HEWLETT hp PACKARD

A FAMILY OF THREE..

high-performance digital computers from HP

Use HP Computers for free-standing scientific computation

The HP Family...

offers three computers to choose from, to suit your particular needs. Model 2116B is the one to pick for applications requiring maximum memory and I/O capacity. Model 2115A is more compact, doesn't go up as high in memory or I/O, but is a good all-round machine for the majority of applications. Model 2114A, smallest of the three and priced at less than $10K, economizes in memory and I/O capacity without sacrificing performance. All three computers are 16-bit machines, sharing the same word structure and software – so all your programs are usable if you add a different model to your stable.

They're fast; memory cycle time is 1.6 microseconds for the 2116B, 2 microseconds for the 2115A and 2114A. The 2116B is available with 8K or 16K memory, externally expandable to 32K, while the smaller machines come with 4K or 8K memory. All provide multilevel priority interrupt I/O . . . 16 channels for the 2116B, 8 channels for the 2115A and 2114A. Moreover, a 32-channel I/O extender can be used with the 2116B and 2115A. There's optional party-line I/O for the 2116B and 2115A, multiplexed I/O for the 2114A.

Plug-in options for the two bigger computers include Extended Arithmetic Unit for high-speed multiply/divide and long shift/rotate instructions, and Direct Memory Access for high-speed data transfer. There's a spec summary on the back of this flyer, and detailed technical literature is yours for the asking.

Use HP Computers in sophisticated instrumentation systems

Software — A Study in Strength

HP Computers are supported by the most comprehensive software package available for computers of this size — and they're *software compatible.* Three high-level languages — FORTRAN, ALGOL and Conversational BASIC. An efficient 70-instruction Assembler. A Basic Control System utilizing modular software drivers — for device-independent programming. Executives for data acquisition and time-sharing. Diagnostics for processor and peripheral checkout.

COMPILERS

FORTRAN:	All features of ASA Basic FORTRAN, plus some features of ASA FORTRAN and many other useful capabilities. Operable in 4K memory.
ALGOL:	All major elements of ALGOL 60, plus exceptional I/O flexibility and other features. Operable in 8K.
BASIC:	Interpretive compiler providing simple mathematical language similar to FORTRAN and ALGOL. Operable in 8K.

ASSEMBLERS

ASSEMBLER:	Provides 70 mnemonic machine operation codes, 23 assembly directing pseudo codes and symbolic addressing. Output may be absolute or *relocatable.*
EXTENDED ASSEMBLER:	Provides additional capabilities for the 8K user.

CONTROL

BASIC CONTROL SYSTEM:	Handles loading, relocating and linking of user programs and library subroutines. Simplifies programming and execution of all input/output operations.
DATA ACQUISITION EXECUTIVE:	Permits real-time operation of computerized data acquisition systems, plus keyboard control (without recompiling) of all data acquisition functions, computation constants, sampling intervals, etc. Requires 8K.
TIME-SHARING EXECUTIVE:	Enables 16 users to time-share 2116B Computer in BASIC language. Also maintains public and private library and bookkeeping. Requires 16K.
REAL-TIME EXECUTIVE:	Provides multiprogramming capability for the 2116B. Allows running foreground programs in real time concurrently with background programs. Requires 16K core plus disc memory.

UTILITY ROUTINES

SYMBOLIC EDITOR:	Allows characters and statements in punched tape programs to be easily changed.
PROGRAM LIBRARY:	Contains mathematical functions, logical operations, I/O formatter, and many other subroutines, callable from compiler or assembler programs.
DEBUGGING ROUTINE:	Allows dynamic checkout of programs through memory dumps, trace printouts, etc.
PREPARE CONTROL SYSTEM:	Enables easy modification of Basic Control System to suit different system hardware configurations.
HARDWARE DIAGNOSTICS:	Permit rapid checkout of memory, arithmetic, and input/output.
MAGNETIC TAPE SYSTEM:	Allows software to be stored on magnetic tape, greatly increasing speed and convenience of assembly, compilation and loading. Requires 8K.

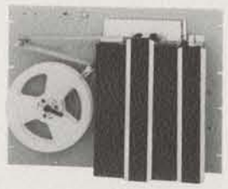
Peripherals for All Purposes

HP Computers are available with peripherals for all traditional computer input/output functions, plus measuring instruments like analog-to-digital converters and counters. They're interfaced simply through plug-in cards (most devices need only one card) and modular software drivers. We have general-purpose interfaces, too, to let you tie your own devices into an HP Computer.

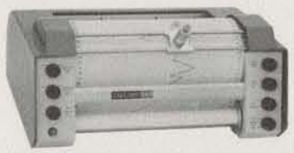
HP 2737A

PUNCHED TAPE READER
Reads 8-level code
300 char/sec

HP 2753A



TAPE PUNCH
Punches 8-level code
120 char/sec



PLOTTER
300 steps/sec
Resolution .01 inch
Plotting width 11 inches

CARD READER
12-bit parallel column,
80-column cards
1000 cards/min

HP 2757A

HP 2756A

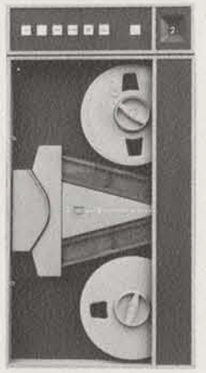
DISC MEMORY
(2116B, 2115A only)
32 tracks, head-per-track
2720 addressable sectors
64 words/sector
174,080 16-bit words
(64-track disc also available)

LINE PRINTER
300 lines/min
72 to 132 characters/line
ASCII character set

MAGNETIC TAPE

Write only
400 char/sec
7-chan, 200 bpi

KENNEDY 1406



Read/write
6000 or 16,700 char/sec
7-chan, 200 or 556 bpi

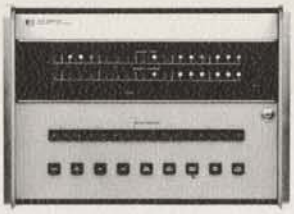
HP 2020A

TELEPRINTER
Keyboard, punch, read, print
10 char/sec
ASCII character set

HP 2752A

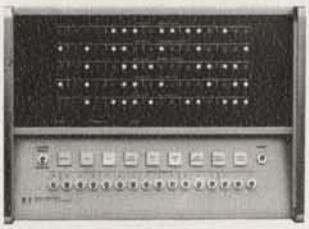
Specifications

2114A



Memory Size: 4K or 8K
Cycle Time: 2 μs
Input/Output: 8 channels in main frame
Environment: 10 to 40°C. RH to 80% at 40°C
Price: $9,950 (without peripherals)

2115A



Memory Size: 4K or 8K
Cycle Time: 2 μs
Input/Output: 8 channels in main frame; 40 channels with external extender
Environment: 10 to 40°C. RH to 80% at 40°C
Price: $14,500 (without peripherals)

2116B

Memory Size: 8K or 16K in main frame; 24K or 32K with external extender
Cycle Time: 1.6 μs
Input/Output: 16 channels in main frame; 48 channels with external extender
Environment: 0 to 55°C. RH to 95% at 40°C
Price: $24,000 (without peripherals)

2114A/2115A/2116B

MEMORY

Type: Magnetic core
Word Size: 16 bits (plus 17th bit for optional parity check)
Page Size: 1024 words
Indirect Addressing: All pages

ARITHMETIC

Parallel, two's complement binary

SPEED

Times shown are maximums, in microseconds, for HP 2116B. Corresponding figures for 2115A and 2114A are extended by 25%.

	Standard	With optional Extended Arithmetic Unit**
Add	3.2 μs	–
Subtract	4.8	–
Multiply	150*	19
Divide	310*	21
Floating Point Add	900*	–
Floating Point Subtract	900*	–
Floating Point Multiply	750*	344
Floating Point Divide	1500*	448

*(*Subroutine – time approximate)*
*(**2116B, 2115A only)*

REGISTERS

Accumulators: Two (A and B, 16 bits each)
Memory Control: Three (Transfer, Program Counter, Memory Address, 16 bits each)
Supplementary: Two (Overflow and Extend, 1 bit each)
Manual Entry: One 16-bit Switch Register

INSTRUCTIONS

Memory Reference	(2-cycle)	14
Register Reference	(1-cycle, microprogrammable)	43
Input/Output	(1-cycle)	13
	Total	70

INPUT/OUTPUT

16-bit parallel interrupting channels, with priority control, utilized through plug-in I/O interface cards (one per channel).

DATA FORM

Punched Tape: 8-level ASCII code (parity not used). 1-inch.
Magnetic Tape: 7- and 9-channel NRZI, IBM-compatible; 1/2-inch.

A call to your local HP field sales office will get you literature and assistance on all Hewlett-Packard products for the computer user.

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