

Dedicated disc based computer systems.



HEWLETT  PACKARD
DIGITAL COMPUTERS



Three low cost computer systems with a lot of punch.



Time-sharing, Real Time or Batch. Now HP offers you a family of small disc based systems that can be easily dedicated to your processing problem. At the lowest possible cost. Their power comes from the marriage of hardware and software. They combine our versatile 2100 minicomputer, the fast 7900 five megabyte disc, and more than a dozen peripherals. And a choice of dedicated operating systems lets you take full advantage of all this powerful hardware.

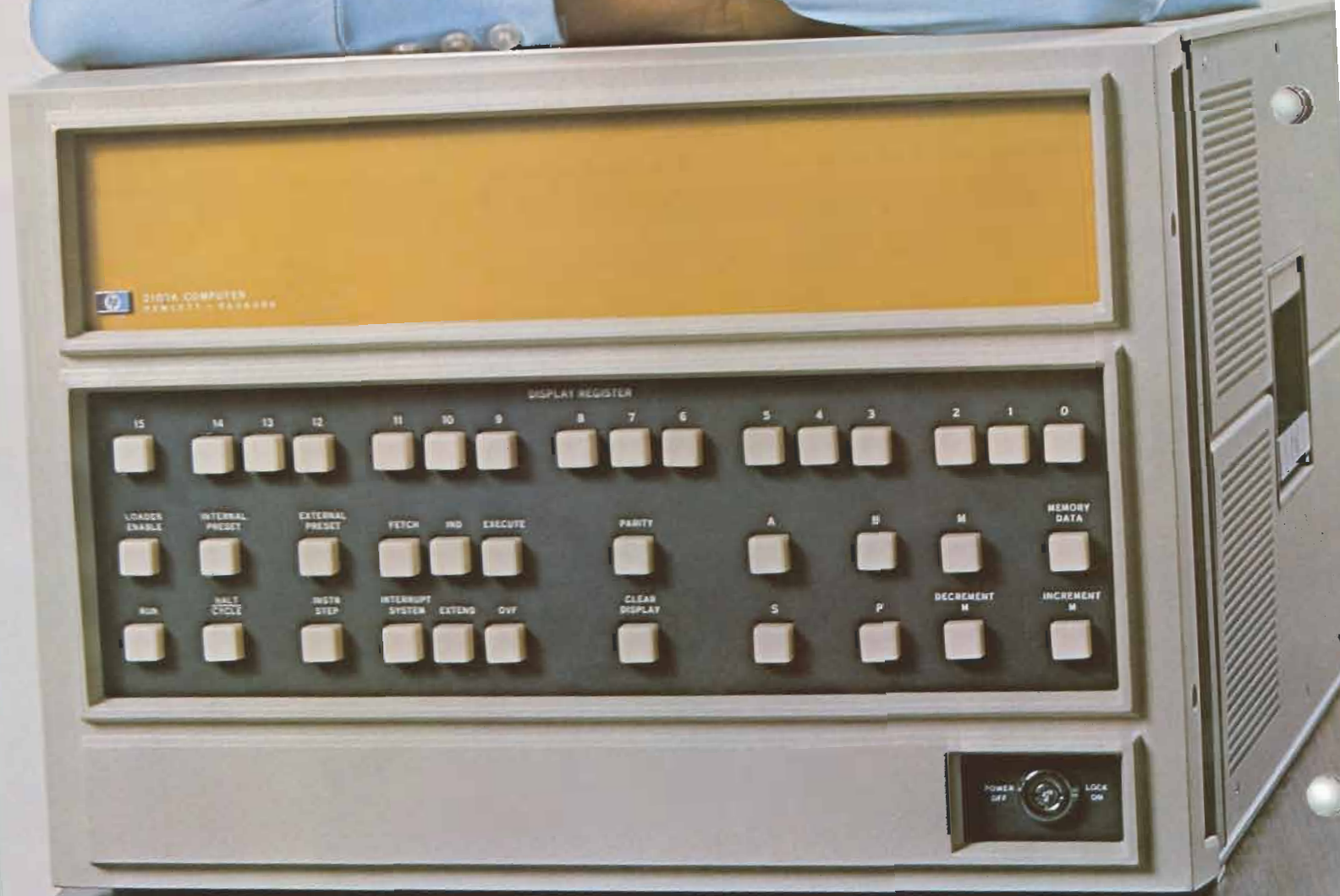
HP disc based systems offer maximum capacity for your computing dollar. Its 2120 Disc Operating System has features like program chaining, extended file management, and a job processor that allows the mixing of FORTRAN IV, ALGOL, and Assembly Language programs. Want a 16 terminal dedicated time sharing system? Just add a bit of hardware and our field proven time-share software, featuring extended HP BASIC. Presto—You've now got the new HP 2000E. It's also expandable to the new dual processor, 32-terminal 2000F. For your real time applications, some additional hardware and HP's Real Time Executive turns your system into the powerful HP 2005 system.

Common to all is the 2100 Digital Computer. It's the heart of each of these new disc-based systems. It has a submicrosecond memory, uses the latest in MSI/LSI technology, and is controlled by a microprogrammed read only memory. The 2100 can expand its memory to 32K. Standard system features are direct memory access, hardware multiply/divide, memory protect, and memory parity check. Hardware floating point can be optionally added to give the system more computational power.

The 7900 Moving Head Disc has five million bytes of on-line storage. It can be used for operating systems, compilers, programs, and data areas. The 7900 is fast, compact, and reliable. Up to four of them can be chained on one controller.

A small computer system has to interface simply and easily to peripherals to make it adaptable to solving problems. The Hewlett-Packard disc based systems interface to more than a dozen peripherals and over 50 HP instruments. Line printers, card readers, punches, terminals, and more. All you do is plug them in. Hewlett-Packard writes and supports all the software to make them useful.

HP's disc based systems are designed to solve a variety of data processing and real time problems. They are cost effective systems for today and expandable ones for tomorrow.



DIGITAL COMPUTER
SYSTEMS - 8400000

DISPLAY REGISTER

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
LOADER ENABLE	INTERNAL PRESET	EXTERNAL PRESET	FETCH	IND	EXECUTE	PARITY	A	B	M	MEMORY DATA					
RUN	HALT CYCLE	INSTN STEP	INTERRUPT SYSTEM	EXTEND	OVF	CLEAR DISPLAY	S	P	DECREMENT M	INCREMENT M					

POWER OFF LOCK ON

They use the “Thoroughly Modern Mini”

Up to date and with it—that’s our system’s processor, the 2100 Digital Computer. It’s a versatile answer to problems that require ease of I/O interface and reliability.

This new computer is an LSI/MSI machine with a memory cycle time of 980 nanoseconds. The control section, actually a computer within a computer, is a microprocessor with its own read only memory (ROM). The instructions in ROM act as sophisticated switches which direct the operation of the computer.

HP disc based systems have many standard processor features that are normally options on other computers. They include hardware multiply/divide, power-fail/restart, memory protect, and parity check. Floating point hardware, standard on the new 2000 series, can be added to the other disc based systems to give a 5 to 20 time increase in the execution of floating point calculations.

The basic systems have two Direct Memory Access (DMA) channels to transfer data at a rate up to one million words per second per channel. DMA directs the transfer of data from the systems’ peripherals to memory without having to go through the arithmetic unit. Each DMA channel contains address, word count, and control registers. They may be assigned, under program control to any interface.

The 2100 processor can expand to 32K of 16-bit word memory. The minimum amount of memory is dependent upon the basic software configuration you choose—8K for DOS, 16K for time-sharing and RTE.

The input/output structure of the 2100 was designed to allow an inexpensive interface to a variety of peripherals and instruments. That’s why it can be easily adapted to your particular application.



MONITOR CONTROL

MONITOR CONTROL

SCODD SCS-64 K.O.

RESET
PAUSE
ON LINE
EXEC

PRINT

0
1
2
3
OFF

And, they expand to a fantastic amount of storage.

A modern up-to-date processor is useless by itself. It needs the peripherals and on-line storage to make it work efficiently. That's why HP offers a number of mass storage devices, ranging from the basic 5 million bytes to a whopping 47 million bytes of disc storage. For magnetic tape requirements, HP 7970 tape drives can be added. The disc based systems were designed to handle large data banks efficiently. With their powerful but inexpensive processor, and their ability to interact with vast amounts of storage, they are the ideal match for many data-based applications.

The 7900 Moving Head Disc has two types of storage, a removable IBM 2315 type disc cartridge, plus an equal amount of fixed storage. This permanent portion is used for information which is of a more constant nature. The cartridge itself is used for variable data.

The average access time is 47 MSec. This gives all the speed necessary for most data based applications.

The 7900 allows 4 units to use one controller and one DMA (Direct Memory Access) channel on the 2100 computer.

An absolute air filtration system excludes dust, smoke, and other contaminants from the heads and disc, and maintains positive pressure in the drives enclosure during a cartridge change.

The 2883 Moving Head Disc gives Disc Operating System users the storage of a large computer.

The 2120 can handle two of these discs in a master/slave relationship. This makes available over 47 million bytes of on-line storage. It is the ideal match for large data base applications.

The disc uses an IBM 2316 removable pack and has an average access time of 32 milliseconds. The data transfer rate on the disc to the 2100 Computer is 236K bytes/second.

The 7970 Magnetic Tape Drive is offered with a number of options. It can be 7 or 9 track, 200, 556, 800, or 1600 BPI and it can run at up to 45 IPS on one controller.



Each can be customized to fit your needs.

An HP disc based system can be tailored to fit your small computer requirements. Over a dozen peripherals are offered. In addition, they will accommodate almost 50 HP instruments. And everything plugs right in. Here are some of the HP peripherals available.



HP 2610 Line Printer 200 lines per minute, line width of 132 characters, 64 or 96 character ASCII, 6 lines per inch vertical density, 6 part crisp printing. A 132 position 600 LPM printer is also available.

2892 Card Reader
600 CPM, Hollerith punched cards, input hopper holds 600 cards output 600 cards.

HP 2761 Optical Mark Reader accepts both punched and marked cards, 200 cards per minute, input hopper holds 300 cards and either Hollerith or ASCII codes can be used.

HP 2600 Keyboard Display 25 lines, 72 characters per line, a 64 character ASCII set, a 10 numerical character keyboard, transmit and receive between 110 and 2400 bits per second. Display can be used as a console on the DOS and RTE, or a terminal for time-sharing.

HP 2895 Punched Tape Output 75 characters per second, designed for 1 inch and 11/16 inch tape, plastic and paper tape.

2605 Console Printer

132 column format, 30 character per second used as console, terminal or printer.



HP 2767 Line Printer line width 80 characters, 356 to 1110 lines per minute, 64 ASCII character set.



Digital Voltmeter

This represents over 50 HP instruments that can be attached to HP disc based systems.



HP 2748 Punched Tape Reader at a speed of 500 characters per second. It reads in 8 level code. Opaque and oily tapes may be intermixed.





POWER ON

LOCK
ON

1108 W



Key to our disc based systems— a choice of dedicated operating modes.

Run real time, time sharing, or batch. The choice is yours. HP can provide you with a 2000 series time sharing or a 2120 batch system. Optionally, you can purchase the Real Time Executive—giving you a powerful 2005 Real Time System. All the systems use essentially the same hardware, but each has a distinctive operating system.

2120 Disc Operating System

The 2120 disc operating system has many features usually found only in much more expensive systems. Files can be easily handled, programs easily maintained, and large amounts of data can be stored on a disc platter or pack.

The system can be created from disc or tape. Chains of programs can be run sequentially, and individual programs can be run in overlays so that the programmer is not limited to the core available in the processor. ALGOL, FORTRAN, and Assembly Language can be intermixed. The operator does not have to intervene and treat each job as a separate operation.

On a 16K 2120 disc system, an extended file manager can be added to make more efficient use of the mass storage device. Files and record sizes are specified by the user at program execution time. Users do not have to be concerned with the physical requirement of the disc.

2005 Real Time Executive System

The HP 2005 Real Time Executive has been field-proven over several years and is working with over 50 instruments types, and more than 20 peripherals and subsystems.

It is a powerful real time system with the capability of running background and foreground programs. Several user real time

programs can be run in the foreground serving multiple sensor devices, while the background can handle general purpose programs. The executive schedules program execution with up to 99 priority levels under both time and event control. It supervises all interrupts, I/O operations, bulk memory transfers, and all the housekeeping necessary for a multiprogramming system. The RTE uses a privileged interrupt to give a fast response to your critical applications. After the interrupt occurs, there is no waiting to complete a user program. Real time needs are serviced immediately.

2000 Series Low Cost Time Sharing

The 2000E and F inherits all the software developed for the successful 2000A, B and C systems. However, their totally new hardware now makes time-sharing available at a new low cost. But performance has not been compromised.

In the 2000E, up to 16 simultaneous system ports are available for access by both hardwired and dial-up terminals. Each terminal user has available all the resources of the system including both a public and private library. User program length is not a limitation. Programs can be chained through a common area giving the user virtually unlimited program length.

And, the 2000E is further expandable. It can increase to the powerful 2000F information system which uses a second 2100 processor as a communications front-end. This enables it to handle 32 simultaneous terminals, thereby significantly extending file handling capability, system response, and terminal handling.

IND

EXECUTE

EXTEND

OVF

And, our software takes the work out of programming.

The HP dedicated disc-based systems use all of the software and applications packages developed for our 3100 plus computer installation. Why? Because the 2100 processor is architecturally compatible with all of them. Over 500 library programs, statistical routines, application packages—and more. Included in these are HP Extended BASIC, FORTRAN, ALGOL, and Assembly Language.

HP Extended BASIC Time-sharing Interpreter

The new HP 2000 Series uses the HP Extended BASIC interpreter. It takes each line of user code as it is presented to the processor and converts it into code which can be edited on a line for line basis. This allows the user to alter code without recompiling his whole program.

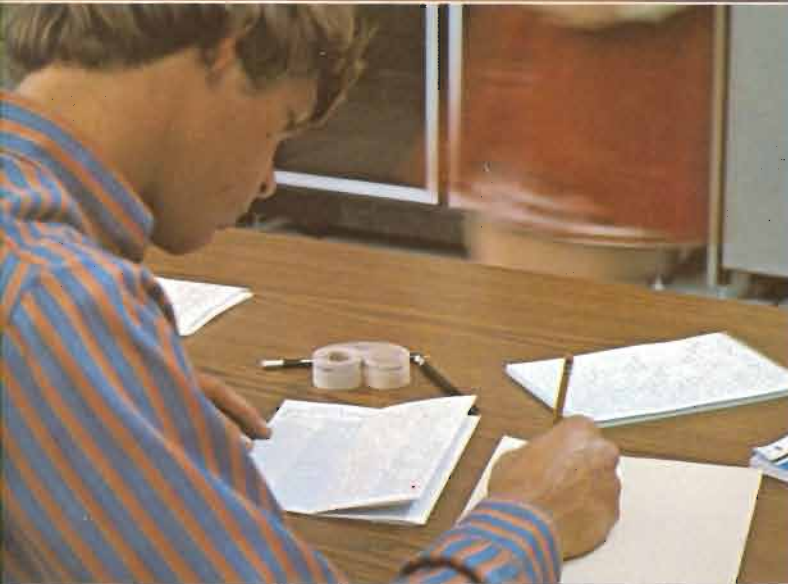
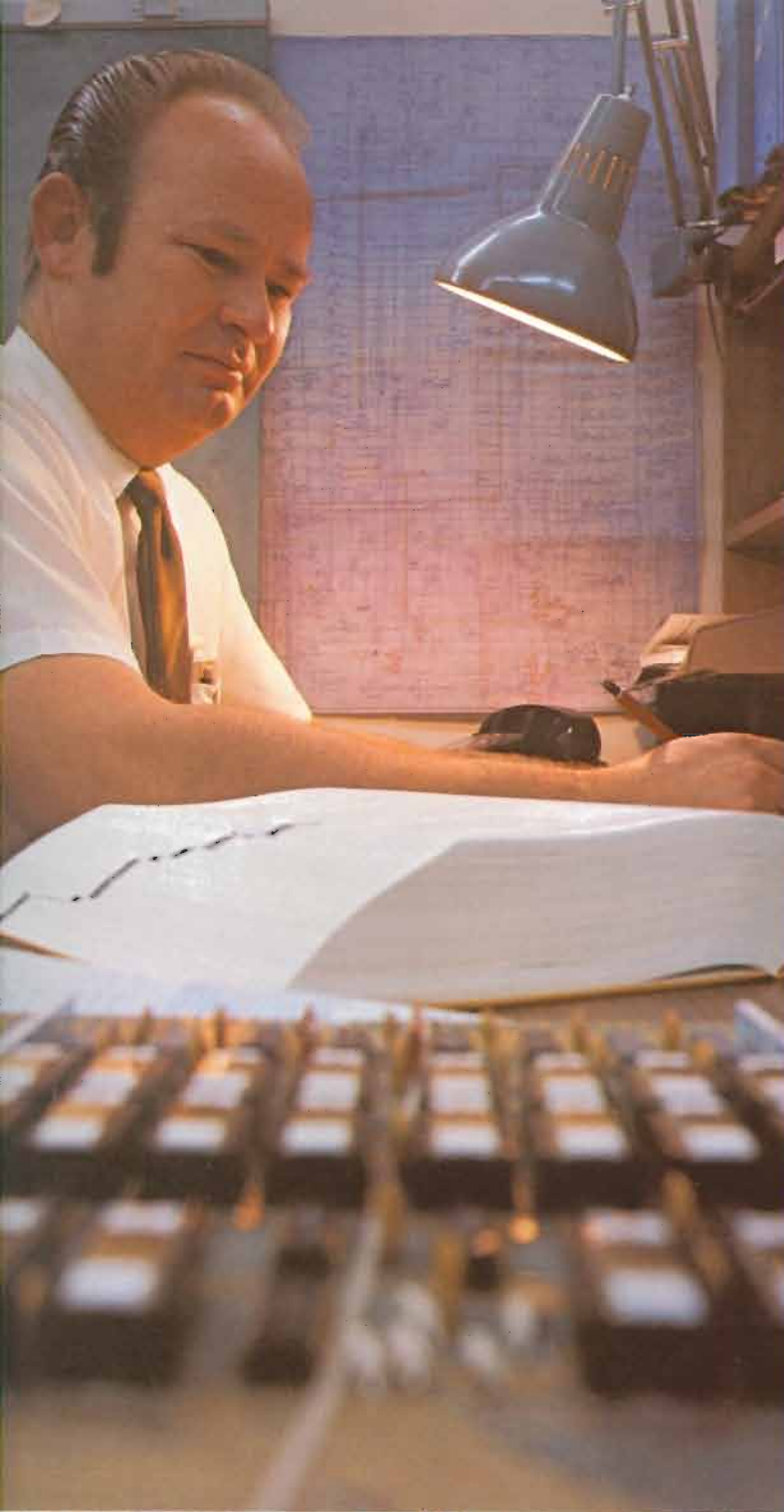
With HP's Extended BASIC, you have all the advantages of the Dartmouth Basic plus useful extension. For instance, you can do complex matrix operations.

Data files can be both random and sequential with a maximum of 4 files per program. And with the CHAIN statement the programmer is not limited by the amount of memory in core. He has available to him the almost unlimited on-line memory of the disc. With the COMMON statement, program and chained subroutines can use the same undisturbed areas of core.

FORTRAN The HP Disc Based System uses the American Standards Association Basic FORTRAN II and IV. FORTRAN is the standard language of the scientist and engineer. The 2120 FORTRAN also offers a modified version which makes it adaptable to the business environment. FORTRAN can be used on both the 2120 batch system and the 2005 Real Time Executive System.

ALGOL allows problem description in an internationally defined language. The compiler produces relocatable code in one pass. It includes all the major elements described in ALGOL 60 revised report, Communications of the ACM January 63 plus a number of features such as an unrestricted nesting of conditional statements and the intermixing of REAL and INTEGER identifiers. ALGOL is available on the 2005 Real Time Executive System and the 2120 Disc Operating System.

Assembly Language gives the full flexibility of the hardware instructions. The language includes machine operation codes, and symbolic addressing. The output may be absolute or relocatable. The DOS and RTE systems also have many other assembly language features. Among these are page-free programming, fixed and floating point pseudo operations and the ability to reserve storage with a COM statement.



Best of all, they get the job done.

HP Disc Based Computer Systems are particularly suitable where there is a need to access a large data bank of information, and where ease of I/O interface is required.

Engineering To the engineer, they can be a valuable tool in solving problems of monitoring and control. While it's in the testing environment, it can also serve as a computational tool—aiding the design and simulation of systems. In fact, HP computers have performed millions of man-hours testing jet engines, computer peripherals and rockets. In this way, they are providing engineers with the answers to design more cost-effective products for tomorrow.

Education HP disc based computers give the educator an inexpensive expandable system. They can be used in the classroom as a problem solver and teaching aid. HP computers have been widely received in the educational community because of the large number of courses and special programs that are in the software library.

Science In the laboratory, HP disc systems are teaming up with mass spectrometers, gas chromatographs, Fourier analyzers, and many

other sophisticated instruments. Working together, they give the scientist the kind of analytical results that only a dedicated system can provide.

Industry The 2100 Disc Based System helps the businessman solving problems of data base management and control. It gives him a tool which can be dedicated to the efficient solution of problems that need constant monitoring. In this area, HP computers are working in inventory, accounting, manufacturing, and production. In so doing, they provide management with timely information for the solution of cost-critical problems.

Support Combine all these systems with HP's traditional service and support. Trained system analysts and service engineers are on call world-wide to assure that your installation is a success.

