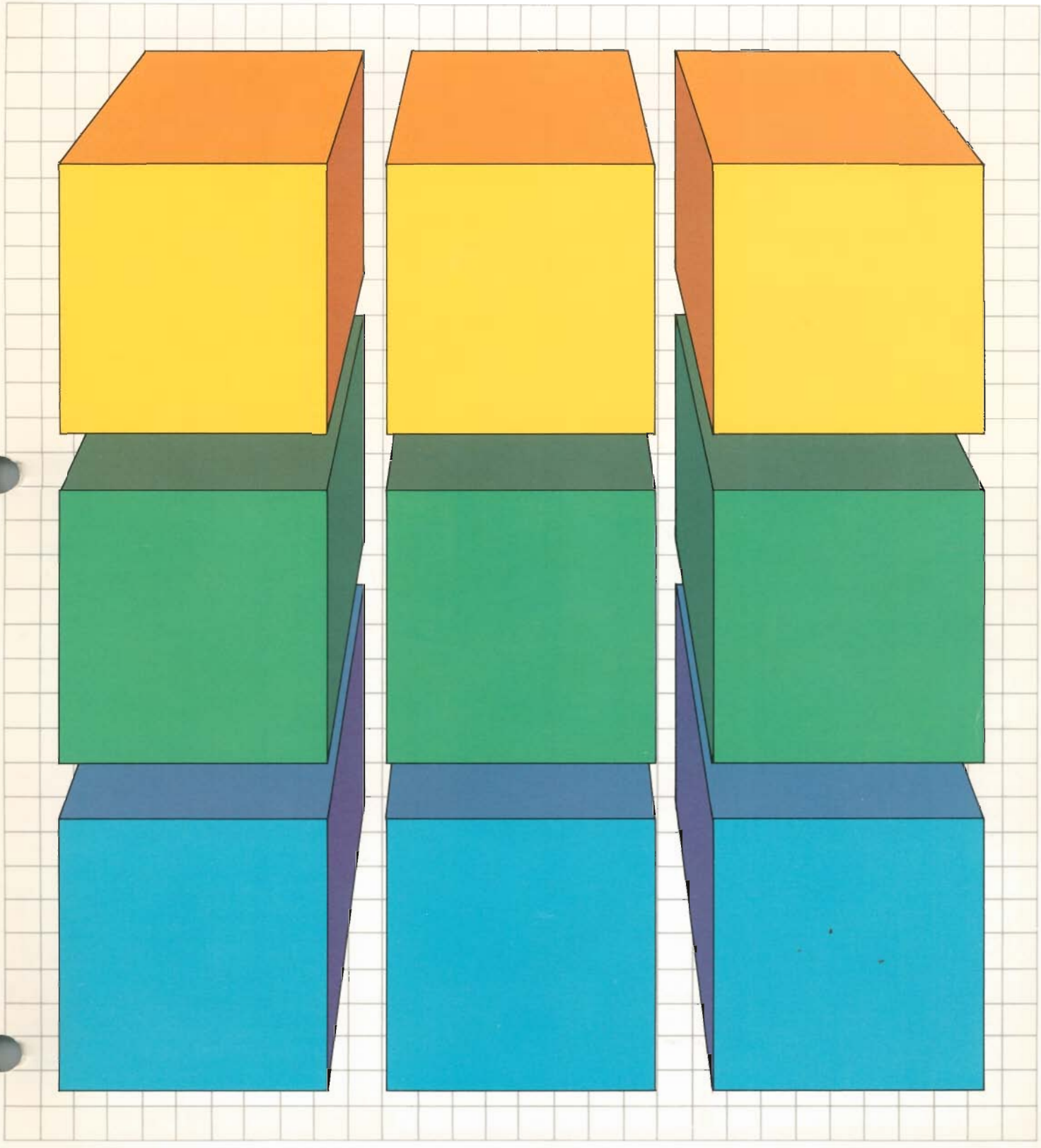
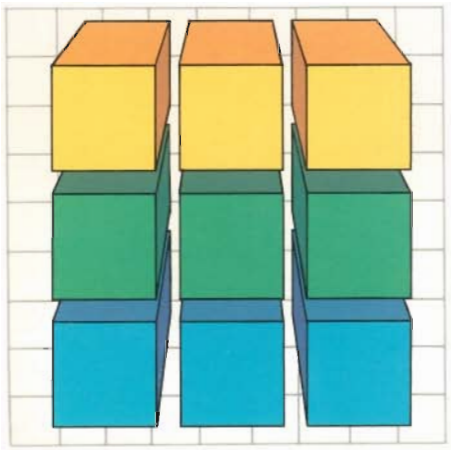
The HP 1000 Family
Advanced computer power
for manufacturing and engineering

HEWLETT PACKARD



The HP 1000 Idea:
Choose the computer power you need, in the right package



HP 1000. An idea for combining computer products to match your precise needs

HP 1000 is our designation for a family of related computers, systems, software and peripherals. But it's more than just a name or number — it's an idea as well. We've designed the entire HP 1000 family to allow you to put together just the right combination of computer products to match specific real-time applications in manufacturing, laboratory, and other performance-critical settings.

And putting the right combination together is simple with the HP 1000 family. Select the level of computing power you want from four series of HP 1000 computers — the A and L-Series and the E and F-Series. Choose from three levels of packaging — boards, boxes, or totally-integrated systems. Then fine-tune for your particular uses with an array of hardware and software add-ons that are built to fit.

The HP 1000 idea not only means simplicity, it means compatibility as well. That's the fundamental element that allows you to harness all the potential of the HP 1000 family — because it's the element that lets you grow. HP 1000 compatibility reaches across the entire family of products:

- HP 1000 computers. The A, L, E, and F-Series computers use the same basic instruction set, which means you can change models to fit your needs, with little effect on software, peripherals, or operator training.
- HP 1000 systems. You can move up from the smallest memory-based system to the largest disc-based system at any time — at once or in increments.
- HP 1000 operating system software. Compatibility is the objective of HP's Real-Time Executive (RTE) operating system software. You can choose the RTE which suits your application, and programs written on one RTE system will execute on others with only minimal modification.
- HP 1000 applications software. You can superimpose HP 1000 applications software products on your system — data base management, graphics, or distributed system networking software is available to tailor a solution to your specific needs.

HP 1000 solutions to your professional problems

The flexibility of the HP 1000 allows you to put it to work in many ways. But there are certain applications and tasks for which the HP 1000 is a proven performer:

- Factory automation — HP's wide range of hardware and software makes it possible for you to speed up and simplify many manufacturing tasks. Whether you need to automate instruments or machines, gain fast access to information from the assembly line or factory floor, or monitor and control real-time processes, the HP 1000 family can help improve productivity and lower costs.
- Computer networking — Distributed Systems Network (DS/1000-IV) software makes it easy to interconnect HP 1000 systems in almost any combination. You can configure an interplant network, or connect systems across a city or continent. You can locate computers where the work is done, and share the equipment and the information they produce throughout the network.
- Data base management — Informed management decisions require timely and accurate information. That information comes as a dynamic flow, comprised of data on inventories, work in progress, production schedules, quality control reports and a host of other elements. Image/1000 data base management software lets you create a data base that stores inter-related information for fast, easy retrieval and report writing.

HP Computer Museum
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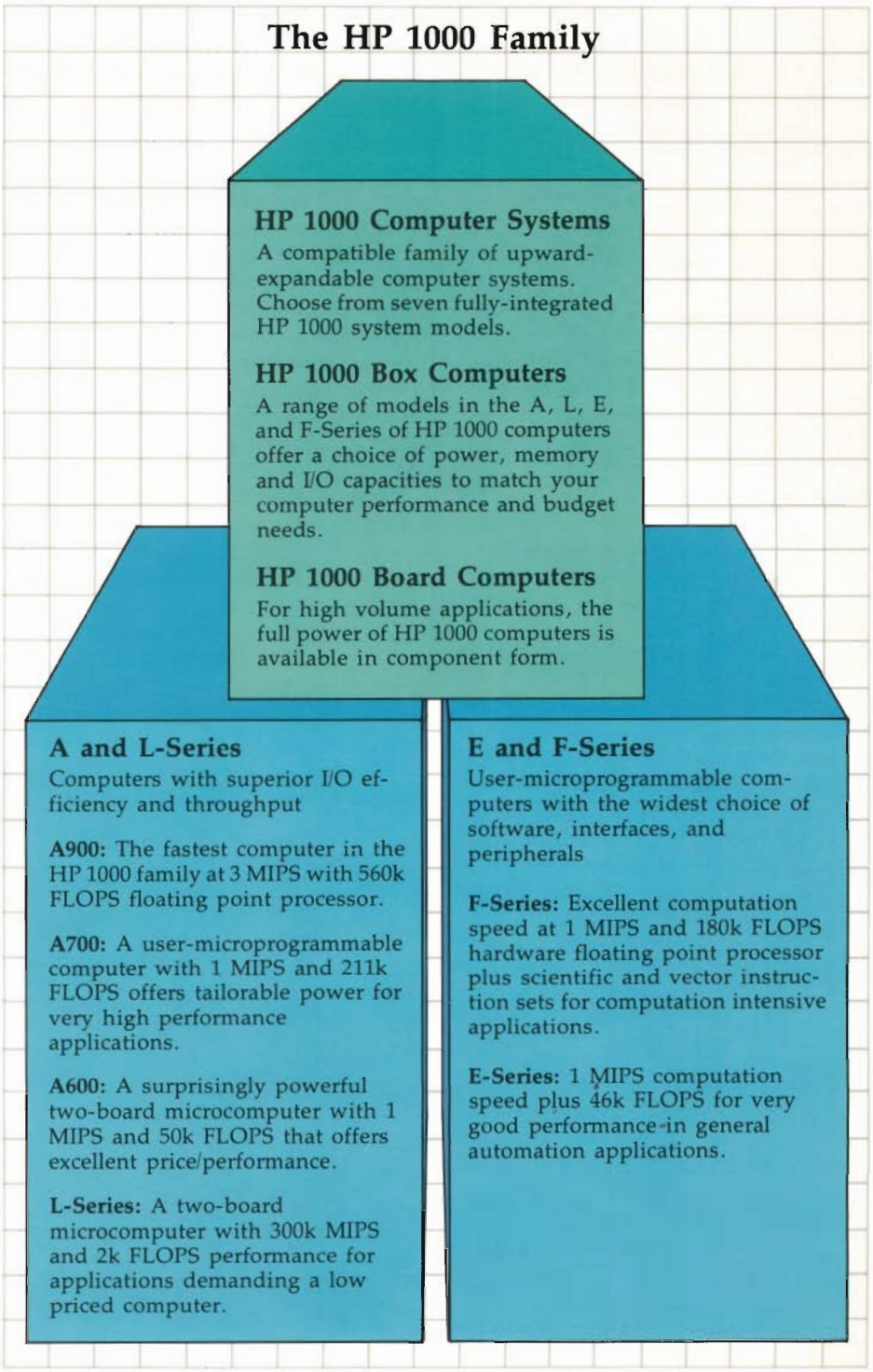
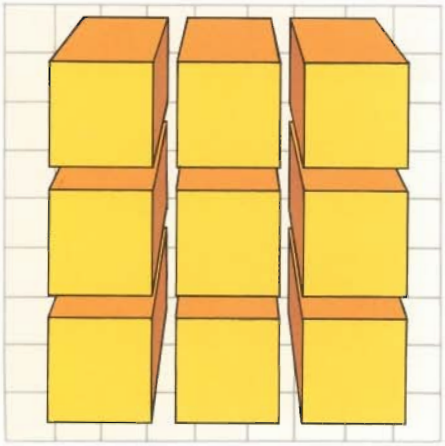
For research and education purposes only.

- Interactive graphics — Interactive graphics applications are increasingly a part of today's information environment. Hewlett-Packard offers one of the most complete hardware and software graphics lines available today. HP's Graphics/1000-II software can simplify the presentation of even the most complex data, and helps improve productivity through better understanding. In design applications, graphics realism speeds the solution of drafting, design, and analysis problems. Graphics/1000-II provides two separate packages for two-dimensional or three-dimensional graphics.

Hewlett-Packard software can assist in meeting your automation needs in many ways — for there are many other software packages available beside those mentioned above. PMC/1000, for instance, a new Process Monitoring and Control package, is available for monitoring and control of continuous manufacturing processes.



HP 1000 Computer Systems



A common-sense approach to applications that require a range of performance

The HP 1000 systems family consists of seven models with various levels of capability. Each model includes an RTE operating system and basic system processor unit hardware. When equipped with a hard disc and optional software, each model can be used for program development in BASIC, FORTRAN 4X or FORTRAN 77, Pascal, and Assembly language. Other software supportable on all systems includes data base management, graphics, and distributed systems networking.

Most HP 1000 systems support sharable memory-resident data arrays up to about 2M bytes and multi-megabyte nonsharable virtual data arrays in main memory and on disc.

To each model can be added a wide choice of peripherals, I/O cards and software that work together on your applications to maximize the value of your system investment.

The Model 60 and 65 Systems

The Model 65 system supports the most extensive array of software available for HP 1000 systems, including new process monitoring and programmable controller link packages. Coordinated by the powerful RTE-6/VM operating system, which supports Extended Code Space for very large programs, up to 128 megabytes of Virtual Memory for Data, and fast-access, megabyte-sized, sharable, memory-resident Extended Memory Areas for data. The Model 65 offers tremendous capability for a wide variety of technical applications.

The Model 65's F-Series computer delivers plenty of processing power, too — 1,000,000 instructions per second, plus a 180,000 floating point operations per second hardware floating point processor. A scientific instruction set puts the Model 65's fast floating point capability to work on trigonometric, logarithmic, and other transcendental calculations. And a vector set provides very fast processing of data arrays.

You can have up to 3.2 Gigabytes of disc storage using eight 404M byte disc drives. The 256k bytes of main memory is expandable to a big 2M bytes. The Model 65 is also user-microprogrammable to meet special application requirements.

A Model 60 system is available for users who do not need the fast hardware floating point capability and scientific and vector instruction sets of the Model 65.

The Model 5, 6 and 16 Microsystems

The HP 1000 family of powerful real-time computer systems starts with the compact Model 6 tabletop Microsystem, which is based on the two-board A600 CPU. The Model 6 combines 1,000,000 instructions per second speed with the ability to support multiple terminals and make full use of HP minicomputer software to provide exceptional power and usefulness in a small, low-priced package. The Model 6 microcomputer is also available in a larger standalone package as the Model 16 system. The lower-priced, less-capable Microsystem based on the L-Series microcomputer is available as the Model 5 for the most price-conscious applications.

The Model 6 supports 4.6, 16, 28, and 65M-byte hard discs, with expansion to 260M bytes possible with additional discs. The 16 through 65M-byte discs include a built-in tape cartridge for software loading and system backup. With all this capability, you'll have to keep reminding yourself, it's "only" a microsystem.

The Model 17 System

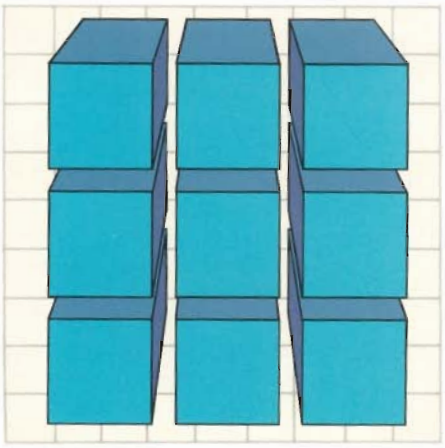
The Model 17 system incorporates the four-card A700 CPU and its optional hardware floating point processor to provide 1,000,000 instructions per second computation speed and 211,000 operations per second floating point speed. Scientific and vector instruction sets further enhance the Model 17's computational speed. In addition to its impressive qualifications for computation intensive applications, the Model 17 system can be microprogrammed by the user in a language similar to Pascal, which facilitates further enhancement of performance or customization to satisfy special application requirements.

The (16, 28, or 65M byte) system disc uses a sealed, fixed-disc design with good tolerance of "dirty" industrial environments. Up to 4M bytes of main memory can be used to keep virtually all applications resident in memory at the same time to optimize responsiveness.

The Model 19 System

The Model 19 is the fastest HP 1000 computer system you can buy. Using the five-card A900 computer with built-in hardware floating point processor and scientific and vector instruction sets, the Model 19 processes 560,000 floating point operations per second on top of its ultra-fast 3,000,000 instructions per second base computational performance. The standard 768k byte memory, with Error Correcting Code capability for maximum system integrity, can be expanded to 6M bytes. The Model 19's exceptional computation speed qualifies it for the most demanding applications in computer simulation, graphics, and other computation-intensive work. Model 19 disc and cabinet choices are the same as for the Model 17.

Real-Time Executive Software



A unified family of RTE systems that put computer power to work for you

HP RTE software is the basis of custom operating environments ranging from simple memory-based systems to large disc-based systems. These RTE operating environments support real-time operations in factory automation, data acquisition, and scientific problem solving. Regardless of system size or application, RTE provides a solid core of compatibility across the entire HP 1000 product line, confidence-building compatibility that is carefully preserved as the RTE systems and software supported on them are improved and their capabilities extended.

HP's applications-oriented software packages offer users the same confidence. We support our applications packages comprehensively, building on the solid core of RTE to assure compatibility among all HP 1000 software packages.

Powerful basic real-time system capabilities

Whether you choose RTE-IVB, RTE-IVE, or RTE-6/VM for E/F-Series computers, RTE-A.1 for A-Series computers, or RTE-XL or RTE-L for L-Series computers, you get a common set of powerful real-time capabilities.

Real-time responsiveness is supported by time, event, program, and operator scheduling of programs. The system responds to I/O devices fast enough to avoid data loss. And scheduled programs run in order of program priority, so the most urgent tasks get done first. In these ways, RTE equips HP 1000 systems to receive data from external sources, process it, and react to it fast enough to control the environment.

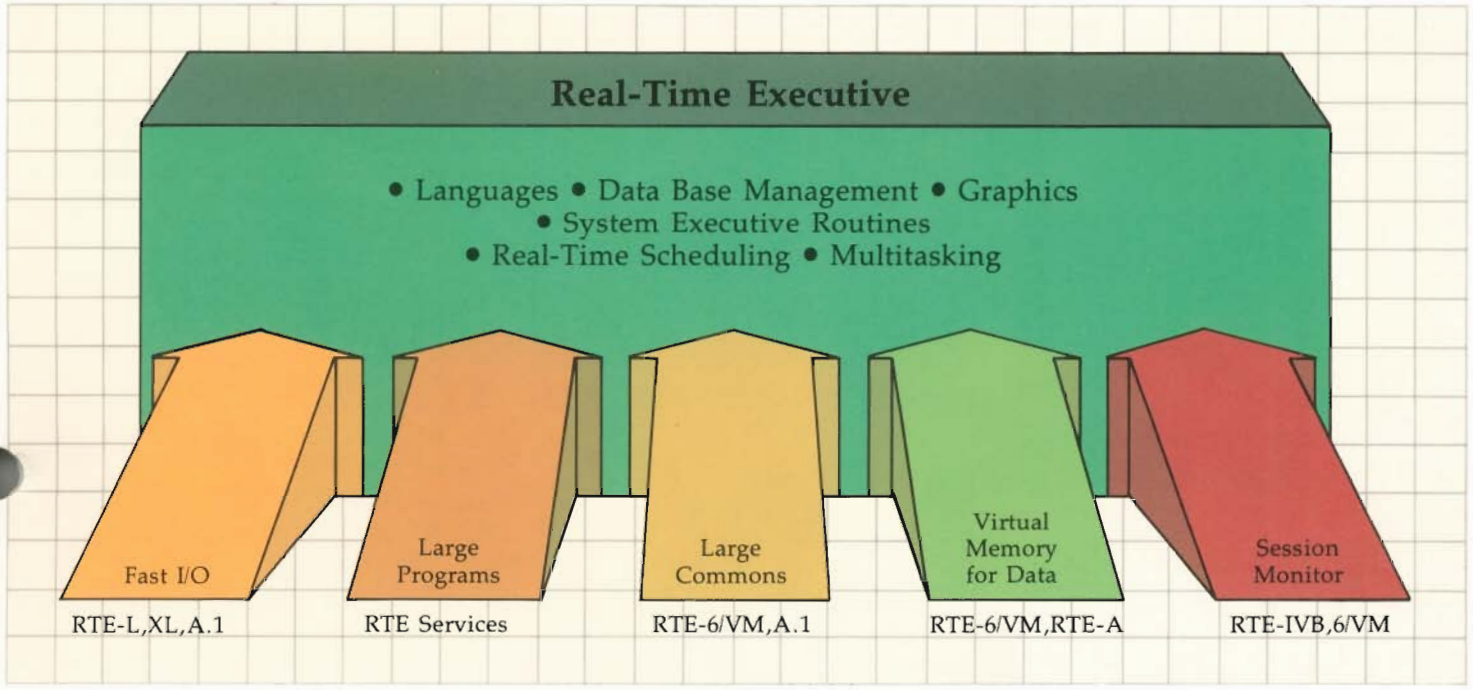
Multi-user support converts a single disc-based system into several systems, each accessible to a different user. The multiple users are independent of each other, yet all can use common system resources, a capability supported in RTE-6/VM and RTE-IVB by a Session Monitor that also gives friendly assistance in the form of "welcome" and "help" procedures.

Multiprogramming gives lower-priority programs the use of spare computing time while higher priority programs are suspended awaiting interrupts or completion of I/O. This maximizes use of system resources and the return on your system investment.

Versatile I/O supported by standard interfaces and drivers gives you an impressive choice of peripheral device capabilities. And, if you need to use an unsupported device, RTE's simple I/O structure makes it easy to develop custom interfaces and custom drivers.

A powerful set of common system software supports program development in BASIC, FORTRAN, Pascal or Assembly language on disc-based RTE systems, except RTE-L. Other commonly supported software resources include Image/1000 data base management, Graphics/1000-II software, and networking software on which to build successful applications.

Built-in modular flexibility makes it easy to tailor RTE to your application needs for peripherals, software, networking, and more specialized requirements, from the smallest operator-less memory-based RTE-L or RTE-IVE system to the largest RTE-A.1, RTE-6/VM or RTE-IVB disc-based system. On-line generation, and reconfiguration at boot-up make it easy to respond to changing application needs with minimal disruption of operations that are already up and running.



Extended capacity for large applications

Virtual memory for data. To the base capabilities of all RTE systems, RTE-A.1 and RTE-6/VM add virtual memory for data, a unique capability for a 16-bit minicomputer. This demand-paged virtual scheme gives users access to data as if it were all in main memory — 12.6 million bytes in RTE-A.1, 128 million bytes in RTE-6/VM.

Sharable extended memory for data. RTE-A.1 and RTE-6/VM also support memory areas up to 2 million bytes each for data that is sharable by multiple programs and is accessible in microseconds because it is resident in main memory.

Extended Code Space for large programs. All RTE systems can support execution of large programs through segmentation. However, the RTE-6/VM system computers feature an Extended Code Space (ECS) capability that makes program segmentation almost transparent to the user. The ECS capability enables users to write programs that occupy all of available memory, up to 1.9M bytes. Additional code can reside on disc so programs can even be much larger than main memory. In addition to making it possible to develop and run large programs on E and F-Series systems, RTE-6/VM's ECS capability helps you move existing large programs to more cost-effective HP 1000 E and F-Series Computer Systems.

RTE: Proven operating system for your HP 1000 computer system

Today's RTE systems are the result of over ten years experience in thousands of successful real-time HP 1000 computer system applications throughout the world. At the same time RTE has been improved by a continuous stream of valuable enhancements, most of them requested by users like you. Today, RTE software and computers deliver an impressive capability for maximum real-time performance and computational power in many different jobs. Give your applications the competitive edge of this capability.

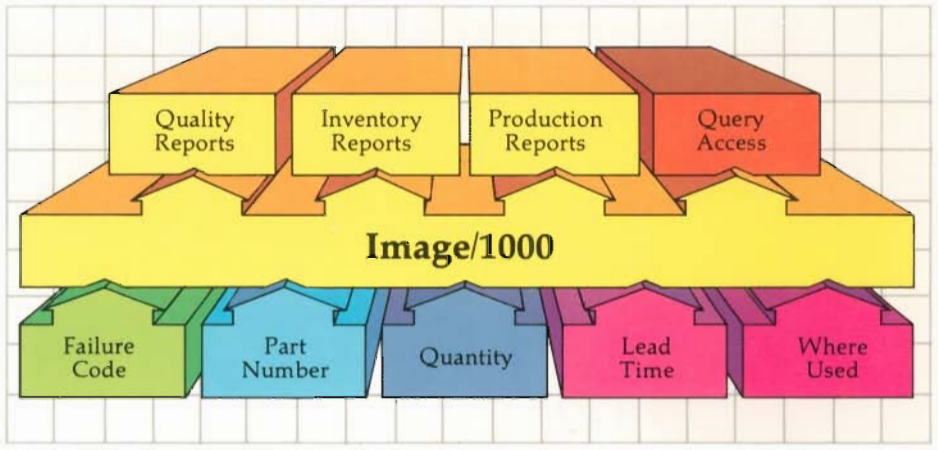
Image/1000. Data base management software that's user-oriented

Immediate answers to immediate questions

Image/1000 data base management software makes the HP 1000 work the way managers want all computers to work — quickly and efficiently.

Image/1000 is a complete set of software tools, used to consolidate data files into a single data base to be accessed by many different people. People who don't have — and don't need — sophisticated programming skills. Image/1000 data bases also provide security to prevent access from those who should not have access.

Image/1000 data bases can hold up to 960M bytes, with individual data sets of up to 120M bytes. Data may be accessed quickly on any of 16 keys to each file. Query, an easy-to-use inquiry language with conversational commands, is used to access Image/1000 data bases.



Remote data base access is also a capability of Image/1000. When HP 1000 systems are linked with DS/1000 networking software, a remote Image/1000 data base at any system can be easily accessed by either an application program or by Query.

You can access Image/1000 data bases through FORTRAN, BASIC, Pascal or Assembly language programs — while Query adds the ability to get answers to "right now" or "what if" questions. That's useful in such applications as quality assurance, when you need an instant look at failure rates; or in production control, when you need labor or machine availability data to organize schedules. HP's data base management software can help manage the record-keeping and information-handling tasks of most small-to-medium companies, or operation departments, plants, or branch offices. You get the best of two possible worlds — local accessibility, and central control of computer resources.

Graphics/1000-II. For interactive and three-dimensional capabilities

Two graphics software packages for flexibility

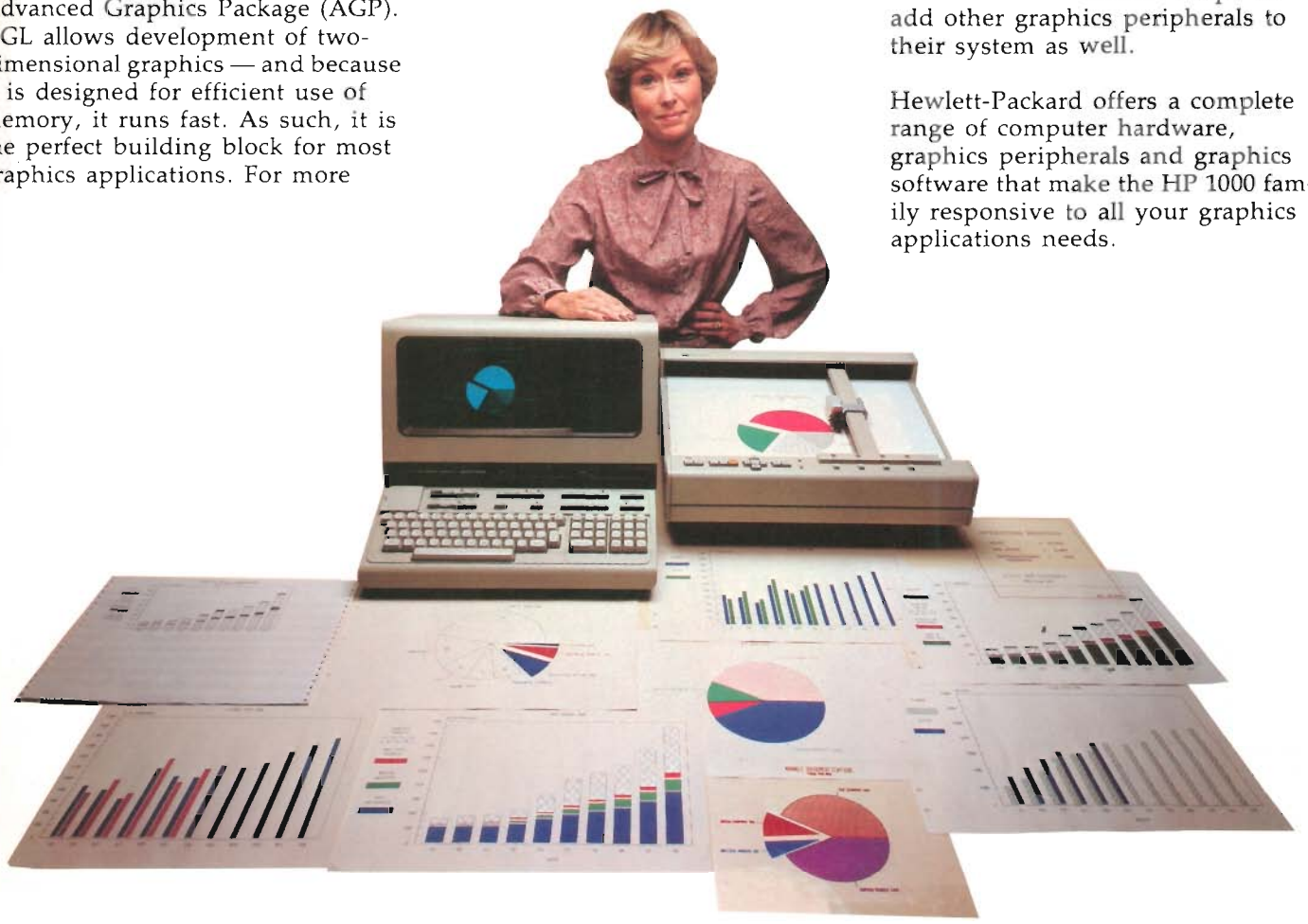
Graphics/1000-II software for the HP 1000 family of computers is a flexible, general purpose package that does not lock you into a particular application, and provides a range of power to fit the range of your graphic needs.

Graphics/1000-II software combines sets of easy-to-use subroutines that can be called from an applications program: a Device-Independent Graphics Library (DGL) and an Advanced Graphics Package (AGP). DGL allows development of two-dimensional graphics — and because it is designed for efficient use of memory, it runs fast. As such, it is the perfect building block for most graphics applications. For more sophisticated three-dimensional needs, you can use AGP to simplify development of interactive graphics applications. AGP adds on to the two-dimensional capability of DGL and can easily generate two-dimensional images of three-dimensional objects.

Graphics/1000-II may be used for applications requiring data display such as pie charts, bar charts, histograms and line graphs; dynamic display such as graphics for monitoring process control systems, and other applications requiring constant status updating; and interactive design graphics for computer-aided drafting, mapping and design tasks.

Graphics/1000-II will support the wide range of Hewlett-Packard graphics devices including vector refresh displays, raster graphics terminals, including a new color graphics terminal, graphics tablets, and graphics plotters. Most significantly, you can interface to any supported graphics peripheral from the same applications program. A skeleton device handler helps users add other graphics peripherals to their system as well.

Hewlett-Packard offers a complete range of computer hardware, graphics peripherals and graphics software that make the HP 1000 family responsive to all your graphics applications needs.



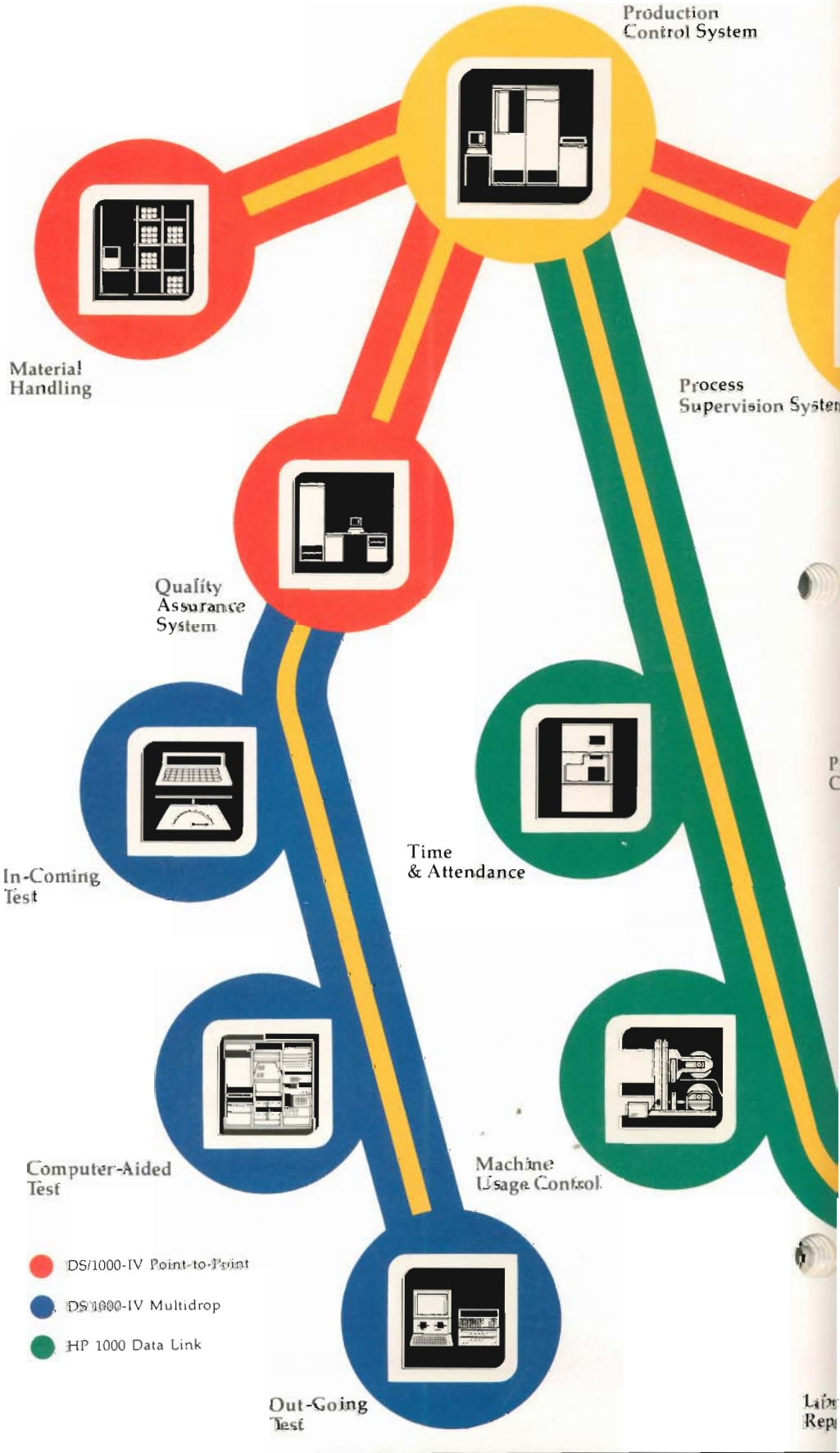
DSN/Distributed Systems:
The widest range of networking capabilities available

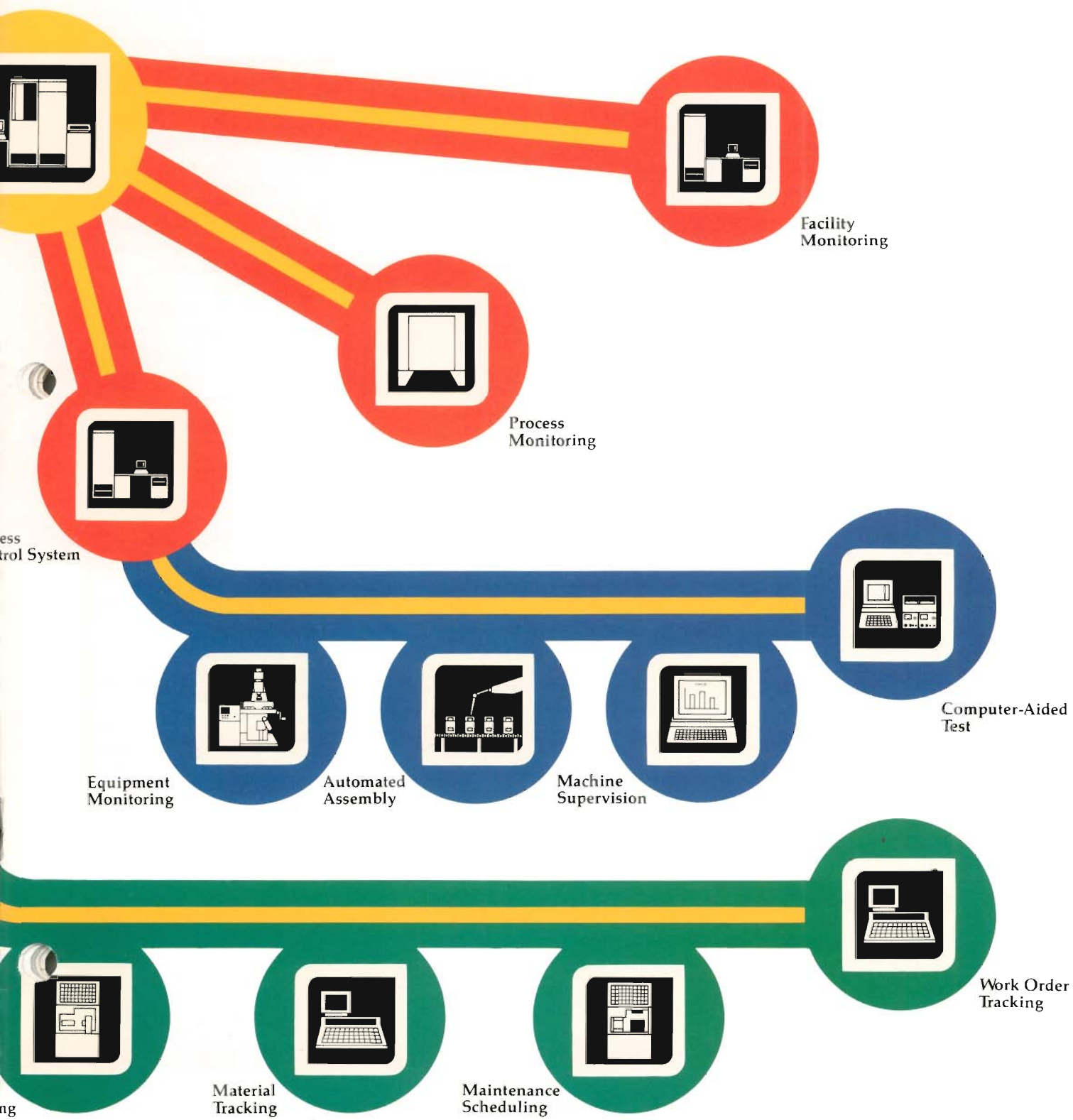
For flexible, reliable and easy-to-use computer networking

Distributed Systems/1000-IV (DS/1000-IV) is the fourth-generation set of software and hardware networking products for the HP 1000 family. It is an advanced communications package that provides user-level multilink performance, improved message integrity and network reliability, and a large list of user services. DS/1000-IV is extremely simple to install and use, and permits the creation of large networks in virtually any configuration.

All HP 1000 computers can take advantage of the network support offered by DS/1000-IV. A customer needs only to become familiar with one compatible family of operating systems and only one networking product. DS/1000-IV features include topological independence, general nodal addressing with store-and-forward communications, layered architecture, and such recent enhancements as HDLC link level protocol, message accounting, dynamic message re-routing, remote I/O mapping, and much more.

Hewlett-Packard is a leader in distributed computer systems, delivering networking software since 1973. Now the fourth-generation of practical networking software is available for your applications. And HP is constantly working to improve its networking packages, so your investment in DS/1000-IV will be protected by compatible upgrades in the future. DS/1000-IV is an affordable network communications package that grows when you do, putting all the power of HP 1000 products to work whatever your application.

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HP 1000 Board Computers:
Full power and maximum flexibility

A choice of board computers lets you do it your way

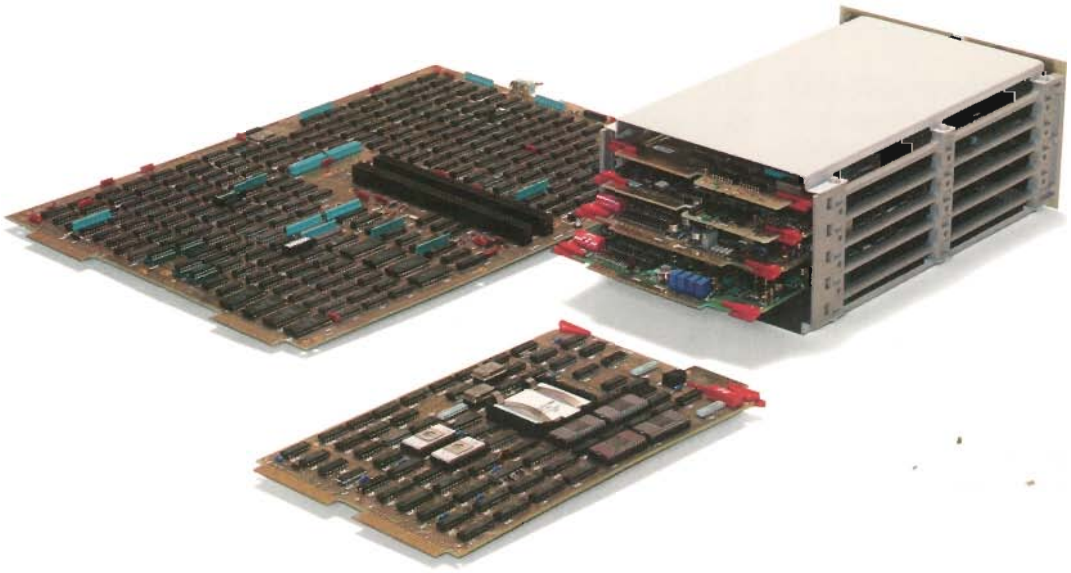
For high volume applications that require the processing power of a minicomputer at lower unit costs, the component board computer is the answer. This package delivers the full power of the computer and the flexibility of component level integration. HP 1000 board computers can be easily integrated within a product or a system, or used with a custom front panel or special operator controls.

The power available in HP 1000 board computers ranges from the 300,000 instructions per second L-Series through the 1,000,000 instructions per second A600 and A700. Additionally, the A700 can be equipped with a very fast hardware floating point processor board.

The A600 and L-Series are offered to OEMs and system designers as a two-board, half-megabyte microcomputer. With this kind of base memory capacity, expandable up to 4 megabytes in the A600 with the addition of four memory array cards, product designers now have more flexibility than ever before.

For OEMs and system designers who want to package their own data processing systems, a five-board A700 board computer includes an optional floating point processor. Up to 1 million bytes of memory can be included in this powerful 5-board set, with further expansion possible to a total of 4 million bytes with additional array cards.

For users who prefer a board computer supported by the widest choice of software, interfaces, and peripherals, the E-Series computer is available as a three-board set with 64k bytes of memory.

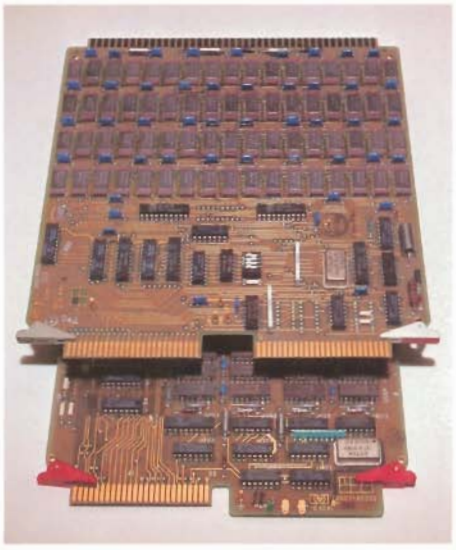


HP 1000 Memory:
Advanced technology at affordable prices

Advantages in performance, capacity and reliability

Semiconductor memory technology has progressed rapidly in recent years, achieving improvements in speed, packaging, density and reliability. And — at affordable prices, as well. But to take advantage of these advances, computer hardware and software capabilities must be designed to put the full range of memory attributes to work for you. The HP 1000 computers do precisely that.

Hewlett-Packard was a pioneer in memory technology, first with 4k N-channel MOS/RAM memories, and then with 16k RAMs built into memory modules. Today, HP is still moving forward, first offering 64k RAM technology in half-megabyte memory boards for our L-Series, and a 512k byte board now available for the E- and F-Series, a 1 megabyte board for the A600 and A700, and a 768k byte Error Correcting Code (ECC) memory board for the A900. Efficient memory system design for the E- and F-Series can provide 420 nanosecond access to main memory.



And pipelining and cache memory in the A900 bring average effective access down to a mere 181 nanoseconds in the highest performing member of the HP 1000 family. Memory parity is standard in all HP 1000 memory systems. And for the needs of very large systems in critical applications, Error Correcting Code (ECC) capability detects and corrects all single-bit errors, and detects all double-bit errors.

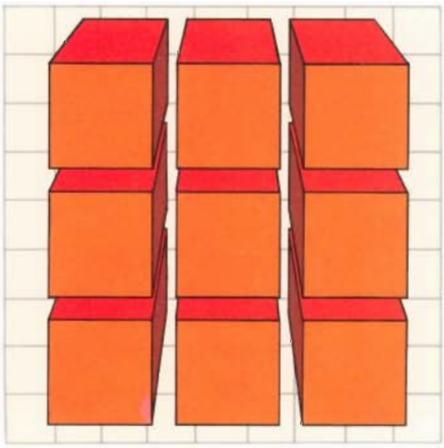
HP 1000 memory systems mean maximum performance, capacity and reliability — at low prices.

Powerful tools to help you take advantage of high technology memory

HP 1000 computers are designed to let you realize the benefits of modern memory technology, and include a number of hardware and software products to make optimum use of your memory system. The Dynamic Mapping System (DMS), for instance, is a flexible memory management system that underlies the large memory capacity of the HP 1000 family. DMS provides four sets of mapping registers, managed by 38 instructions, which permit operations such as cross-loading maps in a single instruction. RTE-A, RTE-XL, RTE-6/VM and DMS enable the HP 1000 to perform tasks formerly only within the capability of larger computers.

HP 1000 computers give you the most advanced memory systems available — and a unique set of tools to let you put that memory to useful work.

HP 1000 Peripherals:
Logical extension of computer power



A complete and compatible family of HP 1000 peripherals

HP 1000 peripherals are designed to do a variety of specific jobs — and designed to fit easily into the family of HP 1000 products. With HP peripherals, available from one company and manufactured by one company, you'll have the confidence that comes not only from knowing each product meets our exacting standards, but also benefits from single-source support.

You can choose from over 50 different peripherals to create your initial HP 1000 system, or to enhance its capabilities in the future. The versatility and high performance of HP 1000 peripherals make it possible for you to configure a system that will meet all your needs. Select from CRT display, graphics, printing and data capture terminals, thermal and impact printers, flexible and hard disc drives, magnetic tape units, a dozen graphics peripherals, modems, and many more. Hewlett-Packard gives you the choice — and the value.

HP 1000 mass storage peripherals: Fast, tough, and smart

Hewlett-Packard also offers a family of fixed drives for HP 1000 Systems — known as Command-Set/80 (CS/80). Members of the CS/80 family share a common HP-IB command protocol and interfacing scheme, and are accessed by the computer in identical ways despite differing widely in capacity.

Three low-cost models in the Command-Set/80 group are based on Winchester fixed-disc technology, with an integrated streaming tape cartridge drive that provides economical backup for archival purposes and can be used for file backup or data interchange with other systems. Capacities of these economical discs are 16.5, 28.1, and 65.6M bytes. Even larger capacity is available in Model 60 and 65 systems with up to eight 404M byte fixed discs.

All the CS/80 disc products have extensive internal self-test diagnostics, automatic head alignment and error logging.

HP 1000 Systems Summary

	Model 5	Model 6	Model 16
System type	Low-cost disc or memory-based system	Higher performance Model 5	General-purpose disc-based system
Configurations available	Tabletop	Tabletop	1.6m (63 in) or 72cm (28 in) cabinet
Central processor	HP 1000 L-Series	HP 1000 A600	HP 1000 A600
Operating system	RTE-XL	RTE-A.1	RTE-A.1
Main memory configuration	128k bytes to 512k bytes	128k bytes to 2M bytes	128k bytes to 4M bytes
System disc	Dual 270kb minifloppy discs; 4.6M byte fixed disc, or 16.5, 28.1, or 65.6M fixed disc with built-in cartridge tape for backup and loading	Dual 270kb minifloppy discs; 4.6M byte fixed disc, or 16.5, 28.1, or 65.6M fixed disc with built-in cartridge tape for backup and loading	16.5, 28.1, or 65.6M byte fixed disc with built-in cartridge tape for backup and loading
Maximum disc storage	260M bytes	260M bytes	260M bytes
System console terminal	Any of the 262x family of interactive terminals	Any of the 262x family of interactive terminals	Choice of: 238x Office display terminal. 262x Interactive terminal 2635B Printing terminal
Available I/O channels	3-4 usable for I/O and/or memory expansion	3-4 usable for I/O and/or memory expansion	16 usable for I/O and/or memory expansion
Number of DMA channels	All I/O channels	All I/O channels	All I/O channels
Direct memory access rate	2.7Mb/sec	4.27Mb/sec	4.27Mb/sec
Memory cycle time	680ns	454ns	454ns
Base instruction set execution speed	300,000 instructions/sec	1,000,000 instructions/sec	1,000,000 instructions/sec
Floating point execution speed	2,000 operations/sec	50,000 operations/sec	50,000 operations/sec
Virtual memory for data	No	Yes	Yes
Sharable extended memory areas	No	Yes	Yes
Extended code space	No	No	No
Scientific instruction set	No	No	No
Vector instruction set	No	No	No

Model 17	Model 19	Model 60	Model 65
General-purpose disc-based system	High performance disc-based system	General-purpose disc-based system	High performance disc-based system
1.6m (63 in) or 72cm (28 in) cabinet	1.6m (63 in) or 72cm (28 in) cabinet	Desk or 1.6m (64 in) upright cabinet	Desk or 1.6m (64 in) upright cabinet
HP 1000 A700	HP 1000 A900	HP 1000 E-Series	HP 1000 F-Series
RTE-A.1	RTE-A.1	RTE-6/VM	RTE-6/VM
256k bytes to 4M bytes (2Mb with ECC)	768k bytes ECC to 6M bytes	256k bytes to 2M bytes	256k bytes to 2M bytes
16.5, 28.1, or 65.6M byte fixed disc with built-in cartridge tape for backup and loading	16.5, 28.1, or 65.6M byte fixed disc with built-in cartridge tape for backup and loading	16.5, 28.1, or 65.6M byte fixed disc with built-in cartridge tape for backup and loading, or 404M byte fixed disc, or 19.6, 50, or 120M byte removable media MAC disc	16.5, 28.1, or 65.6M byte fixed disc with built-in cartridge tape for backup and loading, or 404M byte fixed disc, or 19.6, 50, or 120M byte removable media MAC disc
260M bytes	260M bytes	3200M bytes	3200M bytes
Choice of: 238x Office display terminal. 262x Interactive terminal 2635B Printing terminal	Choice of: 238x Office display terminal. 262x Interactive terminal 2635B Printing terminal	Choice of: 2645A Display station 2647A Graphics terminal 2648A Graphics terminal	Choice of: 2645A Display station 2647A Graphics terminal 2648A Graphics terminal
13 usable for I/O and/or memory expansion	13 usable for I/O and/or memory expansion	10, expandable to 26	10, expandable to 26
All I/O channels	All I/O channels	2	2
4Mb/sec	3.7Mb/sec	1.8Mb/sec (std) 2.3Mb/sec (opt)	2.3Mb/sec
500ns	181ns, effective average	595ns (std) 420ns (opt)	420ns
1,000,000 instructions/sec	3,000,000 instructions/sec	1,000,000 instructions/sec	1,000,000 instructions/sec
211,000 operations/sec	560,000 operations/sec	40,000 operations/sec	180,000 operations/sec
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
No	No	Yes	Yes
Optional	Standard	No	Standard
Optional	Standard	No	Standard

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Printed in U.S.A. 10/82
5953-8701