

HP measurement and computer advances



An approach to "processor distributing": System 45 goes wherever the need exists.

HP's new System 45: an efficient way to handle a small department's computing needs.

In a compact, fully integrated desk-top package, System 45 incorporates the high-performance hardware that scientists and engineers need to solve their computational problems on the spot. It's portable, accessible, and powerful enough to satisfy the processing needs of a project group or a small department.

With the speed and power of a big minicomputer in a desk-top-sized chassis, HP's System 45 is a new genre of computer system.

System 45 integrates:

- an interactive keyboard with alphanumeric, control, editing, and special function keys.
- a processor that is fast enough to execute a full-precision addition in 220 μ sec, and powerful enough to invert an 85 by 85 matrix— with a single command.
- a CRT display that lets you plot and manipulate data as it is generated.
- two built-in, high-speed tape transports (217k bytes per cartridge), one of which is optional, or optional disc drives (up to 50M bytes).
- a unified mass storage command structure that automatically places all files and maintains a directory by mnemonic name.
- ready-made I/O capability for BCD, bit parallel, bit serial, and HP-IB devices.

- powerful language—ANSI standard BASIC that can be enhanced with FORTRAN-like capabilities at the user's command— plus an extensive library of utility and application programs.
- an optional built-in printer that operates at 480 lines per minute and can copy formatted data from the CRT.

For scientific computation and data analysis, System 45 handles data characterizations, variance, regression analysis, and other complex routines. It allows you to view the results immediately in whatever form you choose, and to manipulate them as you proceed to an optimum solution.

For computer-aided design, System 45 places the entire process directly under your control. It lets you customize BASIC programs easily with the CRT and editing keys, display tabular or plotted results on the CRT, and rerun an analysis with new variables.

For data acquisition, System 45 interfaces directly with instrumentation, eliminating high development costs and delays. It captures real-time data at 500k transfers/sec and runs I/O operations while it performs computation routines.

With its singular combination of power, accessibility, and portability, System 45 presents technical managers with new opportunities to distribute computing power within their departments, and so increase the productivity of smaller science and engineering labs. If, on the other hand, multi-user distributed processing better fits your needs, you should consider HP's S/1000 or 3000 Series II computer systems.

Prices for the HP System 45 start at 11,500*.

extend your possibilities.

After the honeymoon, how do you support a microprocessor?

If you're contemplating the conjugation of a microprocessor with a product you are developing, you now have an alternative to costly board-exchange programs in the event of faulty circuit components: HP's new 5004 signature analyzer.

Until now, tracing faults in a digital circuit (the type of circuit in which microprocessors reside) has been difficult. The time-honored signal tracing techniques that a field service technician can use to troubleshoot and repair analog circuits just don't work with digital circuits, where voltage measurements have no meaning and all waveforms look alike. Instead, manufacturers have had to base field service not on component repair but on much more expensive board exchange or replacement programs.

Signature analysis, a new measurement technique developed by HP, provides component-level service capability for digital circuits. Here's how it works. When the modest requirements of signature analysis are designed into a product, the HP 5004 signature analyzer automatically characterizes the bit stream associated with a data node as a four-digit hexadecimal signature. A compressed "fingerprint" of the data present at the node, each signature is unique for a specific good node; any fault in the data stream—even one bad bit out of thousands—generates an erroneous signature. By comparing the displayed signature with the correct one noted on the product schematic, a service technician can easily spot a faulty node, trace it back to a bad component, and repair it without replacing the board—just as with an analog circuit.

The HP 5004 generates the signature by compressing the data stream in a linear feedback shift register. With this technique, there is a 100 percent certainty



Four-digit signature displayed by the HP 5004 signature analyzer (the instrument to the left of the unit under test) greatly simplifies the identification and correction of faulty digital circuits at the component level.

that the HP 5004 will detect a single-bit error, and a 99.998 percent certainty that it will detect any error—regardless of the length of the stream or the subtlety of the fault. It even detects time-related faults such as mid-cycle displaced bits, and speed-related failures in assembled systems.

For the manufacturer, the bottom line is a substantial reduction in field service costs for microprocessor-based products and high-speed state machines. Signature analysis increases development costs by only about 1 percent, an increase that is more than offset by lower manufacturing costs due to reduction in circuit boards, interconnections, and production-line troubleshooting time.

If this sounds interesting, send in the coupon to receive HP Application Note 222, *A Designer's Guide to Signature Analysis*, which tells how to implement signature analysis in the design of a product.

Price of the HP 5004 is \$990*.



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Mail to: Hewlett-Packard, 1502 Page Mill Road, Palo Alto, CA 94304.
Please send me further information on

- HP System 45 desk-top computer
 HP 5004 signature analyzer

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*Domestic U.S. prices only.

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