# New Personal Computer combines IBM PC/AT compatibility and superior performance

Vectra, a new family of HP desktop personal computers, offers IBM PC/AT compatibility and improved computer performance. Using the Intel 80286 microprocessor, the Vectra is designed to be fully hardware and software compatible with the IBM/AT. In the office, the Vectra PC serves as an excellent stand-alone workstation. It can also be networked to the HP 3000, 1000, and 9000 Computers, as well as to the HP Touchscreen II Personal Computer, and to IBM personal computers, minicomputers, and mainframes.

The Vectra offers significant advantages over the IBM system. Running at 8 MHz, it is 30% faster than the IBM PC/AT. It is also 30% lighter and smaller.

### Designed for your needs

The Vectra PC is designed for superior functionality and ease of use. Vectra's keyboard has a positive tactile touch for high-speed typing. And separate numeric and cursor keypads make it much easier to move around on a spreadsheet while entering numbers.

Vectra's twelve-inch monitors have built-in tilt and swivel to adjust to your height and reduce glare. Both monochrome and color displays provide $8 \times 16$ alphanumeric character resolution with a full display resolution of $640 \times 400$ pixels, more than twice the graphics resolution of the comparable IBM monitors.

The Vectra PC also features HP's Personal Applications Manager, PAM. PAM has been enhanced to allow DOS commands to be entered directly. And HP's Human Interface Link lets you use a wide variety of input devices in addition to the keyboard, such as HP Touch, graphics tablets, and a bar code wand, without using any accessory slots.

The Vectra PC supports a full range of HP peripherals, including external disc and tape drives, the ThinkJet and LaserJet printers, and the HP family of plotters.

### System expands as needs grow

The Vectra PC is available with either 356K bytes or 640K bytes of memory. Unlike the IBM PC/AT, which accepts only

# New Personal Computer

512K bytes of memory on the processor board, accessory slots are not required on the Vectra PC to install the full 640K bytes of memory supported under DOS.

Both 360 kbyte and 1.2 Mbyte 5 ¼" flexible discs are available for the Vectra PC, as well as a 20 Mbyte hard disc. A 40 Mbyte hard disc will be available in early 1986. The seven industry-standard compatible expansion slots allow the system to be tailored to meet your needs. These slots can be used to add options such as memory cards, data communications interfaces, and graphics boards.

### Powerful new software

Easy-to-use personal productivity software products for business professionals and managers are available for the HP Vectra and IBM personal computers.

The Executive Series includes:
- Executive MemoMaker: a simple, versatile word processor
- Executive Card Manager: a ROLODEX card file-like information manager with built-in report writer, simple form letter generator, and data base capabilities
- Executive Card Manager Templates: 21 modifiable card file and report layouts for use with Executive Card Manager
- Executive Spreadsheet: a softkey-driven, full-function spreadsheet
- AdvanceLink 2392: an advanced, easy-to-use communications software product with full HP 2392 terminal emulation capabilities

Executive Series products work together-- information can be transferred from product to product and the standard file formats allow information to be exchanged with the most popular software products in the marketplace today.

### Single vendor solution

HP is also entering strategic business relationships with major independent software vendors. Through direct distribution channels, HP will market MultiMate™, MultiMate Advantage™, Wordstar®, WordStar Professional™, WordStar 2000™, WordStar 2000 Plus™, Lotus® 1-2-3®, Symphony®, and a new data base manager R:Base™5000. HP will fully support the software providing a complete "single vendor solution." The software companies will continue to manage their own sales through the dealer channel.

*For more information, check **A** on the HP Reply Card.*

MultiMate™ and MultiMate Advantage™ are trademarks of Multimate International Corporation. WordStar® is a registered trademark of MicroPro International Corporation. WordStar Professional™, WordStar 2000™, and WordStar 2000 Plus™ are trademarks of MicroPro International Corporation. Lotus®, 1-2-3®, and Symphony® are registered trademarks of Lotus Development Corporation. R:Base™ 5000 is a trademark of Microrim™, Inc.

# New low-cost color graphics terminal

The HP 2397A Color Graphics Terminal offers color graphics for business, technical, and industrial color applications at about half the cost of its predecessor. Designed especially for use on HP 3000, HP 1000, and HP 9000 systems, the HP 2397A offers ANSI compatibility so it can work on Digital Equipment Corporation VAX computers, too. The HP 2397A also emulates the Tektronix 4010/4014 terminal, so users can run PLOT10 software.

The HP 2397A features bit-mapped vector graphics on a full color raster display with two modes of resolution (512 by 390 or 640 by 400 pixels). The user can select eight displayable colors from a palette of 64. The HP 2397A draws polyline vectors based on endpoints specified by the host computer. This allows the user to draw and fill complex shapes that have up to 105 sides, selecting from 11 different line types and 11 area fills. The eight selected colors can be mixed programmatically (dithered) to create additional user-defined colors for use with area fills. The user can add vector-drawn graphics text of different sizes and orientations.

Users can daisy-chain up to four different input devices— touchscreen, mouse, graphics tablet, and bar code reader— directly to the terminal, saving the peripheral port for a printer or plotter. Also, the color monitor can be replaced by another video device, such as a film recorder or large screen projector.

### Software support and alphanumeric features

The HP 2397A is supported by a number of Hewlett-Packard graphics software packages as well as other standard industry graphics programs.

Besides its extensive color graphics features, the HP 2397A offers independent color alphanumeric capabilities. Eight pre-defined colors can be used to define foreground/background color combinations (color pairs) for each character cell in the alphanumeric plane. At any one time, up to eight color pairs can be selected from a total of 64 possible color pairs. The HP 2397A's alphanumeric features include math, italic, bold, and line-drawing characters, up to twelve pages of memory, smooth vertical scrolling, and enhanced horizontal scrolling to support 160-column text.

The HP 2397A is available in 16 different national language versions.

*For more information, check **B** on the HP Reply Card.*



The low cost of the HP 2392A Color Graphics Terminal makes color graphics accessible to many more business, technical, and industrial users.

# Engineering graphics system now available on low-cost computer

The HP 98305 Engineering Graphics System (HP EGS) has proven itself in the area of engineering drawing systems. Over 2,500 systems have been installed in the past two years. Now HP EGS software will run on the new lower cost HP 9000 Series 300 engineering workstation.

HP EGS is computer-aided drafting and design software for schematic entry, printed-circuit board artwork, 2-D mechanical drafting, and multipurpose drawing. HP EGS helps you with drawing and has many design tools such as a rat's nest generator for generating point-to-point connections between printed-circuit board components. HP EGS provides tooling outputs for photoplotters and numerically controlled machine tools. And when HP EGS is run on a Series 300, graphics execution can be up to twice as fast as when the software is used on other hardware.

### Flexible to meet your needs

Introduction of the Series 300 engineering workstation provides you with a wider choice of systems. You can purchase an entry-level system at low cost and increase system performance as needs grow. The choices of different processor units, displays, and disc drives allow building just the system needed, without precluding later expansion.

HP's Shared Resource Management (SRM) system reduces the cost of file and peripheral sharing among HP EGS systems. The SRM system allows multiple workstations to share the same resources, including data files, discs, printers, and plotters.

### Documentation software available

HP TechWriter was developed to complement HP EGS for those who must combine graphics and text for technical documentation and reports. Using a picture processor, document editor, and lister, HP TechWriter electronically merges words with the drawings created by HP EGS. The result is

The HP 98305 Engineering Graphics Systems, shown running on the new low-cost HP 9000 Model 310, creates printed circuit board artwork, high-quality graphics and text.

*For more information, check* **C** *on the HP Reply Card.*

# New mass storage solutions increase storage capabilities of HP desktop computers

New midrange mass storage discs enhance the storage capabilities of certain HP 9825 and HP 9845 computer models. A third party system interface allows these HP computers to work with HP 7941/45 fixed discs, HP 7942/46 disc/tape subsystems, and the HP 7907 fixed/removable disc drive. These midrange drives offer a growth path to larger, more convenient mass storage for the HP 9825 and HP 9845.

System interfacing for these discs is provided through mass storage ROMs developed and sold by Structured Software Systems (SSS).

For more information about the ROMs, contact: Structured Software Systems, Inc., Irick Road, Box 1072, Mount Holly, NJ 08060 Phone: (609) 267-1616. In other parts of the world,

contact the SSS representative nearest you. They have international representatives in Australia, France, South Africa, Taiwan, Venezuela, and West Germany.

*For more information about the HP disc and tape drives, check* **D** *on the HP Card.*

# HP Computer Museum
## www.hpmuseum.net

**For research and education purposes only.**

# Measure continuous-wave and pulsed microwave signals to 110 GHz

The new HP 5356D Harmonic Mixer/Driver Head for the HP 5355A Automatic Frequency Converter now permits measurement of pulsed and continuous-wave (CW) millimeter-wave signals up to 110 GHz.

Used with the existing HP 11970Q,U,V, or W Mixers and the HP 5345A Electronic Counter, these products provide automatic, sensitive, and accurate pulse or CW frequency measurements in the range from 36 to 110 GHz. Throughout this range, the HP 5356D and HP 11970Q,U,V, or W Mixers feature −25 to −15 dBm sensitivity, SWR less than 3:1, and high damage level of +24 dBm. Applications include frequency and time interval measurements, average burst frequency measurements, and pulse repetition interval measurements.

### High performance and automatic operation

The combined instruments can measure pulsed signals as narrow as 75 nanoseconds with accuracies to 3 kHz and resolution selectable to 100 Hz or better. The CW measurement range is from dc to 110 GHz with high sensitivity and resolution of one Hz in one second. FM tolerance is 80 MHz peak-to-peak in the CW mode.

Microprocessor control provides automatic signal acquisition and automatic frequency averaging. User-defined frequency offsets can be entered from the keyboard.

With the HP-IB (IEEE-488), the HP 5345A/5355A can be controlled by a wide variety of compatible controllers. All front-panel controls are remotely programmable and measurement results are output via the HP-IB interface in the HP 5345A.
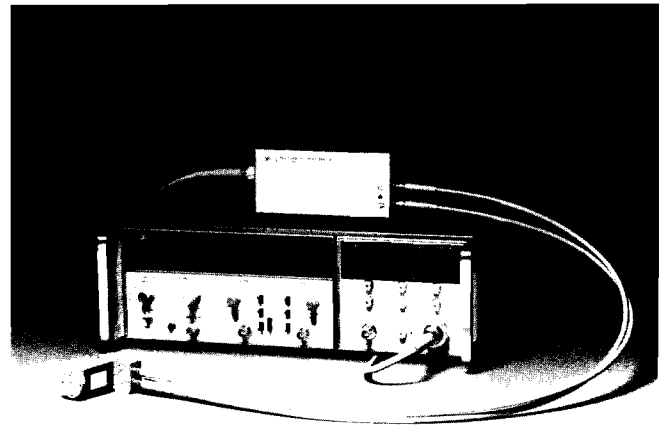


The new HP 5356D Harmonic Mixer, Driver Head, the HP 5355A Automatic Frequency Converter Head, and an HP 11970Q,U,V, or W Mixer allow the HP 5345A Counter to make pulsed RF and CW frequency measurements to 110 GHz.

*For more information, check **E** on the HP Reply Card.*

# New application note details frequency discriminator method of phase noise measurements

HP Product Note 11729C-2, *Phase Noise Characterization of Microwave Oscillators, (Delay Line Discriminator Method)*, presents a detailed overview of the frequency discriminator method of measuring single-sideband phase noise. The method is particularly valuable for measuring free-running sources such as Gunn-diode or GASFET YIG-tuned oscillators.

The HP 11729C Carrier Noise Test Set is the key element of the measuring system. It provides the hardware for conveniently measuring RF and microwave sources from 5 MHz to 18 GHz, manually or automatically. All the necessary down-conversion, filters, amplifiers, and other components are included, with the exception of a simple coaxial delay line to be supplied externally to match the delay needed. The latest HP Model 11729C is particularly well-suited for the discriminator method since the internal SAW (surface-acoustic-wave) filter can be configured into an internal 640-MHz self-oscillator, which eliminates the need for a separate external low-noise reference oscillator.

The product note first discusses phase noise and its effect on signal performance of modern microwave systems. Next comes considerable detail on the theory and practice of the frequency discriminator method. The note then describes the implementation of the technique using the hardware of the
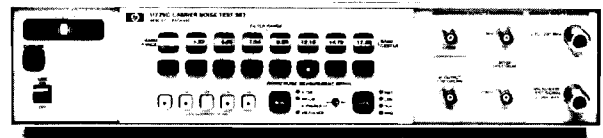


The new HP 11729C carrier noise test set offers improved measurements with a lower broadband noise floor and the ability to measure many pulsed carriers.

HP 11729C. Chapter 5 outlines the specific measurement steps needed to characterize phase noise. Accuracy and error correction considerations follow, including a complete worksheet to be sure no important steps are missed. Finally, several appendices complete the material.

*For a free copy of Product Note 11729C-2, check **F** on the HP Reply Card.*

# Wideband TO-8 cascadable amplifiers offer stability over wide temperature and frequency ranges

Four new cascadable amplifiers are now available for high-speed digital communications at speeds from 400 to 2,000 megabits per second. These amplifiers are also expected to be useful for analog applications like global positioning satellite systems.

Because the amplifiers are cascadable, incorporating them into your design is simplified and your development costs are lowered.

The components achieve typical gain variations of less than ±0.3 dB and deviate less than 2 degrees from linear phase over the specified frequency range at temperatures from −55 to +85 degrees C. They will tolerate temperatures up to 125 degrees C. There's no need for external bias circuitry, and only one +15Vdc power supply is required.

Exceptional phase linearity and gain flatness can improve your system's performance by lowering bit error rates since pulsed signals are reproduced accurately at high data rates.

The four amplifiers in this series are:

- The HAMP-1001 medium-output power amplifier provides typical minimum output power of 12.5 dBm at 1-dB compression. The 1-dB bandwidth of this amplifier is from 5 to 2,800 MHz.
- The HAMP-1002 and HAMP-1003 general-purpose amplifiers offer minimum gain of 9.7 dB. The 1-dB bandwidth of the HAMP-1002 is 5 to 1,900 MHz; it is 5 to 2,100 MHz for the HAMP-1003.
- The HAMP-1004 has a 1-dB bandwidth of 5 to 1,650 MHz, a maximum noise figure of 4.0 dB, and a typical minimum gain of 12.5 dB.
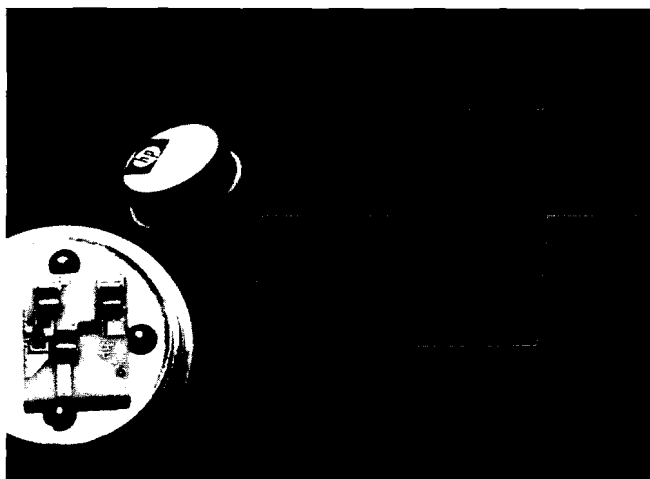


The HAMP-1000 series cascadable amplifiers can lower development costs and increase system performance.

For applications that require high-reliability screening, the amplifiers also are available at the TXV level, which meets MIL-STD-883 requirements.

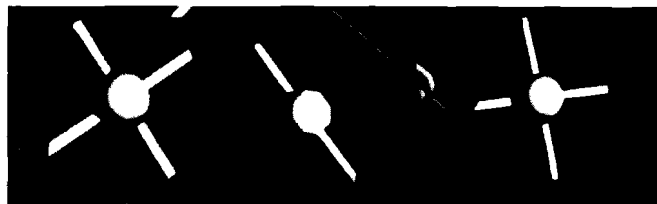*For more information, check **G** on the HP Reply Card.*

# New Schottky beam-lead diodes guarantee high performance at 26 GHz

Designed for microwave mixer and detector applications, 32 new single, pair, and quad beam-leads and J-package products will be used in guidance and control systems, communication satellites, radar, and test instrumentation.

### Pairs and quads

New pair and quad beam-lead diodes include medium- and low-barrier devices at 0.10 pF, 0.15 pF and 0.25 pF capacitance. Closely-matched electrical parameters (0.02 pF for maximum adjacent-capacitance difference and 15 mV for maximum forward-voltage difference) provide superior isolation in mixer applications.

Like the single diodes, the pairs and quads use a platinum tri-metallization system to provide stable and reliable perfor-

mance from −65°C to +175°C. Nitride passivation prevents contamination that could lead to reverse current drift.

With guaranteed and complete RF characterization up to 26 GHz, the new line of Schottky beam-lead single and monolithic-pair diodes features a maximum noise figure of 7.5 dB. Rugged construction ensures that the beam leads will tolerate 4 grams minimum beam pull.

### Low-parasitic hermetic J package

Two-, three- and four-leaded versions of the new high-performance hermetic J package are available.

Operation up to 20 GHz is possible, thanks to the 0.06-pF package capacitance. The solder glass seal and rugged construction of this 0.070-inch package meet the stringent requirements of space-level testing and are capable of meeting the environmental tests of MIL-STD-750.

Prices for HP's beam-lead products vary depending on screening level and performance.



HP's Schottky beam-lead diode family now includes 12 products in this high-performance J package (HSCH-6000 series).

*For more information, check **H** on the HP Reply Card.*

# Subsystem accelerates bit slice and microprogram projects

The new HP 64276 Microprogram Development Subsystem and the HP 64320S 25-MHz Logic State/Software Analyzer extend the range of processor support available with the HP 64000 Logic Development System.
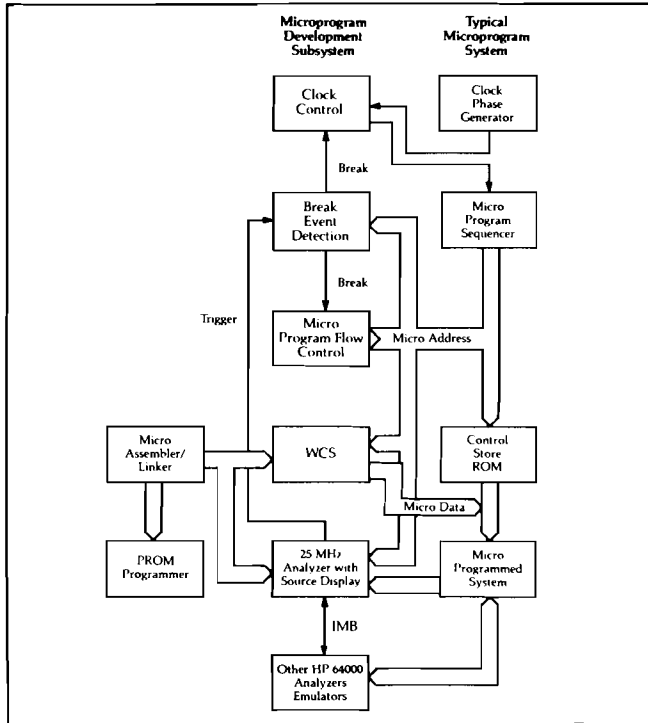


The new microprogram development subsystem consists of a run control module, writable control store, and a microassembler, and operates with a 25-MHz logic state/software analyzer (another HP 64000 subsystem).

The HP 64000 architecture allows simultaneous emulation and analysis of multiple processors, an increasingly important feature since many target systems incorporate 8-bit or 16-bit microprocessors with microprogrammable processors. HP 64276 support for microprogrammable systems includes three components: a run control module, writable control store, and a user-definable microassembler.

To improve debugging of microprogram-based systems, the run control module provides system clock control, break event detection, address jamming, and stepping. When a break event occurs, an address can be jammed onto the address bus or the system clock can be stopped.

Writable control store (WCS), the memory array for the target system microcode, allows easy microcode downloading from the assembly environment and high-speed access of the microcode from the target system. Target system development and debugging are more efficient using the WCS of the microprogram development subsystem instead of PROMs.

### Logic state software analyzer

The HP 64320S 25-MHz logic state/software analyzer supports the high-speed clock rates of microprogrammable target systems. This analyzer monitors system buses and has trigger, store, and sequencing functions for locating problems in the microprogram. Both the state analysis trigger and the run control can enable the run control's break event detection.

### User-definable microassembler

A user-definable microassembler supports macroinstructions, and can be used with the source line referencing of the 25-MHz logic state/software analyzer.

A typical setup of the microprogram development subsystem might consist of run control with 32K WCS, 60 channels of 25-MHz state analysis, and a user-definable microassembler.
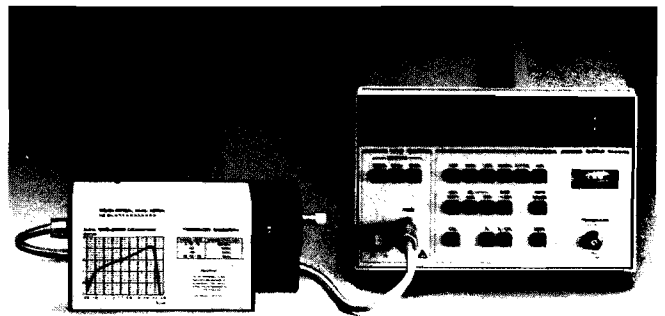
*For more information, check I on the HP Reply Card.*

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# Precise new optical head measures power output of single-mode and multimode fiber optic devices

Hewlett Packard's new HP 81512A Optical Head covers the long-wavelength single-mode and multimode segment of the fiber optics market. When used with the HP 8151A Optical Pulse Power Meter, this head measures both peak and average power of optical components, modules, and systems, either manually or under computer control.

The HP 81512A handles core diameters up to 100 $\mu$m, and interfaces easily to the device under test using a large variety of optical adapters. Featuring a bandwidth of dc to 150 MHz and a sensitivity range of 0 dBm to −50 dBm, it is a versatile head for power measurements in many applications.

This new optical head covers the wavelength range from 950 nm to 1,750 nm. All specifications are valid for 1,300 nm between 0°C and 55°C. Accuracy of ±0.1 dB and repeatability of 0.05 dB for average power ensure reliable measurements on passive and active optical devices. Parameters such as connector and fiber losses or the output power of laser diodes and transmitters can be measured quickly and precisely.



The HP 81512A Optical Head is an excellent tool for power measurements applications ranging from R&D to production testing.

*For more information, check J on the HP Reply Card.*

# Powerful new data-acquisition system offers low cost and ease of use

The new HP 3852S Data Acquisition and Control System combines hardware and software to provide ease of use and power in a single system. The HP 3852S system consists of the HP 3852A data-acquisition/control card cage mainframe, the HP 44456A software package, and a choice of 19 plug-in card assemblies. It is controlled by an HP 9000 Series 200 or 300 Computer. The HP 3852A Data Acquisition and Control Unit can take dynamic readings at 100,000 per second while simultaneously doing static physical measurements with 1-microvolt sensitivity.

Two digital-multimeter plug-in cards for the HP 3852S are available. One is a high-speed 13-bit digital multimeter that can autorange, change channels, and send information to a disc at a genuine system throughput of 100,000 readings per second. The other is a 5½ digit, 1-microvolt-sensitivity, guarded digital multimeter that rejects system noise and stores scanned data into a mainframe memory that can be as large as 1 megabyte.

Using the intelligence of a Motorola 68000 microprocessor, the HP 3852A mainframe linearizes thermocouples, RTDs, and other devices. It checks limits, performs downloaded routines, and handles other monitoring tasks while the operator uses the computer to analyze data or produce plots of experimental results.

In addition to the DMMs, 17 other plug-in card assemblies are available including switches, digital-to-analog converters, counters, actuators, multiplexers, and both digital-input and digital-output assemblies.

The HP 44456A data-acquisition software package can reduce programming time by 90 percent. Eight software modules do high-speed data acquisition, data base management, graphics presentation, analysis, FFTs, and more. The system is easy to program and troubleshoot.
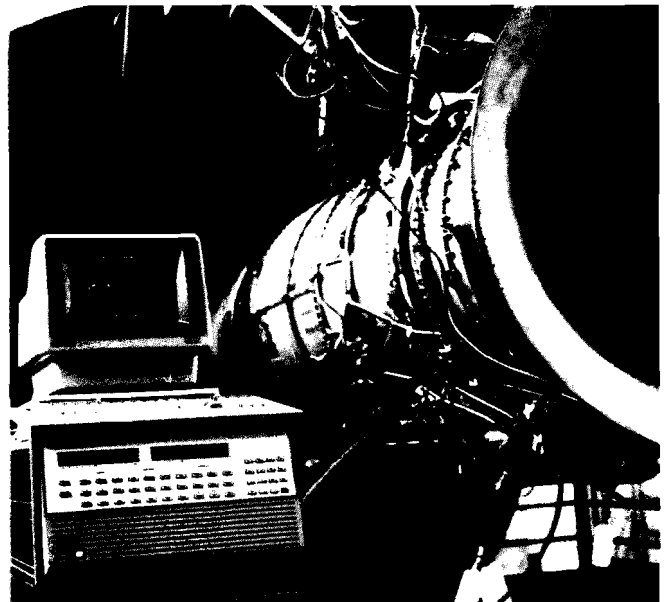


The HP 3852S is an excellent choice for engine test, pump design, process development, and other applications requiring simultaneous static and dynamic measurements.

*For more information, check **K** on the HP Reply Card.*

# New board testers offer broader selection of price and performance

The HP 3065 digital/analog in-circuit test system family has been expanded with the addition of four new board testers.

To protect current and future customer investments, each system is hardware- and software-compatible with the existing HP 3065 system. Current customers can easily upgrade to the 5-MHz capabilities and trade their existing digital and analog cards for hybrid cards. And all HP 3065 systems can participate in the HP 99% Guaranteed Uptime Program.

The top-of-the-line tester is the HP 3065CX/HX. Designed for maximum board throughput and maximum test-station flexibility, it supports up to three test stations and as many as 22 terminals for programming and repair. It operates at a 5-MHz digital vector rate and features 3M bytes of main memory (expandable to 12M bytes), standard disc size of 132 Mbytes, and a maximum disc capacity of 1,344 Mbytes.

The HP 3065CL/HL entry-level board tester operates at a 5-MHz digital vector rate. It offers one test station, supports up to three programming/repair terminals, and has 2M bytes of main memory (expandable to 4M bytes). The standard disc size is 55 Mbytes and maximum capacity is 1,269 Mbytes.

For customers with moderate volumes of complex digital and analog boards, the HP 3065CL/HX implements the test-station capabilities of the HP 3065CX/HX, including advanced functional testing for analog boards and a maximum of eight programmable DUT power supplies. Controller capabilities of the CL/HX tester are the same as the CL/HL tester.

The HP 3065CX/HL targets high-volume, mainly digital boards by combining the test-station capabilities of the CL/HL tester with the controller power and throughput of the CX/HX tester. Included in the test-station capabilities are a maximum of two programmable DUT power supplies and four fixed DUT power supplies, while the controller offers up to 12M bytes of main memory, 132 Mbyte standard disc, and 1,344 Mbyte maximum disc capacity.

*For more information, check **L** on the HP Reply Card.*

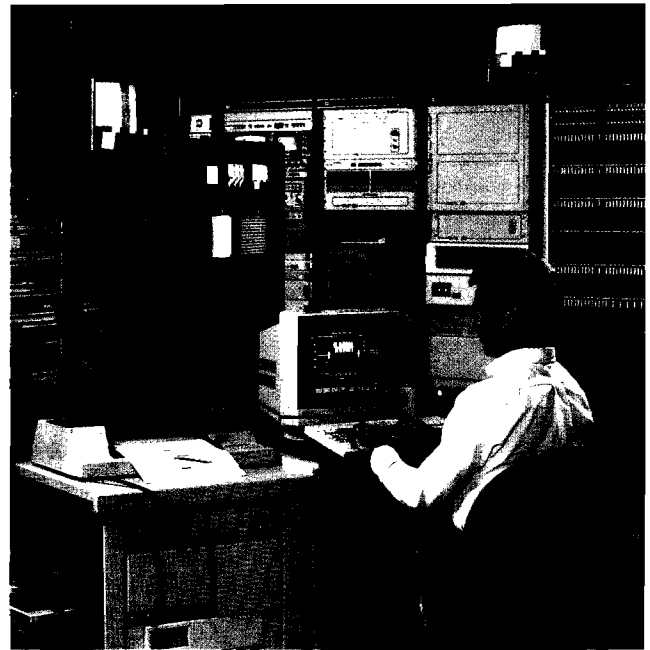# Production-test system assures video product quality

Video product manufacturers now can quickly and automatically assure the quality of their products with Hewlett-Packard's new video-measurement system, the HP 51810S.

Believed to be the first high-volume, manufacturing-test solution available for the video-testing market, this system automatically measures over 60 parameters on National Television Standards Committee (NTSC) baseband video signals at cost-saving throughputs of up to 250 products tested per hour. Signal-to-noise ratio, gain/phase distortions, and timing parameters are examples of the many tests it performs. In addition, the system can be customized to incorporate instruments for signal generation, bar code reading, and audio and RF testing to meet all the requirements imposed by a manufacturer's test plan.

## Simple and flexible operation

To simplify operation, the three steps of testing—defining, executing, and evaluating—are separated. This allows test operators to run predefined tests easily, yet provides flexibility for test managers.

- Defining test plans: Test plans are defined and modified to accommodate new products by making selections from self-documented screens displayed on the system monitor. Measurements, test signals, field and line selections, failure limits, and many other test choices can be selected from the screens. The HP 51810S can store many individual testing plans. Each plan can be optimized for a particular product line.
- Executing tests: By simply entering an identifying number and pressing a key, a test operator can execute an entire predefined test sequence. PASS or FAIL information is displayed on the screen. The operator can obtain quick reports showing actual results or can proceed directly to testing the next unit. For troubleshooting, a quick test allows an operator to depart from a predefined test sequence to run any single test once, a specified number of times, or continuously.
- Analyzing results: For quality control, test results for thousands of devices are stored for off-line analysis so that test time is not interrupted. Valuable management information can be obtained easily because results can be sorted by date, serial number, operator, and by passed or failed units. Results can be reported individually or as multiple-unit statistics such as minimum, maximum, mean value, and standard deviation—ideal for daily summaries.

## Other applications

Although intended primarily for production testing of video products, the system is also expected to find applications in research and development, quality assurance, and broadcasting because of the wide variety of measurements it can make.

A typical setup combines the HP 51810S, a ThinkJet printer, and an HP 7440A graphics plotter.

*For more information, check **M** on the HP Reply Card.*

**MEASUREMENT COMPUTATION news**
*product advances from Hewlett-Packard*

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