I/O expansion, and one 64 kb board. *Note: To obtain desired memory size, order additional 30008A 64 kb memory modules.*		*
	001	Required for Model 6 with 256 kb or less. Adds both memory expansion and I/O expansion kits.		*
	002	Required for Model 6 with 320 kb or greater only. Deletes memory expansion kit and 64 kb board.		*
Memory				
30008A		**64 kb memory module** *Note: Models 5 and 7 memory expandable to 256 kb; Models 6, 8 and 9 memory expandable to 512 kb.*		
30411A		**Field-installed memory expansion subsystem for Models 8 and 9.** Expands memory from 256 kb to 320 kb. *Note: Required for customers who have upgraded from an HP 3000CX to Series II and wish to expand memory from 256 kb to 320 kb.*		
30411B		**Memory expansion kit for Series II Model 6.** Allows Model 6 to accommodate up to 512 kb of memory. Includes one 64 kb memory board.		
30431A		**32 kb core memory for pre-Series II systems**		
Disc Subsystems				
30229A		**7905A/7920A Controller.** Interfaces up to eight 13180B/7920S drives to an HP 3000. Requires 30030B Selector Channel (30030A for Pre-Series II 3000s).		
13180B		**Add-on 15 Mb disc drive subsystem.** 120V, 60 Hz, single-phase		
	001	Specify this option if preceding 7905 is racked in system cabinet or for first 7905 in system		
	015	230V, 50 Hz single-phase operation		
7920S		**50 Mb add-on disc subsystem.** 120V, 60 Hz, single phase		
	001	Specify this option if preceding 7905 is racked in system cabinet or for first 7920 in system		
	015	230V, 50 Hz, single-phase		

* *The monthly maintenance charge should be recalculated on the basis of a new system.*

PRODUCT NUMBER	OPTION	DESCRIPTION	PRICE	MONTHLY MAINT. CHARGE
13395A		**Two 50 Mb disc subsystems.** 120V, 60 Hz, single-phase		
	015	230V, 50 Hz, single-phase		
	050	Third 7920 drive		
12940A		**7905 Disc cartridge**		
13394A		**7920 Disc pack**		
Magnetic Tape Subsystems				
30215A		**Mag Tape Interface.** Interfaces up to four 7970B or 7970E mag tapes with option 300, 301, 302, 303, 304, or 305 to an HP 3000		
7970B		**800 bpi 45 ips Mag Tape.** Must order option 300, 302, 304, or 305 to interface drive to an HP 3000		
	300	Specify this option for 2nd, 3rd, and 4th drive on 30215A controller. Drive is racked in a CX/Series I/Series II style cabinet (Order option 302 in place of option 300 for pre-CX style cabinet . . .		
	304	Specify this option for first drive on a 30215A mag tape controller. Drive is racked in a CX/Series I/Series II style cabinet (Order option 305 in place of option 304 for a pre-CX style cabinet . . .		
7970E		**1600 bpi, 45 ips Mag Tape.** Must order option 300, 301, 302, 303, 304, or 305 to interface drive to an HP 3000.		
	300	Specify this option for 2nd, 3rd, and 4th master drive on 30215A controller. Drive is racked in a CX/Series I/Series II style cabinet (Order option 302 in place of option 300 for pre-CX style cabinet . . .		
	301	Specify this option for 2nd, 3rd, and 4th slave drive on 30215A controller. Drive is racked in a CX/Series I/Series II style cabinet (Order option 303 in place of option 301 for pre-CX style cabinet . . . A 1600 bpi master drive must precede this slave.		
	304	Specify this option for first drive on a 30215A mag tape controller. Drive is racked in a CX/Series I/Series II style cabinet (Order option 305 in place of option 304 for pre-CX cabinet . . .		
Line Printers				
30209A		**Line Printer Controller.** Interfaces one 2607A, 2613A, 2617A or 2618A printer with option 300 to an HP 3000.		
2607A		**200 lpm Dot Matrix Line Printer.** With 132 columns and 64 characters, 115V, 60 Hz.		
	001	128 character set		
	015	230V, 50 Hz, single-phase operation		
	300	Adds HP 3000 interface cable, documentation, and installation		
2613A		**300 lpm Line Printer.** With 136 columns, 64 characters; 115V, 60 Hz		
	001	96 character set		
	002	64 character set with OCR-B font. Slug character replaces backslash		
	003	96 character set with OCR-B font as above		
	015	230V, 50 Hz, single-phase operation		
	016	96 character set and 230V, 50 Hz operation		
	300	Adds HP 3000 interface cable, documentation, and installation		

PRODUCT NUMBER	OPTION	DESCRIPTION	PRICE	MONTHLY MAINT. CHARGE
2617A		**600 lpm Line Printer.** With 136 columns, 64 characters; 115V, 60 Hz		
	001	96 character set		
	002	64 character set with OCR-B font. Slug character replaces backslash		
	003	96 character set with OCR-B font as above		
	015	230V, 50 Hz, single-phase operation		
	016	96 character set and 230V, 50 Hz		
	300	Adds HP 3000 interface cable, documentation, and installation		
2618A		**1250 lpm Line Printer.** With 132 columns, 64 characters; 115V, 60 Hz		
	001	96 character set		
	002	64 character set with OCR-B font. Slug character replaces backslash		
	003	96 character set with OCR-B font as above		
	015	230V, 50 Hz, single-phase operation		
	016	96 character set and 230V, 50 Hz		
	300	Adds HP 3000 interface cable, documentation, and installation		
Card Subsystems				
30106A		**Card Reader Subsystem.** 600 cpm; 115V, 60 Hz		
	015	230V, 50 Hz, single-operation		
30119A		**Card Reader/Punch Subsystem.** Reads 175-200 cpm, punches 45-75 cpm; 115V, 60 Hz		
	002	Adds off-line keyboard punch and verify capability *Note: All 30119A subsystems must be ordered with option 002.*		
	015	230V, 50 Hz, single-phase operation		
7260A		**Optical Mark Reader.** 115V/60 Hz, operating manual, card weight, dust cover		
	002	Selector Hopper – Second hopper to store cards selected by computer control		
	003	Encoder – allows capability to read cards without clock marks		
	004	Bell – audible event indicator activated under computer control		
	005	Changes power to 220/240Vac		
	006	Changes power to 50 Hz		
	300	Adds operating documentation for HP 3000 Series II		
Paper Tape Subsystem				
30104A		**Paper Tape Reader Subsystem.** Reads 500 cps		
	001	Add CX/Series I/Series II cabinet		
	002	Add pre-Cx cabinet		

PRODUCT NUMBER	OPTION	DESCRIPTION	PRICE	MONTHLY MAINT. CHARGE
30105A		**Paper Tape Punch Subsystem.** Punches 75 cps		
	001	Add CX/Series I/Series II cabinet		
	002	Add pre-CX cabinet		
		Note: The paper tape reader and paper tape punch subsystems together require 17 vertical inches of cabinet space. One subsystem or both may be installed below the magnetic tape drive on a three bay system, if no other equipment occupies that space. Option 001 or 002 must be ordered if this space is not available.		
Distributed Systems/Communications Products				
30055A		**Synchronous Single Line Controller.** For modem links. Cable to modem included.		
30360A		**Hardwired Serial Interface.** For coaxial links. A 30220A cable is required for each pair of hardwired serial interfaces.		
30220A		**Coaxial cable.** For hardwired serial interface. 25 ft. long.		
	001	100 ft. cable		
	002	250 ft. cable		
	003	500 ft. cable		
	004	1000 ft. cable		
	005	2000 ft. cable		
I/O Expansion				
30030A		**High Speed Selector Channel.** For HP 3000 Series I or pre-Series II Systems		
30030B		**High Speed Selector Channel.** For Series II Systems		
		Note: 30030A/B may be used only with 30229A disc controller.		
30032B		**Asynchronous Terminal Controller**		
	001	For 103 type modems only		
	002	For 103 and 202 type modems		
30412A		**Add-on I/O power supply for Series I or pre-Series II Systems**		
	001	**Additional card cage**		
30413A		**I/O Expansion.** Adds 10 I/O slots to HP 3000 Series I. Field installed.		*
30441A		**Asynchronous Terminal Controller Field Upgrade Kit**		
		Note: This kit allows conversion of a standard 30032B to a 30032B-001. The same kit converts a 30032B-001 to a 30032B-002. Ordering of two kits converts a standard 30032B to a 30032B-002.		
Add-On Device Interfacing				
30126A		**CalComp 565 series plotter interface**		
	001	CalComp 702 series plotter interface		

* *The monthly maintenance charge should be recalculated on the basis of a new system.*

PRODUCT NUMBER	OPTION	DESCRIPTION	PRICE	MONTHLY MAINT. CHARGE
Terminals				
2640B		**Interactive Display Terminal.** Character mode; 64 character uppercase Roman set; 115V, 60 Hz, 1 kb storage.		
	001	128 character set — Roman		
	015	230V, 50 Hz		
	020	Extended Asynchronous communications card		
2641A		**APL Display Station.** 128 character APL, 64 character set uppercase Roman, 64 character APL over strike, 8 user-defined soft keys, 4 kb storage.		
	001	128 character set — Roman		
	007	Integrated Dual Cartridge Tape		
	015	220V, 50 Hz		
		Only one of the following options (201, 202, or 203,) may be ordered		
	201	64 character Mathematic Symbol Set		
	202	64 character Line Drawing Set		
	203	Large Character Set		
2645A		**Display Station.** Character mode, 64 character set uppercase Roman. Eight user-defined soft keys, 115V, 60 Hz, 4 kb storage.		
	001	128 character set — Roman. Adds lowercase and display control codes		
	007	Integrated dual cartridge tape		
	015	220V, 50 Hz		
Cables				
30062B		**Cable.** For 103 and 202 type data modems; 25 ft (7.6 m)		
	001	Replaces 25 ft (7.6 m) cable with a 50 ft (15.2 m) cable		
30062C		**Extender Cable.** For hardwired device or modem, 25 ft (7.6 m)		
	001	Replaces 25 ft (7.6 m) cable with a 50 ft (15.2 m) cable		
	002	Replaces 25 ft (7.6 m) cable with a 100 ft (30.4 m) cable		
30062D		**System Console Cable.** 25 ft (7.6 m)		
30062E		**Cable Adapter.**		

PRODUCT NUMBER	OPTION	DESCRIPTION	PRICE	MONTHLY MAINT. CHARGE
Manuals				
30321A		**HP 3000 Series I Manual Set.**		
		Note; This product provides manuals shipped in advance of the system (See Data Sheet).		
	600	Add BASIC/3000 Compiler and Interpreter manuals		
	601	Add FORTRAN/3000 Reference Manual and Scientific Library Reference Manual		
	602	Add: IMAGE/3000 Reference Manual QUERY/3000 Reference Manual COBOL/3000 Reference Manual RPG Reference Manual RPG Listing Analyzer Data Entry Reference Manual INDEX/3000 Reference Manual		
	603	Deletes all manuals except new MPE-C manuals		
30381A		**HP 3000 Series II Manual Set.**		
		Note: This product provides manuals shipped in advance of the system (See Data Sheet).		
	600	Add BASIC/3000 Compiler and Interpreter manuals		
	601	Add FORTRAN/3000 Reference Manual and Scientific Library Reference Manual		
	602	Add: IMAGE/3000 Reference Manual QUERY/3000 Reference Manual COBOL/3000 Reference Manual RPG Reference Manual RPG Listing Analyzer Data Entry Reference Manual KSAM Reference Manual		
	699	Deletes binders		

PRODUCT NUMBER	OPTION	DESCRIPTION	INITIAL PAYMENT	MONTHLY FEE
Software				
		HP 3000 software is purchased on a monthly fee basis and includes a 90-day warranty. The plan requires an initial payment plus monthly fees for 48 months, beginning at end of warranty. For pre-paid software purchase, please consult your Hewlett-Packard sales representative.		
		Fundamental operating software. Includes SPL, Edit, compiler library, SORT, FCOPY, TRACE.	included in system price	*
32105A		**APL/3000 (Series II)**		*
32111A		**BASIC/3000**		*
	001	Series I or pre-Series II manual instead of Series II		
32213B		**COBOL/3000** (Series I or pre-Series II)		*
32213C		**COBOL/3000** (Series II)		*
32206A		**DEL/3000**		*
32190A		**DS/3000**		*
30130D		**2780/3780 Emulation subsystem software** (for Series I or pre-Series II)		*
30130E		**2780/3780 Emulation subsystem software** (for Series II)		*
32102B		**FORTRAN/3000**		*
	001	Series I manual instead of Series II.		
32235A		**IMAGE/QUERY**		*
32207A		**INDEX/3000**		*
32208A		**KSAM/3000**		*
32104A		**RPG/3000**		*
32205B		**Scientific Library**		*
	001	Series I or pre-Series II manual instead of Series II		
32900A		**SIS/3000** *Note: License agreement required with SIS/3000.*		*
22823A		**Monthly Software fee for Fundamental Operating Software**	—	
	001	APL/3000	—	
	002	BASIC/3000	—	
	003	COBOL/3000	—	
	004	DEL/3000	—	
	005	DS/3000	—	
	006	2780/3780 Emulation subsystem software	—	
	007	FORTRAN/3000	—	
	008	IMAGE/QUERY	—	
	009	INDEX/3000	—	
	010	KSAM/3000	—	
	011	RPG/3000	—	
	012	Scientific Library	—	
	013	SIS/3000	—	

*Order product number 22823A with appropriate options listed above.

PRODUCT NUMBER	DESCRIPTION	PRICE	MONTHLY MAINT. CHARGE
Training and Consulting			
22801A	**HP 3000 — A Comprehensive Introduction.** Five-day course given at an HP Technical Center. Tuition per student.		
22815A	**HP 3000 — A Comprehensive Introduction.** Five-day course given on site.		
22802A	**HP 3000 System Management and Operation.** Four-day course given at an HP Technical Center. Tuition per student.		
22816A	**HP 3000 System Management and Operation.** Four-day on-site course.		
22956A	**HP 3000 IMAGE (Data Base Management).** Five-day course given at an HP Technical Center. Tuition per student.		
22827A	**HP 3000 IMAGE (Data Base Management).** Five-day on-site course.		
22957-90000	**HP 3000 COBOL.** Self-study course.		
22958-90000	**HP 3000 BASIC.** Self-study course.		
22805A	**HP 3000 Series II Special Capabilities.** Five-day course given at an HP Technical Center. Tuition per student.		
22804A	**HP 3000 SPL File System Introduction.** Five-day course given at an HP Technical Center. Tuition per student.		
22817A	**IBM System/3-to-HP 3000 Conversion.** A two-day on-site course.		
22818A	**HP 3000CX or Series I-to-HP 3000 Series II Conversion.** A one-day on-site course.		
22819A	**HP 3000 Data Entry Library.** A one-day on-site course.		
22828A	**KSAM (Keyed Sequential Access Method).** A two-day on-site course.		
36900E	**Distributed Systems/3000.** A three-day on-site course.		
22825A	**HP 3000 Software Consulting.** A consultation service to help in applying HP software to your specific applications problems. Cost per day.		

Note: Fee for on-site classes includes up to 10 students. Additional students (up to the maximum permissible) can be accommodated at a charge of $50.00/student.

Hewlett-Packard reserves the right to cancel any class upon three-weeks notice.

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