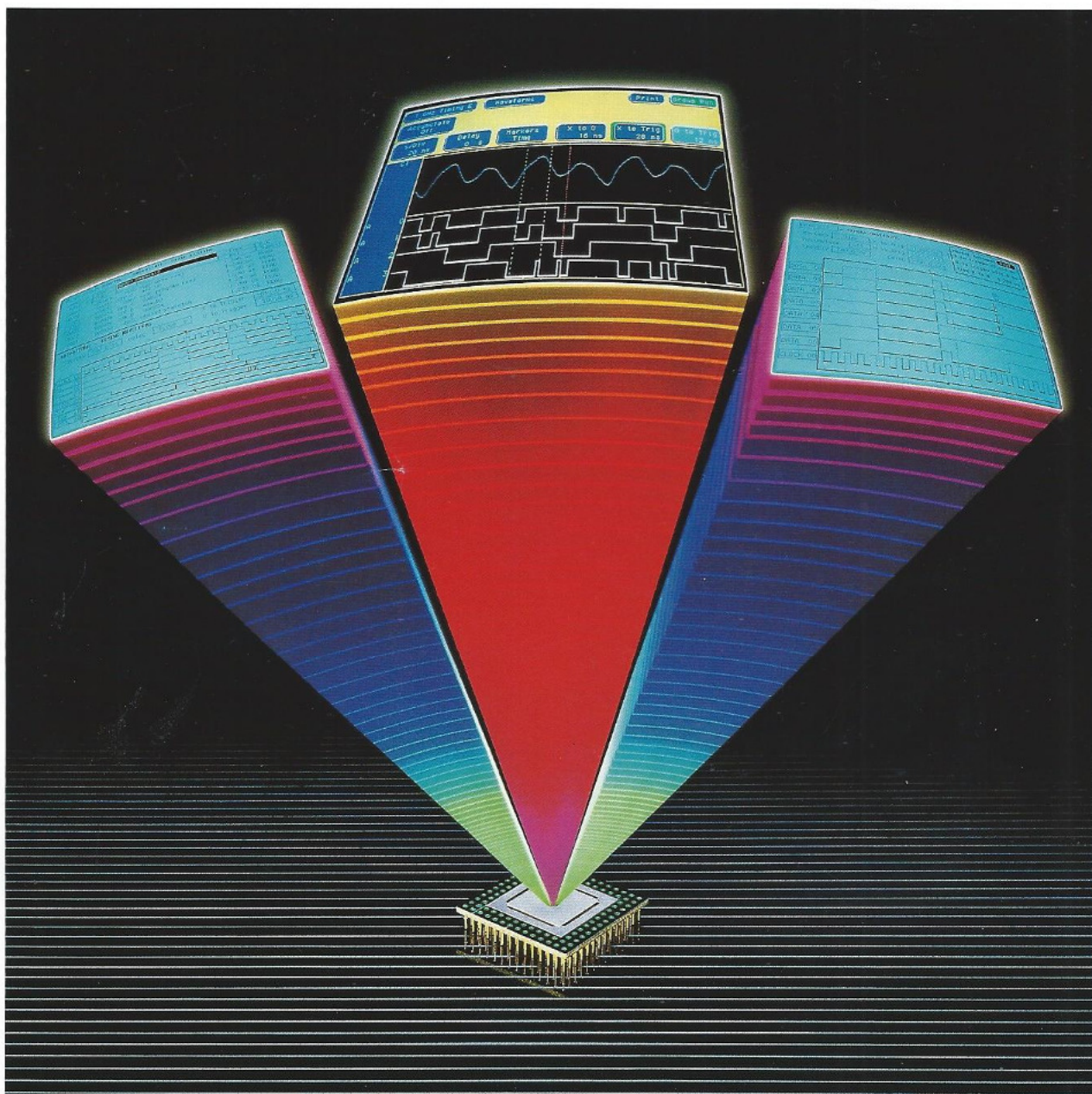


TEST & MEASUREMENT

N E W S

HEWLETT-PACKARD

SEPTEMBER/OCTOBER 1987



HP 1650 and 1651 Logic
Analyzers; HP 16500 Logic
Analyzer System

 HEWLETT
PACKARD

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GENERAL-PURPOSE INSTRUMENTS

Make measurements 150 times faster with new OTDR

The HP 8145A is a high-performance optical time-domain reflectometer for field maintenance and bench applications. It features a data correlation technique that increases the dynamic range to more than 25 dB at 1300 nm single mode. The HP 8145A OTDR can perform precise measurements much deeper in the fiber and up to 150 times faster than conventional units.

In the field

For field maintenance the HP 8145A is lightweight and rugged. It can be operated with batteries (12 to 30Vdc) because of its low power consumption, or from mains (90 to 260Vac). Resolution is 0.01 dB and 1 m over a distance range of 200 km.

Two cursors are available for distance and loss measurements. To automatically check splice loss, you can activate a third cursor. The built-in 32-bit microprocessor calculates the splice loss using the noise-reducing least square approximation (LSA) method.

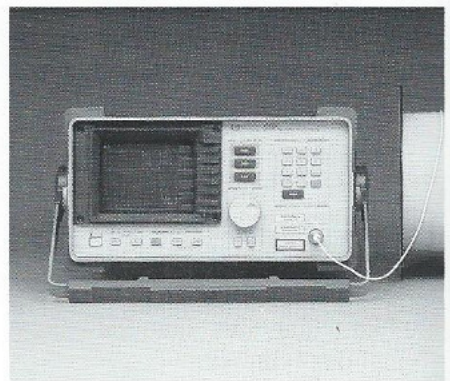
No longer do you need data loggers and external disc drives. A plug-in nonvolatile memory module stores more than 100 curves, each with its related measurement information. This saves you time, since all relevant measurement results can be stored in the HP 8145A OTDR and output later.

If you need documentation immediately, any data set can be printed out directly by an HP ThinkJet printer—a controller is not required.

On the bench

Any previously taken trace can be recalled and compared against the presently sampled one. This ensures fast and easy detection of inhomogeneities and attenuation changes. The fiber attenuation can also be measured at both 1300 nm and 1550 nm for comparison of the two traces.

The zooming capabilities of the HP 8145A are convenient for measurements on longer cables and fibers. You can change every horizontal and vertical parameter while the OTDR continues to measure with its initial



The HP 8145A offers an excellent set of features for bench applications.

setting. For example, while the full length of a 50-km link is being checked and the instrument is running, you can expand the range about each splice and examine it more closely. You can return to the display of the entire link at any time, and the position of the cursors is not affected.

Laser modules available

Two optional laser modules allow the HP 8145A to operate at wavelengths of 1300 nm, 1550 nm, or both. They are connected via a low-loss wavelength-division multiplexer. The dynamic range of 28 dB at 1300 nm and 25 dB at 1550 nm is independent of the number of installed wavelength options.

Four exchangeable connector options (Diamond R HMS-10, FC/PC, DIN47256, and ST) and a large variety of adapter cables are also available.

The HP 8145A mainframe is priced at \$12,900. The 1300-nm laser module is \$10,800, the 1550-nm laser module is \$14,800, the combined wavelength option is \$21,800, and any connector option is \$290.

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

GENERAL-PURPOSE INSTRUMENTS

Waveform recorder, precision digitizing scope fea- ture 8-bit A-to-D conversion

Capture high-speed, single-shot, and repetitive events with excellent voltage resolution with the new HP 5185A Waveform Recorder and HP 5185T Precision Digitizing Oscilloscope. Both excel at measuring transient events by offering two simultaneous channels of 8-bit analog-to-digital conversion each with a 250 Msamples/second digitizing rate, 110-MHz input bandwidth and 64K samples of memory.

New HP ADC design yields better performance

Both the waveform recorder and the digitizing oscilloscope use high-speed monolithic bipolar analog-to-digital converters (ADCs) with 8 bits of resolution. Combining a new flash-conversion technique with advanced process technology, these HP ADCs reduce noise and harmonic distortion.

Compared to current high-speed ADC designs that use charge-coupled devices

(CCDs), scanned arrays, or multiple lower-performance ADCs, the architecture and implementation of HP's monolithic bipolar ADCs result in superior performance and reliability. This performance is demonstrated by characteristics such as zero missing codes from dc to 100 MHz.

Characterized analysis boosts user confidence

The HP 5185T digitizing oscilloscope offers a high-resolution display, friendly user interface, and extensive analysis capability in both the time and frequency domains. The HP 5185T's characterized analysis from the signal input through the final analysis result is believed by HP to be the first available in an oscilloscope. By providing characteristics such as FFT (fast Fourier transform), magnitude error vs frequency, or frequency-counter accuracy vs number of periods, analysis results from the HP 5185T can be used with confidence.

Capture difficult signals

Both new products are designed for the capture and characterization of diverse single-shot and repetitive signals. Typical applications include radar, surveillance signals, optical and magnetic discs, digital radio, and VCO turn-on transients.

Systems applications

The HP 5185A is designed for systems applications where measurement setup, display, and analysis are performed on a system controller such as an HP 9000 Series 300 computer, or an IBM-PC compatible such as the HP Vectra PC.

Control the digitizing rate to fit the measurement

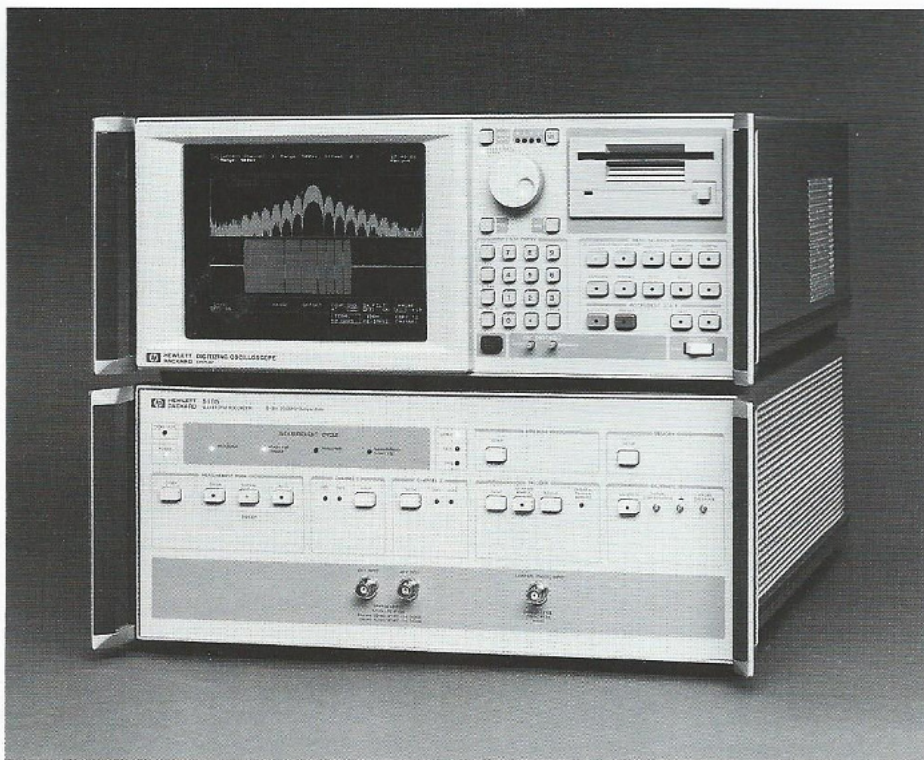
The HP 5185A/T allows you to select the internal time base from over 60,000 values in the range of 250 Msamples/second to 2.5 ksamples/second. The external time base input lets you control the digitizing rate via a user-supplied signal from dc through 250 Msamples/second.

Advanced triggering captures the desired information

The HP 5185A/T has internal and external triggering. Among the advanced internal trigger modes are hysteresis, bi-trigger, delay trigger, and dropout trigger (trigger on the absence of a signal caused by a frequency shift or an amplitude reduction).

The HP 5185A is \$28,200 and the HP 5185T is \$40,000, including one day of consultation by an HP systems engineer. Option W30, offering two additional years of "return-to-HP" service and support, is \$740 for the HP 5185A and \$1,050 for the HP 5185T.

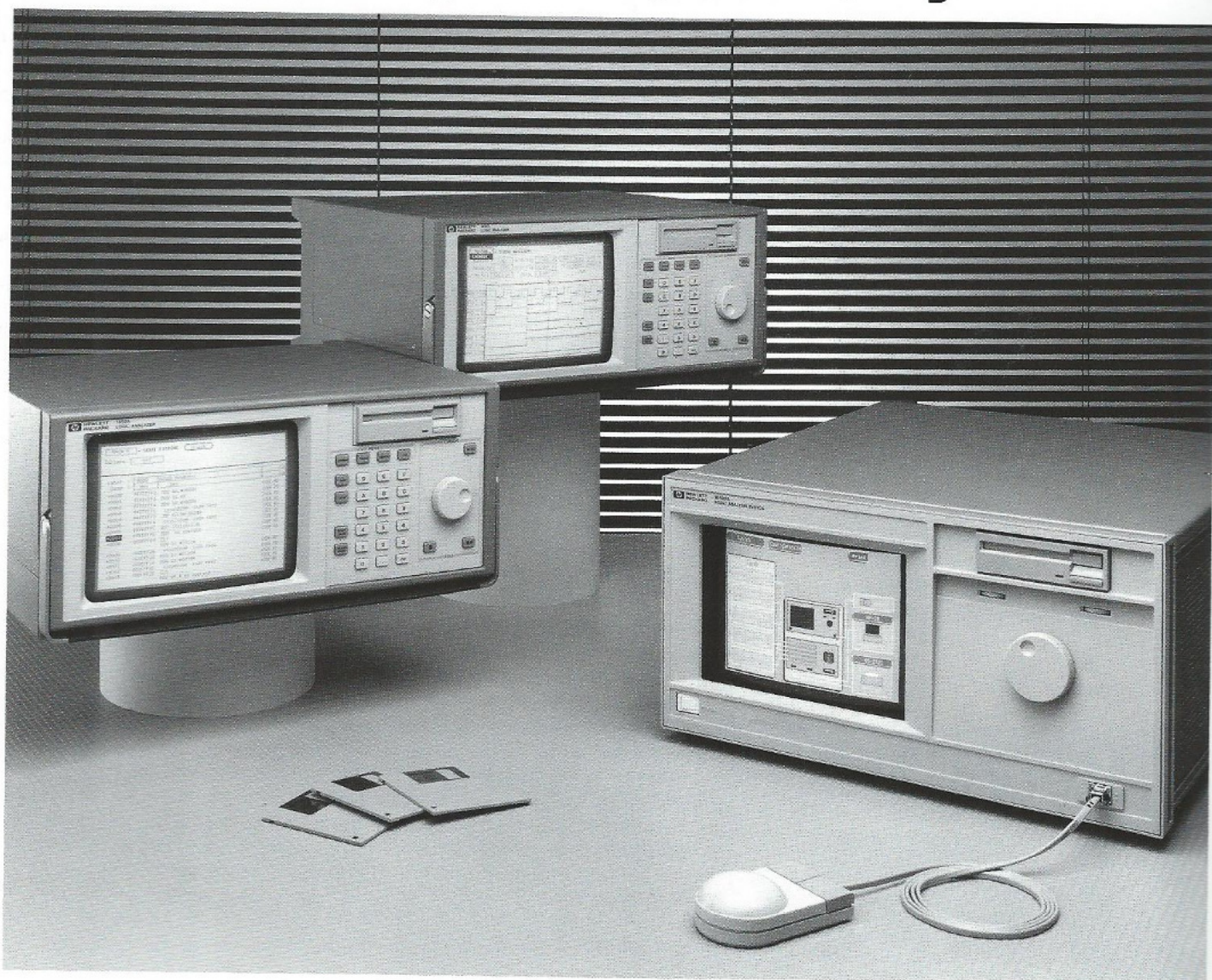
For more information, check **B** on the HP Reply Card.



The HP 5185T analyzes and displays signals in the time and frequency domain.

GENERAL-PURPOSE INSTRUMENTS

Three new logic analyzers are powerful, easy to use



HP's new family of logic analyzers benefit engineers involved with digital hardware design and debug, software development, and systems integration.

A new family of Hewlett-Packard logic analyzers fulfills measurement needs ranging from general-purpose logic analysis at a low cost to high performance with user configurability. Consisting of the HP 1650A and 1651A Logic Analyzers and the HP 16500A Logic Analysis System, the new family provides a range of features that allow you to choose the best solution for your digital design, software development, and systems integration problems.

The HP 1650A is a portable benchtop analyzer that offers 25-MHz state and 100-MHz transitional timing analysis on

all of its 80 channels. It provides general-purpose logic analysis for 8, 16, and 32-bit microprocessors.

The HP 1651A is identical to the HP 1650A except that it provides 32 channels of 100-MHz timing and 25-MHz state analysis. This instrument offers you general-purpose logic analyzer performance with a low-end price tag.

Modular system provides one-box solution

At the top of the line is the HP 16500A Logic Analysis System. Five card slots allow you to configure the system with mix-and-

match combinations of 25-MHz state and 100-MHz timing analysis, a 400-Mega-sample/s digitizing oscilloscope, a 50-Mbit/s pattern generator, and a 1-GHz timing analyzer. The mainframe keeps track of which cards are installed, and an intermodule bus allows you to configure the cards from the front panel. Modules can trigger one another to make measurements that wouldn't be possible with individual instruments.

Multiple cards of the same type can be used to increase channel count. The maximum channel counts for each kind of module are:

- 100-MHz timing/25-MHz state analysis: up to 400 channels
- 100-MHz digitizing oscilloscope: up to 8 channels
- 50-Mbit/s pattern generation: up to 204 channels
- 1-GHz timing analysis: up to 80 channels.

Access to the HP 16500A's powerful features is through its touch-sensitive 9-inch color display or an optional mouse, so the system doesn't have the numerous front-panel buttons you might expect on an instrument with so many capabilities.

An easy-to-use family

All three of the new instruments feature simplified, intuitive user interfaces with pop-up menus. Graphics help you set up the instruments with logical, flowchart-like diagrams. Built-in disc drives provide convenient storage, and hard-copy output to graphics printers is only a keystroke away.

Along with the new analyzers, HP has designed a new passive probing system that features lightweight, ultra-flexible ribbon cables and probes that attach easily and securely to a device under test.

The HP 1650A is priced at \$7,800 and the 1651A is \$3,900. The HP 16500A mainframe is \$7,200. Plug-in cards for the HP 16500A range in price from \$3,700 to \$7,800.

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

GENERAL-PURPOSE INSTRUMENTS

New PC board-test fixture for HP-IB functional test systems

The new HP 34597A Simplate Test Fixture and the HP 3235A Switch/Test Unit combine to provide a low-priced solution for printed-circuit-board test. The new test fixture provides a reliable solution for interfacing electronic measurement instruments to a bed-of-nails test fixture.

High-quality probing and switching

The HP 34597A is a vacuum-type fixture attached to the HP 3235A through HP's quick-interconnect panel (Opt. 590), which provides simultaneous connection of up to 320 analog or digital channels. Circuit-board test points are accessed by long-lasting, gold-plated test probes.

Signals are routed from the test probes through user-installed wiring to standard switch-terminal blocks. The HP 3235A switches signals through relay multiplexers and matrices so that you can achieve the desired measurement path. When higher frequencies are switched, separate coax lines can be interfaced directly to the board under test to route signals up to 1.3 GHz.

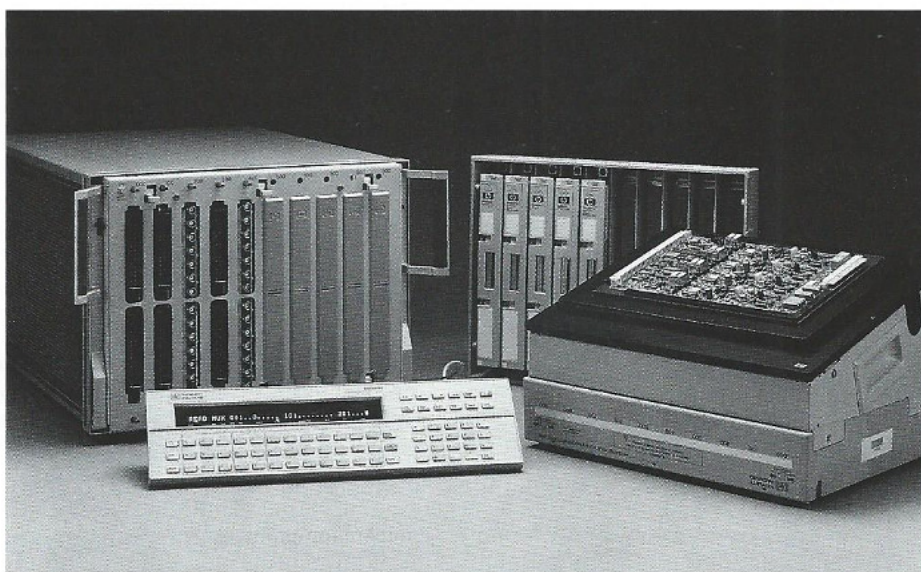
High-performance switch/test unit mainframe

The HP 3235A unit routes signals between the board under test and test equipment such as multimeters, counters, signal generators, analyzers, and sources. It also speeds test system development by reducing integration, cabling, fixturing, and programming requirements.

Up to 10 plug-in switching modules can be configured in each HP 3235A or extender to switch signals from millivolt levels to 250Vdc at 3 amperes.

The HP 34597A Simplate fixture (basic kit) is priced at \$596, the HP 3235A is \$4,470, and the Option 590 quick-interconnect panel is \$761.

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



The same high-quality Simplate fixture technology used on HP 3065 Board Test Systems is available for rack-and-stack applications.

GENERAL-PURPOSE INSTRUMENTS

Link electronic design system to logic analysis or board test system

New software for the HP Electronic Design System (EDS) provides a bidirectional link to the HP 16500A Logic Analysis System and a direct link to the HP 3065 family of printed circuit board testers.

The HP 74240A software package is a CAE link between the HP EDS and the HP 16500A. This integrated software package runs on the HP EDS system and provides configuration, formatting, and test-vector transfer capabilities for the HP 16500A.

The HP 74241A Test Program Generator is an integrated software package that runs on the HP EDS and provides test-generation capabilities for the HP 3065 family of testers using simulation data from the HP EDS.

Software packages include:

- Integrated user interface with HP EDS
- Automatic conversion of simulation data into HP 16500A format or HP 3065 source code

- Automatic conversion of measured data from HP 16500A to HP EDS format.

CAE link advantage

A primary advantage of the new CAE link is to bring together the prototype verification process and the design verification process. The design engineer can use information developed in the simulation environment for the actual prototype-debug process. Measured prototype data can be brought into the simulation environment to allow correlation and analysis.

Test-program generator advantages

The test-program generator can solve the problem of in-circuit test development for printed circuit boards containing ASICs (application-specific integrated circuits). You can transfer test vectors, developed with the

simulation tools of EDS, into HP 3065 tester programs to test these user-developed parts.

Part of the HP DesignCenter

As an integrated part of the HP DesignCenter, the new software link automates the transition from design to manufacturing or prototype test, shortens product development time, and increases design and test quality. During the prototype test cycle, the HP 16500A system provides the user with digital pattern generation, response, and analog measurement capabilities in one modular user-configurable mainframe. During the manufacturing cycle, the HP 3065 family of printed circuit board testers provides full support for advanced in-circuit testing of digital/analog PCBs as well as functional testing for ASICs and boards.

The HP 74240A CAE link and HP 74240B simulation data-file comparator are \$2,000 each. The HP 74241A EDS/3065 is \$2,040. The HP 16500A mainframe is \$7,200 and plug-in cards for it range from \$3,700 to \$7,800. The HP 3065 ranges from \$95,000 to \$500,000.

For more information about the HP 74240A, 74240B, and 16500A, check C on the HP Reply Card. Check E to find out more about the HP 74241A.

Instrument Notes

Improved specifications and increased warranty for the HP 5061B. New specifications for the HP 5061B Cesium Beam Frequency Standard, which HP believes to be unmatched in other commercially-available cesium standards, are guaranteed and warranted in instruments now being delivered. These performance enhancements will increase your confidence in the HP 5061B for time-keeping, calibration, communications, or navigation applications. For a summary of the specifications, check **F**.

New product note for HP 3852A. "Multitasking for the HP 3852A Data Acquisition/Control Unit" describes the flexibility of the multitasking operating system. Included are examples of time-slicing, queued tasks, priorities, real-time interrupts, interactive programming, data logging, and I/O buffers. For a copy of the product note, check **G**.

Using the HP 5345A Electronic Counter. "Radar System Characterization and Testing," a new application note (AN 174-14), demonstrates performance capabilities of the electronic counter system, which includes the HP 5345A Counter, HP 5355A Frequency Converter, and HP 5356A/B/C/D Frequency Converter Heads. This system provides a powerful test tool for precision time-interval and frequency measurements of radar waveform parameters. The note also includes a method of measuring phase-coded radar signals. Check **H**.

High-speed timing acquisition and statistical jitter analysis. The HP 5370B Universal Time Interval Counter is a tool for analyzing timing phenomena in digital or pulse-code modulated signals. These signals are susceptible to various forms of timing jitter, and can be found in a wide variety of systems that involve magnetic discs, fiber optics, high-speed modems, digital audio, video, sonar, or satellite communications. A new application note (AN 191-7) teaches you how to use histogram software designed for the HP 5370B to capture and analyze various time interval measurements at a throughput

of up to 4,200 measurements per second. Check **I**.

Slash test-development time with HP PC Instruments. HP PC Instruments link test and measurement instrumentation to the HP Vectra PC, IBM PC/XT/AT, HP 9000 Series 200/300, and AT&T PC 6300. The HP PC Instruments system of hardware and software lets you monitor and control test instruments from your computer display screen or through high-level languages. To receive a new data sheet that describes the 12 instrumentation modules in this series, check **J**.

Meet HP's family of vector network analyzers. Did you know that HP has a full line of network analyzers that span the entire spectrum from 64 μ Hz to 100 GHz? Each model is optimized for the measurement needs and applications in a particular frequency range. Whether your application needs are in the sub-audio/audio, baseband/IF, IF/RF, or microwave/millimeter-wave regions, a new family flier will help you sort out your options. Check **K** for a copy.

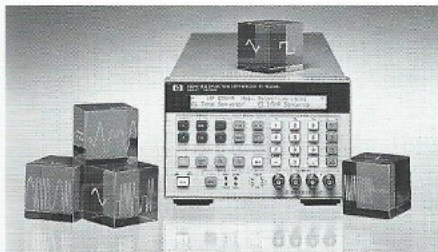
RF & MICROWAVE

New synthesizer creates complex audio signals

Using the same chip technology (HP's proprietary NMOS-IIIIB process) as the new Hewlett-Packard computer systems, the HP 8904A Multifunction Synthesizer is an instrument on a chip. You can use it as a simple function generator or as stimulus for an audio circuit. You can also use it as a modulation source for VOR, ILS, FM stereo, and communications signaling, digitally creating complex signals from six basic waveforms.

The standard HP 8904A is a synthesizer that digitally generates precise sinewaves to 600 kHz; square, ramp, and triangle signals to 50 kHz; and white noise and dc signals. You have the precision of a digital synthesizer for the price of a function generator.

Option 001 adds three more synthesizers or channels that can either AM, FM, PM, DSBSC (double-sideband suppressed carrier), or pulse-modulate the first synthesizer. Or, any of the three extra signals can be summed with the first channel at the output (see Figure 1). With the ability to select waveforms and the way they are combined, you can create an infinite number of signals.



The HP 8904A can be used as a complex modulation source or as a simple function generator.

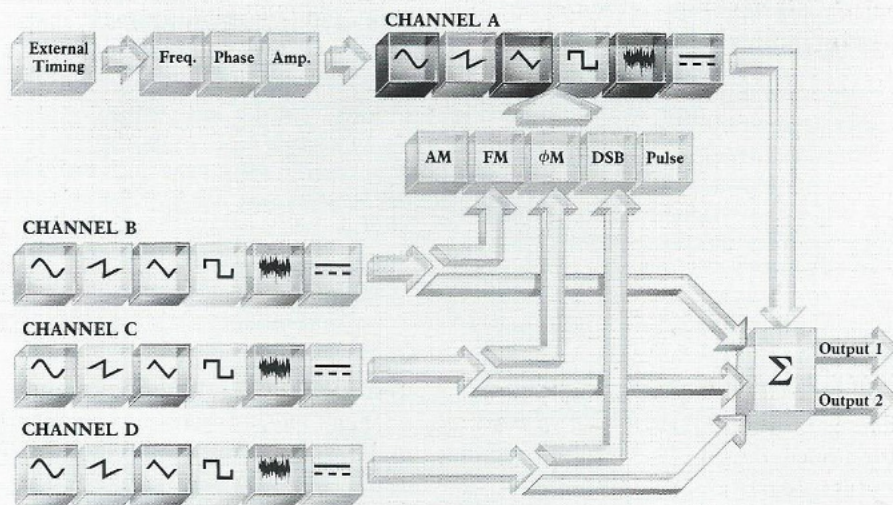


Figure 1. The standard HP 8904A Multifunction Synthesizer generates six precise basic waveforms. Options include a second output and three more synthesizers to modulate or be added to the first.

All four channels of the HP 8904A can be set to generate different waveforms, frequencies, amplitudes, and phase offsets simultaneously. This lets you test all aspects of a circuit. For example, FM stereo pilot-tone frequency, phase, and amplitude can be varied to test phase-locked-loop stereo decoder chips for lock-on range.

Option 002 adds a second output. Your ATE applications can now have two signals in a half-rack-sized space.

Although each synthesizer is independent, the relative phase between the two outputs can be controlled precisely. With phase accuracy between the two outputs specified to be better than ± 0.10 degree, the HP 8904A can test phase detectors, servo systems, shaft encoders, sonar, and other two-port devices.

For digital modulation and fast hop applications, Option 003 adds external timing control. For example, by applying a four-bit wide parallel word to the control port, you can create FSK, BPSK, QPSK, and QAM modulations.

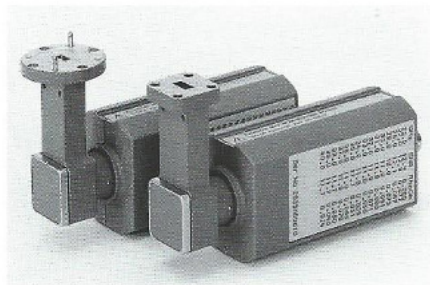
The price of the HP 8904A is \$2,600. Option 001 is \$1,500, Option 002 is \$1,200, and Option 003 is \$500.

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

Noise figure capabilities extended to 50 GHz

Two new excess noise sources, the HP R347B and HP Q347B, extend the capabilities of the recently announced HP 8970T Microwave Noise Figure Measurement System into the millimeter-wave frequencies.

Noise figure measurements are important in the design of receiver front-end semiconductor devices such as mixers and amplifiers. As operational systems have moved above 26 GHz, these new noise sources now make those measurements possible.



Microwave systems to 50 GHz can now be tested for noise figure.

The HP R347B (26.5 to 40 GHz) uses WR-28 waveguide with UG-599/U equivalent flange with an excess noise ratio of 10 to 13 dB. The HP Q347B (33 to 50 GHz) uses WR-22 guide with UG-383/U flange with an ENR of 6 to 13 dB. RSS uncertainty is 0.5 dB.

Both products are furnished with an individually calibrated data card attached, which can be entered into the meter memory for best accuracy.

The HP R347B is \$2,200 and the HP Q347B is \$2,800.

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

RF & MICROWAVE

Spectrum analyzer, probes help solve EMC problems

When electromagnetic compatibility (EMC) problems are found in the early stages of a product's development, they are usually easier and less expensive to correct than when the product is undergoing final compliance testing. The HP 8590A Option H51 Close-Field EMC Analyzer tailors the HP 8590A Portable RF Spectrum Analyzer to find and measure EMC trouble spots when new products are still on the design bench.

Close-field probes

The HP 8590A Option H51 is used with the HP 11945A Close-Field Probe Set. The set includes the HP 11940A (30 MHz to 1 GHz) and 11941A (9 kHz to 30 MHz) Close-Field Probes, double-shielded cables, and adapters. These lightweight, handheld probes will repeatably pinpoint and measure magnetic-field radiation from circuit boards,

cables, and enclosures with minimal disturbance to the field. They allow you to measure both the frequency and magnetic-field strength of emissions.

The probes' inherent rejection of electric fields reduces errors caused by coupling to stray electric fields. The type-N input connector of the EMC analyzer also minimizes electric-field coupling to further ensure the repeatability of measurements.

Attached to a source, the probes generate a localized magnetic field for susceptibility testing.

EMC analyzer features

Option H51 has a field-strength marker that displays the magnetic-field strength at the probe tip in $\text{dB}\mu\text{A}/\text{m}$, automatically accounting for the probe's antenna factors. Impulse interference can be measured with the analyzer's 9-kHz and 120-kHz resolution bandwidths, which is important if the results are to be compared to radiated compliance measurements. A MIN/MAX function helps distinguish between narrowband and broadband (impulse) signals.

Evaluate EMC fixes

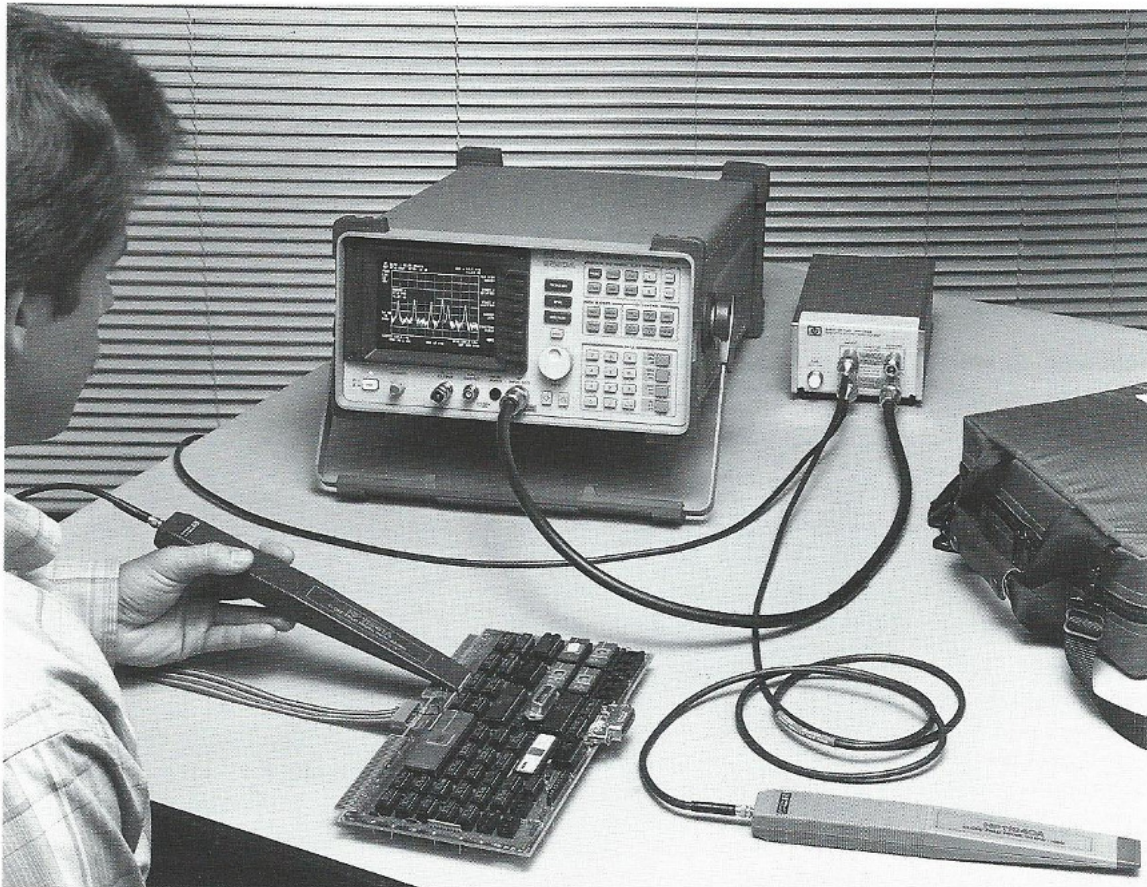
Three traces can be saved in the non-volatile memory of Option H51 for comparing interference data. When you want to see if your fix has improved an EMI trouble spot, you can recall the previous trace measured at that spot and compare it to the current trace, using the NORM function.

Enhanced frequency accuracy

Option H51 also improves on the standard frequency accuracy of the HP 8590A to aid in identifying interference sources. First you identify a known signal on the display to be used as a frequency reference. Then the analyzer adjusts the frequency readouts to provide frequency accuracy limited only by the analyzer's span accuracy of 1%.

The HP 8590A Option H51 is priced at \$10,250. The HP 11945A is \$1,110. The HP 8590A is \$9,690.

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



New portable spectrum analyzer and close-field probes can be used to check EMI radiation from any type of device.

RF & MICROWAVE

RF/Microwave Notes

Components. Did you know that all HP coaxial step attenuators are now warranted to 5 million cycles per pad?

Signal generators. There's a new combined data sheet on HP 8673B/C/D Synthesized Signal Generators (50 MHz to 26.5 GHz). Now all your microwave synthesized generator tradeoffs appear on one page. Check **O**.

Communications engineers will be happy to hear that the 64QAM option for the HP 8780A Vector Signal Generator (introduced in February) is now available. Option 064 is a no-cost option that provides for six digital data stream inputs and then generates 64 QAM phase-modulated signals from 10 to 3000 MHz.

We recently gave the HP 8770S Arbitrary Waveform Synthesizer System (dc-50 MHz) a new name—Signal Simulator System—to better describe what it does. And there's a new data sheet that shows expanded applications and specifications for radar and communications testing. Packed with application-specific photos of waveforms and spectrum analyzer screens, it also covers PRF, PRI, AM resolution, pulse chirp, and antenna scan test considerations. And a new Product Note 8770S-2, "Effective Use of the HP 8770S Signal Simulator System" provides programming details to make your measurement job easier. It covers specific waveform examples, from sine waves to pulsed, hopped, chirped waves, software creation tips, and WGL programming hints. For a copy of the data sheet and the product note, check **P**.

Automatic test systems. Many test engineers want to design their own custom modules for HP's 70000 Series Modular Measurement System. The HP 70595A design kit includes a design guide for electrical, mechanical, and EMI considerations. Two other parts kits supply the sheet metal and other parts for the 1/8 and 1/4 module size. Ask your HP Sales Representative about them.

Signal analyzers. The HP 8903B/E Audio Analyzer now includes a quasi-peak detector at no extra cost. When used with the optional CCIR weighting filter, the quasi-peak detector will make noise or signal-to-noise measurements according to the CCIR 468-3 standard. This gives a signal-to-noise measurement number, which better correlates with perceived S/N ratios.

A custom frequency counter now enhances the basic tuning accuracy of the new HP 8590A Spectrum Analyzer (1.5 GHz) to 20 kHz. The HP 5386A Frequency Counter with Option H20 operates off the SA local oscillator. Option H20 for the HP 8590A supplies the LO output.

If you're working in the EMI profession, you may wish to add your name to our mailing list for a new EMI newsletter HP has started. It covers new measurement and applications techniques and, not surprisingly, some of our new products too. It will be published aperiodically. Tell your HP Sales Representative that you're interested, or send your name to: Erik Diez, Hewlett-Packard, Signal Analysis Division, 1212 Valley House Dr., Rohnert Park, CA 94928.

U.S. and Canadian CATV technicians can now run any of seven proof-of-performance tests such as AM modulation depth, cross modulation, and composite triple beat at the push of a button with the HP 8590A Option H50 Spectrum Analyzer. All regular spectrum analyzer functions are preserved too, making this a handy box for portable field operations.

Network analysis. The metrology of microwave network analysis equipment is far from trivial. Verification kits are typified by the HP 85029A Precision 7mm Verification Kit for the HP 8753A Network Analyzer. By measuring the kit's etalons (the physical standard, as opposed to a written standard), traceability links to NBS performance are verified.

Transceiver test. HP 11805A Transceiver Test Software with Revision A.00.00 now runs on BASIC 5.0. It supports the new hierarchical file of 5.0 and is compatible with the HP Vectra personal computer. There are also some new revisions of the options for AMPS radio test and cellular radio testing.

Carrier phase noise. You may wonder if it's worth the cost of our HP 3048A Phase Noise System to find out about the phase-noise characteristics of your RF/microwave source. If so, we've got a deal for you. If you send us your source, we'll make a phase-noise characterization run on it and send you a plot. We think we can run most sources, and we're willing to try the others. You can get in touch with us through your HP Sales Representative.

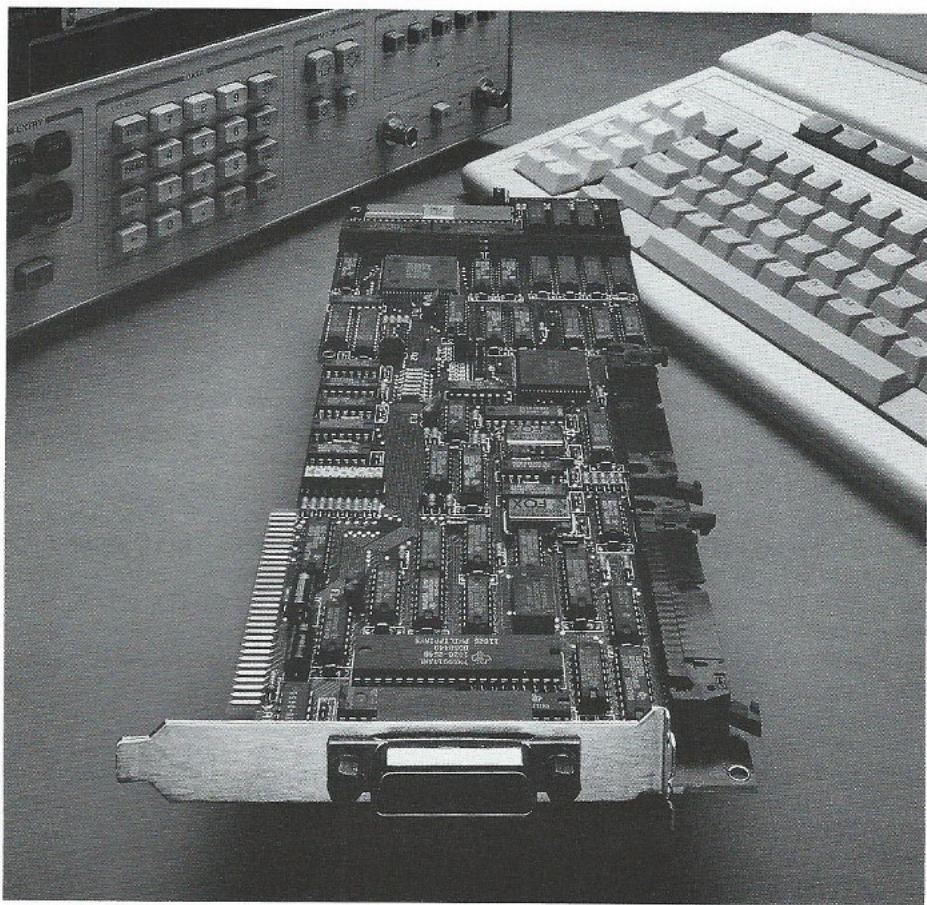
Some of you are eager to extend phase-noise measurements of the HP 11729C Carrier Phase Noise Test Set (100 MHz to 18 GHz) into the mm-wave ranges, perhaps as high as 110 GHz. An HP 11729C Option H33 in conjunction with some external power amplifiers and filters will get you into mm-wave. We'll be happy to discuss all the details—ask your HP Sales Representative to put you in touch with us.

Noise figure. We've extended to Dec. 31, 1987 the special retrofit offer for converting your HP 8970A Noise Figure Meter into a B model. This is important if you want to upgrade your 1500-MHz system to 18 GHz with the new HP 8971B Noise Figure Test Set. You'll want to do this if you need single-sideband measuring accuracy for work on microwave transistors or amplifiers. The HP 8971B has a tracking YIG-filter to tune out one sideband. The system then uses your own external LO to 18 GHz.

Software corner. If you're in the calibration and metrology business, the HP 11795A Opt. 319 Software Pac will make calibration of the HP 8673A/B/C/D/E/M Synthesized Generators easy. It operates on the HP 8952A Signal Generator Test System and tests to published specifications. Check **Q**.

If you're calibrating a lot of HP 8340A/B or 8341A/B Synthesized Sweepers, the HP 11877A Performance Verification Software will help perform up to 90% of the performance tests of those sweepers. It works with HP 9000 Series 200 or 300 computers and uses the same ancillary test equipment as your typical manual calibration setup. Our calculations show that it can reduce test time from 21 hours to 8.8 hours.

COMPUTERS/CONTROLLERS



HP BASIC Language Processor Card offers Series 80 migration path.

HP-85 and HP-86 computers to be discontinued

Hewlett-Packard is discontinuing sales and manufacturing of its Series 80 personal computers, the HP-85 and HP-86, effective November 1, 1987. Orders will continue to be accepted through November. Series 80 enhancements and accessories such as memory modules, CRT displays, ROMs, and I/O interfaces will continue to be available until November 1, 1988.

Migration path for Series 80 customers

HP BASIC is used by HP 9000 Series 200/300 workstation users because of its ease of use, advanced I/O capabilities, and high performance. With the introduction of the HP 82300A BASIC Language Processor Plug-In

Card for the HP Vectra PC and the new PC-308 controllers running HP BASIC as a task under the MS-DOS operating system, HP BASIC becomes a natural migration path for Series 80 BASIC.

Software transportability

To aid in porting Series 80 programs to HP BASIC, you can obtain a Series 80 Software Porting Kit available through the Series 80 Users Library. This kit provides a porting document and a variety of utility programs.

The HP 82300A BASIC Language Processor Plug-In Card complete with BASIC software is priced at \$1,320. The Series 80 Software Porting Kit is \$75.

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

MORE PRODUCTS

Telecom '87 to be held Oct. 20-27 in Geneva

One of the most significant worldwide events in the communications industry is held every four years by the International Telecommunications Union. This year's show, Telecom '87, will be held in Geneva, Switzerland, October 20-27. The convergence of computers and telecommunications ensures an industry event with a broad appeal to manufacturers, PTTs, and end users.

HP will be demonstrating products at the booth at Palexpo and at the European headquarters building nearby.

At the booth

The exhibit area will be divided into three main sections:

- HP's company-wide multivendor networking. Our latest products will be integrated into a networking schematic and will operate as standalone products, although there will be instruments monitoring live traffic between Palexpo and a parallel show in Munich.
- Test and measurement. On display will be our latest instruments used in the manufacture and test of telecom equipment as well as those used to monitor the network operations.
- Standards. Two HP terminals will be shown communicating with each other over a standard four-wire telephone cable and through different PBXs located at the booths of other PBX vendors, including Northern Telecom, Alcatel, Plessey, and ITT-Austria.

At the European headquarters building

If you're interested in seeing integration in action, we will conduct two integrated information tours. All facets of computerization within two types of companies, from receipt of order to delivery of the product, will be shown. The emphasis is on networking in a multivendor environment, with actual communication to non-HP computers being demonstrated.

In addition to these tours there will be standalone exhibits for test and measurement, design and manufacturing, business systems, and customer support.

If you are planning to visit Telecom '87 and are interested in receiving more information on Hewlett-Packard at this event, check **S** on the HP Reply Card, or call Casey Caruso at (408) 447-1123.

MORE PRODUCTS



The new HP 4954A adds power and versatility to HP's family of disc-based analyzers.

High-performance protocol analyzer is flexible, expandable

The HP 4954A Protocol Analyzer adds power and versatility to the family of disc-based analyzers: the HP 4972A, HP 4951C, and HP 4952A. The new analyzer offers high-speed operation, extensive mass storage, multiprotocol handling, programming adaptability, and expandability. It is the most versatile of HP's disc-based analyzers.

High-speed advanced multiprocessor design ensures reliable, sophisticated analysis and simulation of full-duplex bit-oriented protocols to 72 kbps, and data capture of bit-oriented protocols at lower line utilizations up to 256 kbps.

Mass storage

An integral 20-Mbyte hard disc and a 613-kbyte 3½-inch floppy disc provide extensive mass storage. Any HP 4954A file can be autoloaded at power-on to configure the protocol analyzer instantly for your needs. The mass-storage capacity of the HP 4954A can be further extended through HP-IB subset 80 disc drives. Setup menus, user-written programs, and buffer data stored to floppy disc may be shared with the HP 4951C and HP 4952A.

The internal 256K-byte data capture buffer can be expanded through the integral hard disc up to 20 Mbytes.

Extensive multiprotocol handling

Multiprotocol testing capabilities can monitor, analyze, and simulate protocols such as X.25, SNA/SDLC, Bisync, Async, DDCMP, X.75, HDLC, BSC-framed X.25, and character-oriented synchronous protocols. X.21 and CCITT#7/CCS7 support is also available through the HP 4954A's application software.

Its numerous application software packages allow this high-performance analyzer to act as an X.25 network performance analyzer, or as an SNA, X.21, or CCITT#7 development tool.

Custom measurements and tests are easy to perform with softkey-driven entry of monitor and simulation programs with triggering based on datacom events. The HP 4954A gives you programmatic control of send strings, timers, and counters.

The price of the HP 4954A includes one of four interface pods: RS-232-C/V.24, RS-449, V.35, and MIL-188C.

The HP 4954A is priced at \$17,000. HP's other disc-based analyzers range in price from \$4,000 to \$18,000.

For more information about the HP 4954A, the interface pods, and the application software, check T on the HP Reply Card.

MORE PRODUCTS

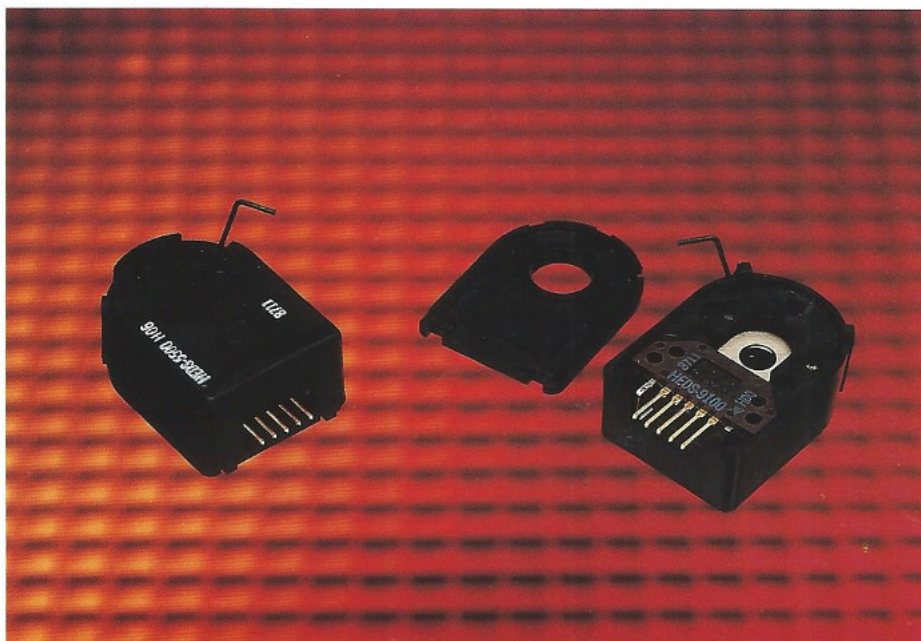
New encoders broaden motion-control component line

The HP HEDS-5500 "Quick-Assembly" Optical Encoder and the HP HEDS-9200 Linear Optical Encoder are two of HP's newest position sensors. Geared toward high-volume applications, both series of encoders are easy to use and require no follow-up adjustments.

The HP HEDS-5500 encoders require only four steps to complete the mounting and assembly of the device on the motor. The HEDS-9200 Linear Optical Encoder is the first encoder from HP that allows economical, high-performance linear motion detection.

Fifteen-second assembly

Using a screwdriver, you can assemble the HEDS-5500 to a motor in as little as 15 seconds. The mounted encoder is insensitive to radial and axial play. The encoder provides a two-channel quadrature signal that is specified over a wide operating temperature range of -40°C to $+100^{\circ}\text{C}$. The HEDS-5500 series is available in nine standard resolutions for use in combination with nine shaft sizes.



The HP HEDS-5500 is designed for quick assembly in high-volume applications.

These encoders are excellent for use in high-volume assembly of printers, plotters, tape drives, positioning tables, and automatic handlers.

The HEDS-9200 module can be used in conjunction with a codestrip to detect linear

position in applications for printers, plotters, tape drives, and factory automation equipment, for example. The module is available in three standard resolutions.

In quantities of 250, the HP HEDS-5500 encoder is \$33 each and the HEDS-9200 is \$26.75 each.

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