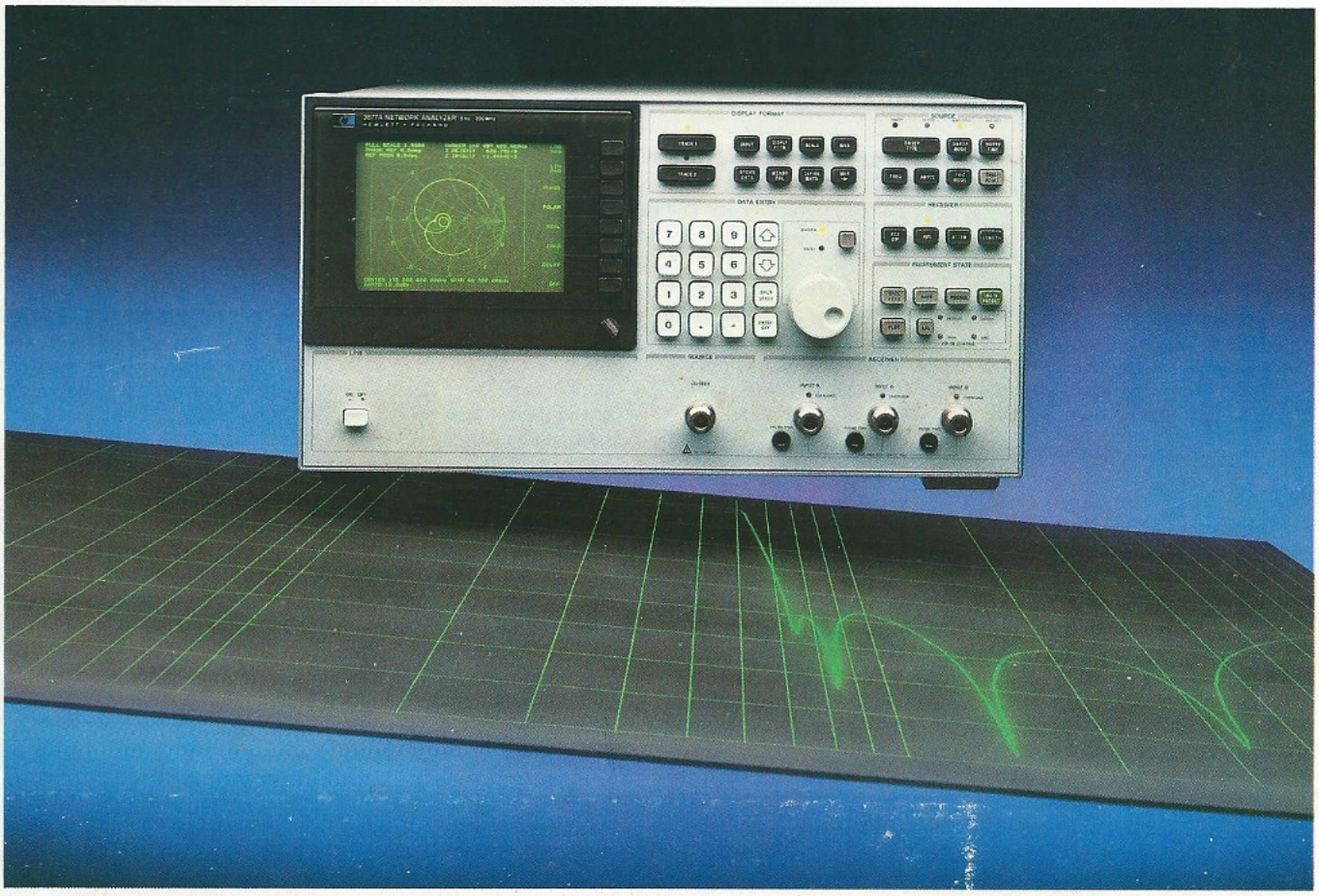
MEASUREMENT COMPUTATION news

product advances from Hewlett-Packard

JANUARY/FEBRUARY 1984



Network analyzer provides high-performance measurement from 5 Hz to 200 MHz

State-of-the-art design and testing have in the past often been limited by the performance capabilities of existing network analyzers. Now, with a single, easy-to-use instrument, the HP 3577A Network Analyzer, many device characteristics can be revealed for the first time.

No longer must you invest in one instrument for narrowband network analysis of high-performance components and another for broadband testing up to 200 MHz. With the HP 3577A, you can perform both narrowband and broadband analysis, including audio (up to 20 kHz), baseband (up to 20 MHz), and IF to low RF (up to 200 MHz).

Technical design innovations in the new HP 3577A provide at least an order of magnitude improvement over other network analyzers in resolution and accuracy for network measurements from 5 Hz to 200 MHz, not to mention the instrument's versatility and ease of use. The HP 3577A is believed to be the first network analyzer to change an incoming analog signal into a digital format for subsequent processing. Softkeys and menus make it easy to use the more than 300 different measurement functions this product offers.

Measurements can be made over the analyzer's 100-dB dynamic range with up to 0.02-dB and 0.2-degree dynamic accuracy. In the 1-Hz resolution bandwidth, critical low-level measurements can be made with −130 dBm sensitivity. The display marker shows points of interest to 0.001-dB, 0.005-degree, and 0.001-Hz resolution. In each case, this measurement quality represents at least an order of magnitude improvement over previous network analyzers.

Key features

The HP 3577A provides an integrated three-input receiver, graphics display, and synthesized source. The analyzer can measure directly in 50-ohm or high-impedance environments using the selectable 50-ohm/1-megohm input impedance. The

(continued on page 2)

Network Analyzer

(continued from page 1)

companion HP 35677A or HP 35677B S-Parameter Test Set can be used with it to make reflection measurements such as return loss, reflection coefficient, and impedance in 50-ohm or 75-ohm systems. These test sets also allow simultaneous display of both transmission and reflection parameters from 100 kHz to 200 MHz.

Other important features include:

- An autoscale function that brings the desired measurement to the screen quickly with a full-scale display
- Direct digital plotting to HP-GL plotters via the HP-IB (IEEE 488) with no need for a computer
- User-definable vector math capability for customized results
- Multiple display formats with electronic graticules for accurate displays in rectangular, polar, or Smith chart coordinates
- Selectable resolution bandwidths of 1 kHz, 100 Hz, 10 Hz, and 1 Hz achievable with digital filters
- Swept frequency (linear or logarithmic) or amplitude.

The HP 3577A Network Analyzer is priced at $23,500. Either the HP 35677A or the HP 35677B S-Parameter Test Set may be added on for $3,500.

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

New dynamic signal analyzer features major advancement in spectrum analysis, plus vibration analysis capabilities

The versatile, high-performance HP 3561A Dynamic Signal Analyzer from Hewlett-Packard provides a new combination of measurement capabilities for mechanical vibration analysis, acoustical applications, and a range of electronics applications, including spectrum analysis, network measurement, and waveform recording.

Spectrum analysis: 100 times faster

In its frequency range of dc to 100 kHz, the HP 3561A provides significant advancements over swept spectrum analyzers in measurement speed, accuracy, and resolution. In addition, it is believed to be the first analyzer to bring Fourier transform capabilities into a dynamic range appropriate for electronic applications.

The HP 3561A features state-of-the-art digital signal processing techniques and use of a dedicated, high-performance IC for performing the Fourier transform, reducing measurement time by as much as two orders of magnitude over swept spectrum analyzers. You can, for example, obtain a display with 1-Hz resolution in less than two seconds.

Custom-made digital filter ICs provide frequency resolution as fine as 0.000625 Hz (0.25-Hz frequency span) anywhere in the 100-kHz range. The HP 3561A also provides phase spectrum and time-domain displays. These are new capabilities for spectrum analyzers that give you added insight into signal characteristics.

Vibration analysis is just one area in which the new HP 3561A makes important contributions. This versatile dynamic signal analyzer is believed to be the first to bring Fourier transform capabilities into a dynamic range suitable for electronic applications.

A high-performance analog-to-digital converter provides a full 80-dB dynamic range, with amplitude accuracy of ±0.15 dB on input ranges of +27 dBV to −40 dBV. This accuracy is maintained over time and temperature variations with automatic calibration. You can read answers quickly from a crosshair marker that provides high-resolution readings of amplitude or phase and time or frequency.

Other electronic capabilities

A built-in band-limited, band-translated noise source, combined with trace math, allows the HP 3561A to make amplitude and phase network measurements over the full 100-kHz range. Another key capability of the HP 3561A is its time capture mode, which lets you use the instrument as a low-frequency waveform recorder. The 13-bit, 256-kHz analog-to-digital converter and a 40k-word time buffer enable you to capture and analyze events containing frequencies as high as 100 kHz with 80 dB of alias protection.

Time buffer data can be analyzed in either the time or the frequency domain and can be zoom processed with up to 40× total expansion factor. Several types of triggering are available, including free-run, external, input, delayed, and HP-IB (IEEE 488). All trigger setup parameters, display formats, and the time data itself are accessible via the HP-IB.

Mechanical applications

The HP 3561A makes significant contributions in mechanical applications, offering greater speed and a wider dynamic range than previous digital signal analyzers. Its capabilities are especially well suited for predictive maintenance, dynamic balancing, run-up or coast-down analysis, and acoustical noise-emission analysis, as well as general vibration analysis.

Using the HP 3561A to monitor the spectra of a machine on a regular basis lets you spot defects before serious damage occurs, allowing you to schedule necessary maintenance. Spectral mapping can help you identify trends in machinery condition by adding a third dimension to the display, such as time or RPM. The HP 3561A's optional nonvolatile bubble memory lets you store and recall a combination of up to 127 spectra, time traces, or front-panel setups.

The HP 3561A's capabilities are also useful for acoustical analysis, expecially noise prevention and abatement, audio analysis, and speech signal processing. Acoustic phenomena can be analyzed in either 1/3 or full-octave formats, closely approximating how the human ear responds to sound.

Price of the HP 3561A Dynamic Analyzer is $10,000, and Option 001, the Bubble Memory, is $1,500.

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

Switch/control unit automates HP-IB system signal connections for production, R&D applications

Hewlett-Packard's new HP 3488A Switch/Control Unit provides a low-cost solution to HP-IB (IEEE 488) system signal-switching problems in a wide range of applications. Its versatility can help you achieve higher throughput in manufacturing systems or faster performance analysis during product design.

Signal-switching versatility

Switching functions are accomplished with one or more plug-in switch modules. You can configure up to five modules in each unit, allowing you to switch signals ranging from low-level voltmeter inputs to 250V/2A power-supply outputs. You can also automate the connections required for wide-dynamic-range measurements to 300 MHz when using network or spectrum analyzers (see Fig. 1). The modules slide into the rear of the HP 3488A for quick test setup and can be interchanged for rapid reconfiguration.

The following optional plug-in switch modules are available:

- 10-Channel Relay Multiplexer Module (Opt. 010)
- 10-Channel General-Purpose Relay Module (Opt. 011)
- Dual Four-Channel VHF Switch Module (Opt. 012)
- 4×4 Matrix Switch Module (Opt. 013)
- 16-Bit Digital Input/Output Module (Opt. 014)
- Breadboard Module (Opt. 015).

Up to 40 complete switch configurations can be stored in the HP 3488A for later recall. Predefined switch settings can help you reduce lengthy programming commands during repetitive testing. Each storage register contains a complete configuration for all analog relays and digital output lines.

Easy to program

The HP 3488A's programming commands can be learned quickly during setup and interpreted easily whenever you make programming changes. You can display the complete syntax of commands simply by pushing the SYNTAX key on the front panel.

Troubleshooting your programs is also simplified, thanks to the HP 3488A's ability to trap and display errors in program commands. You can interrogate the SRQ mask, determine the type of switching module installed, and close, open, or monitor channels from your computer terminal or the HP 3488A front panel.

The HP 3488A HP-IB Switch/Control Unit is priced at $1,300. Prices for the optional plug-in switch modules range from $150 to $550 each.

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

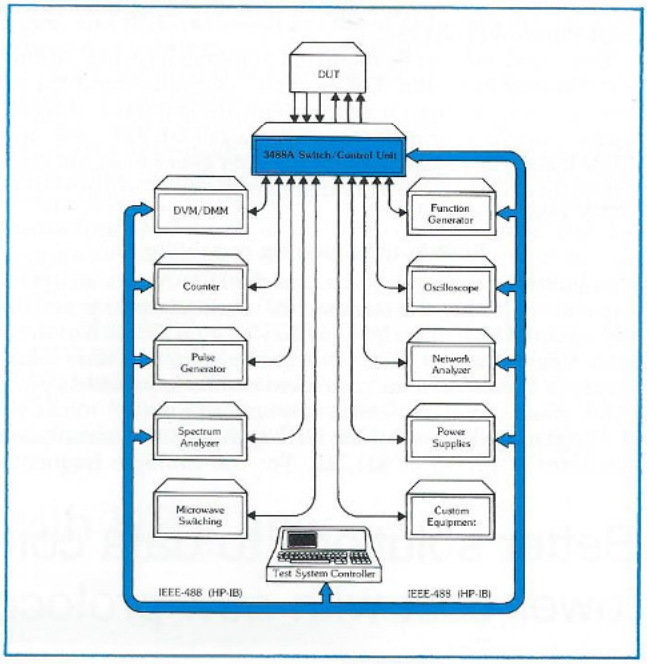


Fig. 1. The HP 3488A can be used for automated signal switching in HP-IB functional test systems.

Technological milestones chronicled in new book from Hewlett-Packard

Inventions of Opportunity: Matching Technology with Market Needs, published recently by Hewlett-Packard, marks several milestones in technological achievement during the company's history. The 364-page book covers 33 years of engineering at HP through articles gleaned from HP's monthly technical periodical, the *Hewlett-Packard Journal*.

Highlighting the book is commentary by William R. Hewlett, company cofounder and vice chairman of its board of directors. In introductory remarks and chapter prefaces, Mr. Hewlett sets the scene for the market-driven technology developments detailed in the book's 31 reprinted articles. Selected by a panel of 20 senior HP engineers, the articles were chosen for their description of products that contributed to the state of the art in electronics technology at the time of development.

The title comes from the early practice by HP engineers of a research and development technique called "engineering of opportunity." This approach sought to match a market need with a technology that would produce an appropriate and commercially successful product.

Among the articles are those on the first high-speed frequency counter, the HP-35 Calculator that replaced the slide rule in engineers' pockets, the beginnings of computer-controlled instrumentation systems, and many others. The introduction comments on each article, providing insights into the dynamics of innovation and showing how a need, a technology, and creative people come together to produce a successful invention.

Cloth-bound, with dust cover, the book is available exclusively from Hewlett-Packard by ordering part number 92233B. In the U.S., the book may be ordered from: Computer Supplies Operation, Hewlett-Packard Co., P.O. Box 60008, Sunnyvale, CA 94088, telephone (800) 538-8787. In California call collect (408) 738-4133. Outside the U.S., contact your local Hewlett-Packard sales office.

U.S. list price is $27.50.

Versatile analyzer measures, analyzes, and records error and jitter performance of high-speed systems

The performance of high-speed digital transmission systems can be measured, analyzed, and recorded using the new HP 3764A Digital Transmission Analyzer. Developed primarily for use on systems operating at the CEPT bit rate of 139M bits/s, the HP 3764A uses a versatile option structure to increase its standard measurement power.

The HP 3764A performs conventional bit-error-ratio measurements, as well as these new CCITT-recommended error-performance tests: percentage availability, percentage error-free seconds, and percentage of time the error ratio is less than threshold level N.

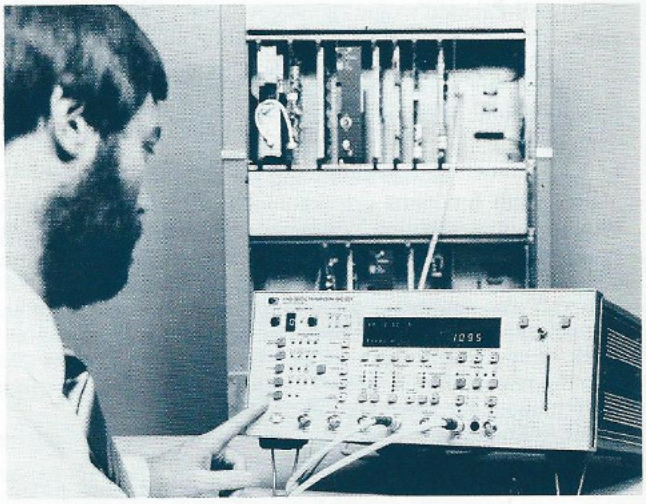
This capability can be increased at minimal cost by adding a measurement option. For example, you can extend the instrument's frequency range to provide the standard measurements over the four major CEPT bit rates (2M, 8M, 34M, and 139M bits/s), or you can add timing jitter generation and measurement at 139M bits/s. All versions of the HP 3764A are HP-IB (IEEE 488) compatible.

Built-in data logging capability

A built-in data logger increases the HP 3764A's analytical capabilities. Either the standard 20-column impact printer or the optional tape cartridge unit may be built in. Each of these data loggers can be used with the built-in, real-time clock, auxiliary inputs, and measurement results to provide a powerful, stand-alone transmission monitoring unit.

The standard model of the HP 3764A Digital Transmission Analyzer is priced at $11,360. For the multiple frequency version (Option 001), add $2,145 to the base price. Option 002, the jitter version, is priced at $5,035 above the base price. For an additional $750 above the base price, you can choose Option 003 with delayed data outputs.

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

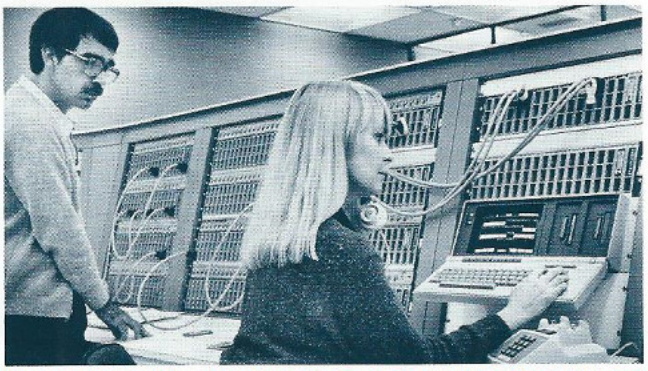


You can evaluate high-speed digital transmission systems rapidly and easily using the new HP 3764A Digital Transmission Analyzer.

Better solutions to data communications problems at lower cost with new protocol analyzer enhancements

In a world that grows smaller and moves faster each day, receiving and transmitting information with greater speed and reliability are of paramount importance to communications users and providers. The HP 4955A Protocol Analyzer, introduced early last year, is designed to help meet this need by solving a variety of data communications problems.

The first in a new line of HP protocol analyzers, the HP 4955A can monitor or simulate at 72K bits/s, using either character-oriented protocols, such as bisync, or bit-oriented protocols, such as X.25. Each event and character input into the analyzer gets a unique time stamp, letting you perform precise analysis in either a real-time or a post-process mode.



New enhancements and reduced prices make the HP 4955A Protocol Analyzer a cost-effective solution to many data communications problems, minimizing network down time and transmission delays.

Enhancements expand capabilities and lower price

A new configuration for the HP 4955A, Option 004, eliminates one tape drive and a field service kit. The resulting manufacturing efficiencies have led to price reductions on both the new option and the standard unit.

Another recent enhancement is the HP 18144A Protocol Decode Pack, which adds specialized protocol decoding and display software capabilities. Now you can decode IBM's SNA, BSC-framed X.25, or DEC's DDCMP protocol and have simultaneous display of frame and packet, which provides complete information for levels 2 and 3, as defined by the OSI Reference Model.

The HP 18138A Interface Kit, another new enhancement, provides a cable with X.21 15-pin connectors and includes software for displaying X.21 data in a clear, concise format.

With its original capabilities, plus these new enhancements, the HP 4955A offers a powerful combination of speed, BASIC programming capability, mass storage (128K-word internal buffer), multiple display formats, expanded protocol flexibility, and trigger sophistication (63 triggers that operate at all speeds up to 72K bits/s).

The standard HP 4955A Protocol Analyzer is priced at $18,680. Option 004 reduces the price to $17,880. For $250, current owners of the HP 4955A may add the HP 18144A Protocol Decode Pack, which is now standard with all new units. The new HP 18138A Interface Kit is priced at $250.

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

Two new RF plug-ins join sweep oscillator family

Hewlett-Packard has expanded the performance of its microprocessor-based HP 8350 Sweep Oscillator product line with the introduction of two new RF plug-ins. The HP 83592C RF Plug-In covers the range from 0.01 to 20.0 GHz, and the HP 83572B covers the 26.5-to-40-GHz range.

Low harmonics aid wideband measurements

The HP 83592C offers −55 dBc suppression of harmonics and subharmonics from 3.5 to 20 GHz—15 dB more suppression than is currently found in any other broadband general-purpose microwave sweeper. When broadband detection systems, such as scalar network analyzers, are used, low harmonics increase the validity and range of the measurements.

The HP 83592C achieves its low harmonics by incorporating a tracking YIG filter in its output circuit. Because this filter's tuning is carefully matched to that of the plug-in's microwave oscillator, insertion loss is minimized. The result is +6 dBm leveled output power from 2.4 to 18.6 GHz and +4 dBm at 20 GHz. From 10 MHz to 2.5 GHz, the power output is +10 dBm, and the harmonics are down at least 25 dB.

The new HP 83572B RF Plug-In for the HP 8350B Sweep Oscillator delivers +7 dBm output power from 26.5 to 40 GHz. Also new for the HP 8350B is the HP 83592C, a low-harmonic, wideband 20-GHz plug-in.

Greater output power at millimeter wavelengths

The new HP 83572B delivers at least +7 dBm unleveled output power from 26.5 to 40 GHz. It provides microwave engineers the RF power previously available from limited-life, backward-wave-oscillator tube-type sweepers.

Option 001 includes an external 10-dB coupler, crystal detector, and BNC cable—all calibrated to the specific plug-in. When used with this option, the HP 83572B offers +6 dBm of leveled output power for regulated power control during swept and CW operations.

When equipped with Option 006, which adds internal pulse and square-wave-modulation capabilities, the HP 8350/83572B combination can be used with the HP 8756A and HP 8755C Scalar Network Analyzers for scalar waveguide measurements from 26.5 to 40 GHz. This combination is also the appropriate source for vector measurements involving the HP 8410C Network Analyzer and the HP R8747B Waveguide Reflection/Transmission Test Set.

The HP 83592C and 83572B RF Plug-Ins are priced at $26,580 and $17,500, respectively. Add $1,600 for Option 001, and $1,800 for Option 006 on the HP 83572B. The HP 8350B Sweep Oscillator Mainframe is priced at $4,565.

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

Enjoy more autotest flexibility with HP's new dual-sensor power meter

Hewlett-Packard's new microprocessor-based HP 438A Dual Sensor Power Meter offers more flexibility in automatic test applications. By combining two power sensors with the HP 438A, you can measure absolute power at two points and compute the ratio of or difference between the two in either dB or percentage. This capability lets you use the HP 438A in applications such as gain, gain compression, and power absorption measurements. When used with signal-separating couplers, it measures either return loss in the ratio mode or net absorbed power in the difference mode.

The HP 438A operates with any of the HP 8480 Series Power Sensors over a frequency range from 100 kHz to 26.5 GHz and a power range from −70 to +44 dBm. You can set digital offsets into memory to compensate for coupling factors or cable loss.

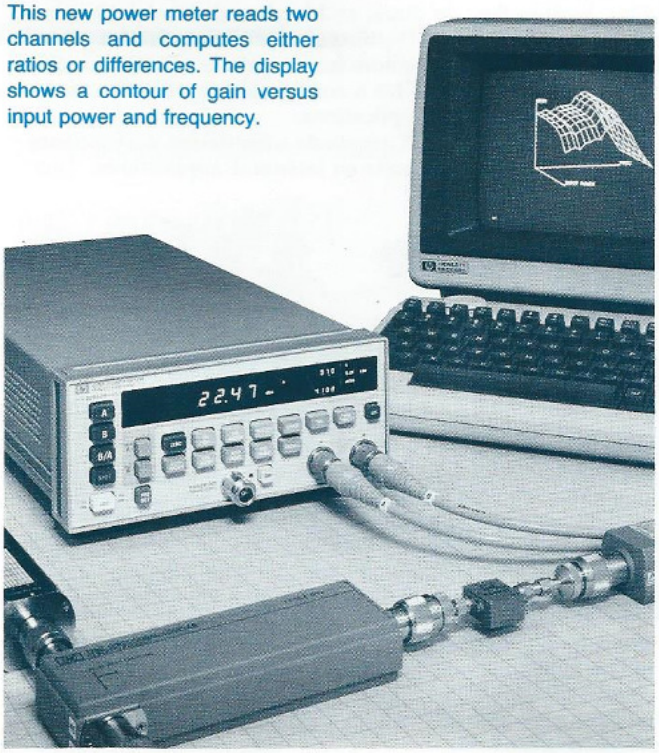
HP-IB (IEEE 488) programmable, this new meter is especially suited for system applications requiring up to 20 digitized measurements per second. Its microprocessor simplifies program writing and operation. For example, setting offsets or taking ratios requires only a single programming statement. Nineteen store/recall registers let you store the operating state of both channels for later recall.

The HP 438A's front-panel reference oscillator output (1.0 mW at 50 MHz) provides 1.2% accuracy. Optional rear sensor inputs include an additional rear reference oscillator.

The standard HP 438A is priced at $4,900. Option 002, the rear panel sensor, is $325, including the rear calibrator. Sensors range from the HP 8482A (100 kHz to 4.2 GHz) at $580 to the high-power HP 8481B (+44 dBm) at $1,402.

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

This new power meter reads two channels and computes either ratios or differences. The display shows a contour of gain versus input power and frequency.



New excess noise sources help cut measurement uncertainty and extend frequency range

Hewlett-Packard's HP 346 noise source family, suitable for use with the HP 8970A Noise Figure Meter, includes two new devices to help reduce uncertainty during measurement and extend the frequency coverage to 26.5 GHz.

A common problem in measuring the noise figure of certain microwave devices, such as GaAs field effect transistors or amplifiers with shunt feedback, has been the noise figure's sensitivity to the complex impedance of the driving source. If the excess noise source used for measuring the noise figure changes its reflection coefficient from "on" to "off," the measured noise figure may change as much as 0.3 to 0.4 dB during the measurement process.

To deal with this problem, the new HP 346A Noise Source features a 10-dB internal attenuator, which reduces the maximum change in the reflection coefficient to less than 0.01. In addition, the HP 346A's lower excess noise ratio (ENR) of 4 to 6 dB provides a better match for measuring ultra-low-noise devices with noise figures of about 1 dB.

Both the new HP 346A and the previously existing HP 346B cover a frequency range from 10 MHz to 18 GHz. The new HP 346C expands the range up to 26.5 GHz and has a nominal ENR between 12 and 17 dB. All three devices feature digital correction charts printed on each nameplate for greater accuracy in transferring the ENR to the HP 8970A NF Meter for measurement corrections. All three sources are fully compatible with the HP 8970A, which provides 28±1 Vdc bias.

The HP 346A Noise Source is priced at $1,500, the HP 346B is $1,400, and the HP 346C is $1,900. Price of the HP 8970A Noise Figure Meter is $10,300.

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

HP-UX now offered on HP 9000 Series 200 Computers

The latest of Hewlett-Packard's product lines to offer the HP-UX operating system are the HP 9000 Series 200 Computers. HP-UX is a software environment compatible with Bell Laboratories' UNIX* operating system.

Series 200 HP-UX configurations

The Series 200 hardware capable of running HP-UX comes in three primary configurations: Models 236, 236C, and 220. (HP-UX is not available on the HP 216.) Model 236 offers an integrated 12-inch monochrome CRT with graphics capability, built-in flexible discs, and keyboard. Model 236C has similar capabilities, but features a color CRT with 4-bit planes for selection of up to 16 colors from a palette of 4,096 possible colors. Model 220 provides a configurable system for multiusers, terminal-based applications.

The Series 200 HP-UX products offer 16-bit performance for a small number of users in technical applications. They complement the 32-bit Series 500 HP-UX products, which offer a superset of Series 200 capabilities.

Several configurations of the HP 9000 Series 200 Computer Systems are now capable of running HP-UX, Hewlett-Packard's UNIX-based software licensed from Bell Laboratories. Model 236C, shown here, features a color CRT that lets you select up to 16 colors from a palette of 4,096 possible hues.

The Series 200 Computers use a Motorola MC68000 processor running at 12.5 MHz. Memory management hardware and cache memory are used to let you run multiple processes and take full advantage of the processor's speed. Multiple users are supported by connecting additional terminals to the system. A full range of printers, mass-storage devices (hard and flexible discs and tape drives), terminals, A- to E-size plotters, and a data tablet are supported.

HP-UX features

The HP-UX software is a licensed UNIX system based on Bell System III, with the addition of selected Berkeley 4.2 system extensions. HP-UX includes a range of engineering extensions such as language compilers, a graphics library, and peripheral support.

The following are features of the operating system:

- FORTRAN 77, Pascal, and C compilers
- Device-independent graphics library
- MC68000 assembler
- Data communications capabilities for transferring mail, files, and logon to other UNIX systems
- Single-user and multiuser configurations available.

The HP-UX system requires use of a hard disc, which includes the operating system, compilers, libraries, and process swap space, as well as normal mass-storage files.

Because of the system's compatibility with the Bell System III UNIX, HP-UX software is portable and offers a range of compatible devices that let you expand your system as your needs grow. Hardware and software support are available at nearby Hewlett-Packard offices worldwide.

Depending on the system complexity, complete HP 9000 Series 200 Computer Systems range in price from $24,000 to $60,000.

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

**UNIX is a U.S. trademark of Bell Laboratories.*

New printers offer improved print quality at lower prices

Hewlett-Packard recently expanded its printer product line with the introduction of four printers, all of which offer improved print quality and printing capabilities plus a substantial decrease in cost, compared with other models.

HP 2930 family printers: quiet, fast, and versatile

Incorporating a new high-density, high-speed matrix printhead, the HP 2930 family of impact serial printers all operate at 200 cps with a noise level of only 63 dBA. The family consists of the HP 2932A General-Purpose Printer, the HP 2933A Factory Data Printer, and the HP 2934A Office Printer.

The HP 2932A provides the print speed, forms-handling capability, and quiet operation required for distributed printing applications. The HP 2933A features large-character generation and bar-code printing capabilities, including popular codes such as Intermec Code 39, Industrial 2 of 5, and Interleaved 2 of 5.

The HP 2563A General-Purpose Line Printer (left of partition) is suitable for manufacturing as well as other business environments. The compact HP 2934A Office Printer (right of partition) offers convenient printing right at your desk in a choice of print speeds.

Designed for business and personal use, the HP 2934A features dual-mode printing. You can select speeds of either 67 or 40 cps for printing letters or 200 cps for applications such as memos and reports.

Common features

The innovative printhead used in all three printers employs 12 wires arranged in two staggered columns—the key to its high-quality character formation. Because of its bayonet-style design, the printhead is inexpensive and easy to replace.

Several other features are shared by these three printers:

- Fixed platen and straight paper path, enabling the paper to move easily through the printer
- Last-form tearoff capability, which lets you remove the last printed sheet of continuous forms without wasting a blank form
- Adjustable tractor-feed mechanism that handles a variety of paper sizes in widths up to 400 mm (15.75 inches).

Model 2563A Printer offers fast throughput

Printing at 300 lines per minute, the HP Series 300 Model 2563A General-Purpose Line Printer is designed for use in all areas of a business network, including accounting, engineering, manufacturing, shipping, and data centers. This dot-matrix, impact line printer offers fast throughput for jobs that exceed the capabilities of serial printers.

Featuring compressed print and large-character generation, multinational and OCR character sets, and raster graphics and bar-code capabilities, the HP 2563A prints at a quiet 60 dBA with sound abatement options. It also offers features such as paper jam detection and easy recoverability.

Prices for the HP 2930 family are $2,495 for the HP 2932A, $2,795 for the HP 2933A, and $2,895 for the HP 2934A. The HP 2563A is priced at $5,690 for the RS-232-C version and $6,190 with the HP-IB option.

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

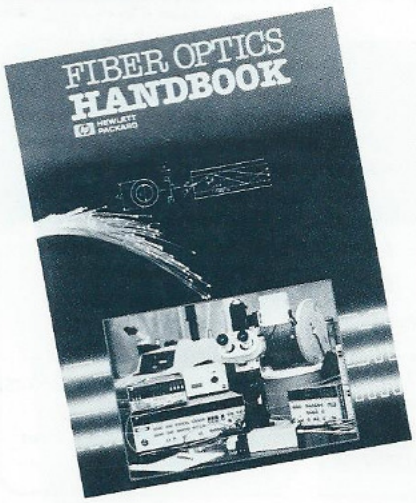
Fiber optics handbook serves as primer and reference guide

The *Fiber Optics Handbook*, recently published by Hewlett-Packard, is both an introduction to and a reference guide for fiber optics technology and measurement techniques. Written especially for engineers new to the field, it is intended to help answer questions in a comprehensive, easy-to-read format.

This 140-page brochure is divided into two major sections. The first section comprises several tutorials and discusses topics such as the pros and cons of fiber optics, fiber optics systems, typical measurements, and safety aspects.

In the second section more than 160 fiber optics terms are defined and measurement principles described in alphabetical order. Primary emphasis is on an extensive, sound overview of the basics, tradeoffs, state of the art, and typical characteristics. Diagrams, illustrations, and formulas further enhance the information.

For your free copy, check **K** *on the HP Reply Card.*



New fiber optics instruments offer precision parametric capabilities

Hewlett-Packard marks its entry into the rapidly growing field of fiber optics testing with the introduction of two new products: the HP 8150A Optical Signal Source and the HP 8151A Optical Pulse Power Meter. Major technical contributions of these instruments include their precision and their capability for parametric characterization of fiber optics components, modules, and systems at high confidence levels.

New technologies

Technological innovations let you use front-panel keys for direct setting of calibrated optical levels on the HP 8150A and of peak-power measurements on the HP 8151A. Both instruments incorporate large-bandwidth transducers, providing easy conversion of signals: either electrical-to-optical with the HP 8150A or optical-to-electrical with the HP 8151A. With these instruments, fiber optics testing can grow from simple functional checkout to parametric performance analysis.

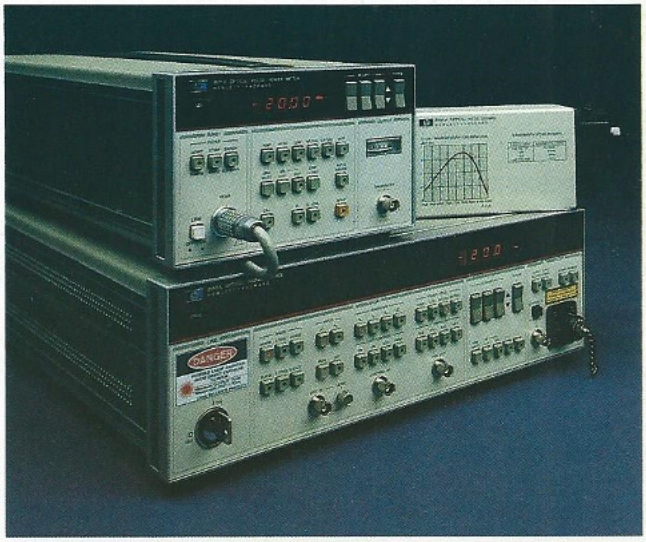
Both instruments are designed as fundamental engineering tools for fiber optics research and design, incoming inspection, manufacturing test, and quality assurance.

Optical signals with calibrated levels

The HP 8150A Optical Signal Source is a precise, universal light stimulus that uses a laser diode operating at a wavelength of 850 nm. Its primary component is a large-bandwidth transducer with variable gain, which can be modulated with electrical analog or digital signals from dc to 250 MHz. The transducer delivers the optical equivalent of the electrical signals with a conversion factor you have programmed.

The built-in modulator lets you easily set calibrated light-power levels using vernier and range keys. With this capability, parametric evaluation of receivers or passive components with reliable, repeatable measurement results is a simple task.

With the wide power range from 1 nW to 2 mW, you can generate small attenuated signals for receiver sensitivity tests or deliver powerful outputs for testing large fiber optics systems.



With the new HP 8150A and HP 8151A stimulus and response measuring instruments, you can analyze parametric performance of fiber optics devices and systems.

Peak-power measurements

The HP 8151A Optical Pulse Power Meter, combined with the HP 81511A Optical Head which interfaces with the fibers, is a fully programmable response-measuring instrument suitable for the wavelength range of 550 to 950 nm.

It measures peak values and the average power of optical signals. This feature means that in digital and analog applications the power levels, amplitudes, or extinction ratio of optical signals are measured and displayed directly.

The HP 8151A performs both functional and parametric measurements over a wide frequency range. With its 250-MHz transducer, you have direct access to optical signals during the actual measurement, allowing you to run performance checks while the device or system under test is operational.

The HP 8150A Optical Signal Source is priced at $12,900. Price for the HP 8151A is $6,300, and the HP 81511A Optical Head is $2,600.

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

hp MEASUREMENT COMPUTATION news
product advances from Hewlett-Packard

January/February 1984
Editor
Barbara L. Carpenter
Hewlett-Packard Company
3000 Hanover Street
Palo Alto, California 94304
(415) 857-3456

Address Correction Requested

Regional Sales Headquarters

Eastern Region
4 Choke Cherry Road
Rockville, Maryland 20850
Ph. (301) 258-2000

Midwestern Region
5201 Tollview Drive
Rolling Meadows, Illinois 60008
Ph. (312) 255-9800

Southern Region
2000 South Park Place
Atlanta, Georgia 30339
Ph. (404) 955-1500

Western Region
3939 Lankershim Boulevard
North Hollywood, California 916
Ph. (213) 877-1282

00461A

Bulk Rate
U.S. Postage
PAID
Permit No. 173
Milpitas, CA