Do your own system design in weeks, instead of months

HP-IB: Not just a standard, but a decade of experience.

HEWLETT PACKARD

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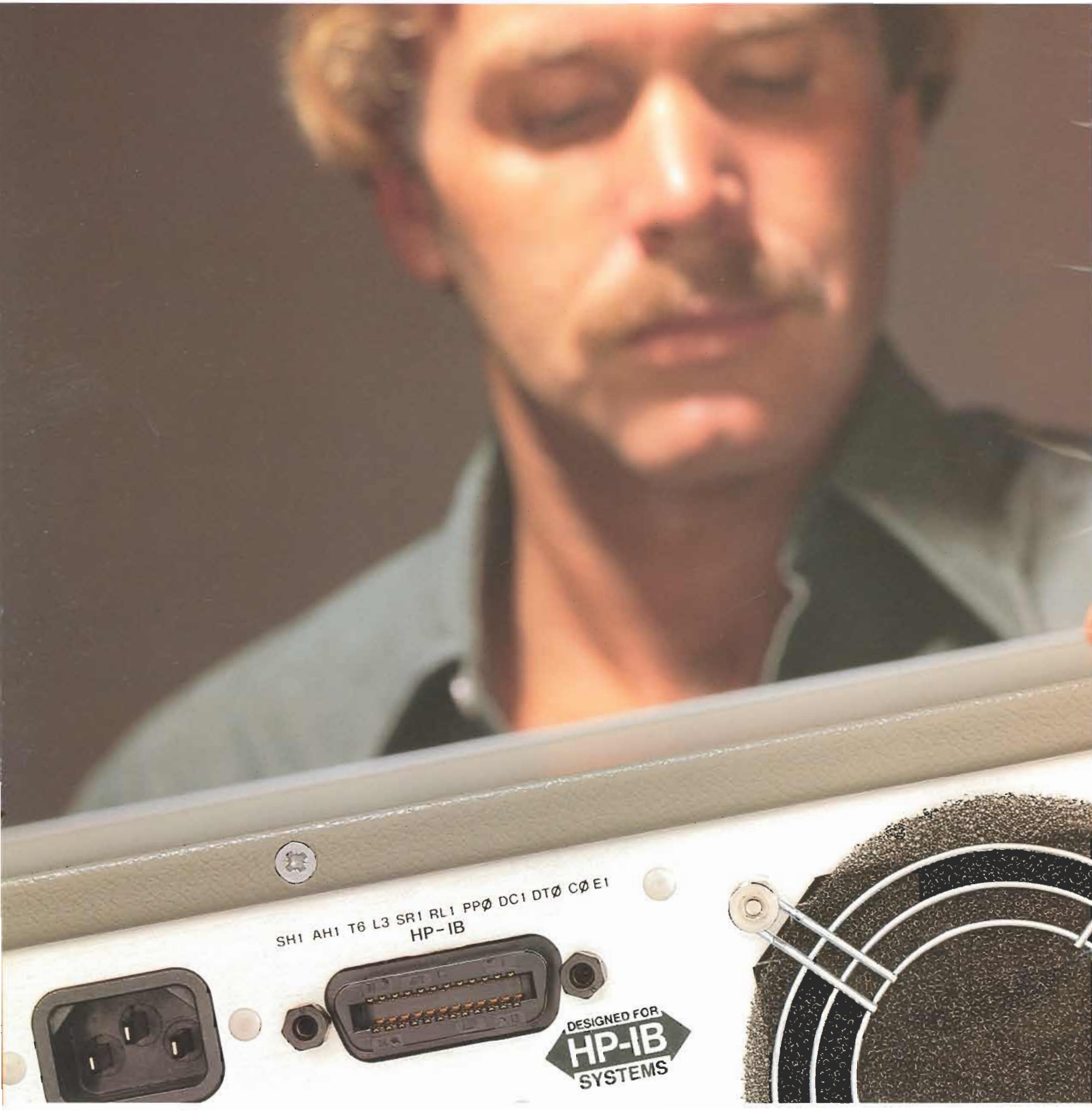
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HP-IB
DESIGNED FOR
HP-IB
SYSTEMS

The HP way to easier measurement systems.

As a systems designer, you know that the best way to get the exact automated measurement system you need is by designing and assembling it yourself.

But you've probably also discovered that this can be a very time-consuming and frustrating process.

First, the various system components must be evaluated for function and compatibility — or the potential they hold for successful interfacing. Next, the various computer alternatives must be researched, and a desktop computer or computer chosen. Then comes the most difficult part of all: the chore of interfacing the controller to each of your other system components, not just electronically, but also in terms of the software that must be written, tested and debugged.

An easier solution: "Designed For Systems" instruments and computers.

HP now offers you a better and easier alternative — a way for you to enjoy all the benefits of assembling your own bus-compatible components into a system faster, and without many of the conventional problems.

The answer is 119 different "Designed For Systems" instruments and controllers (desktop computers and minicomputers), all of which in corporate HP-IB. And HP-IB isn't just Hewlett-Packard's implementation of IEEE 488-1978.

It's much, much more.

For example, HP has been designing and building HP-IB compatible system components for more than a decade. This means more than 10 years experience in interface bus architecture, and how it can best be incorporated into instruments and computers.

You do less work, because HP has done more.

This expertise means that when you choose HP-IB "Designed For Systems" components, you'll do less work interfacing your bus-compatible components, because HP system designers have already done so much of it for you — to help you get your system up and running weeks faster than normal. And, chances are, you'll be able to do the entire job yourself.

Because HP offers such a wide spectrum of "Designed For Systems" instruments and computers, you're never forced to choose a system component simply because it's bus compatible. Instead, you can choose the hardware that best fits your needs, knowing that it will incorporate the necessary bus architecture.

As you will see later in this brochure, HP now offers 104 different application notes on "Designed For Systems" products. Many of these include application software samples to help make your job even easier. In fact, one of these may be just what you need to get to your exact application . . . quickly and effortlessly.

Complete and comprehensive documentation.

Every HP-IB system-designed instrument and computer also comes with HP's complete and comprehensive documentation, which includes not just operating and service manuals, but the previously-mentioned application notes, and much, much more. Many of our computers feature a high-level I/O language that completely eliminates the need to write I/O drivers. And others feature I/O drivers that have already been written for you by HP system engineers.

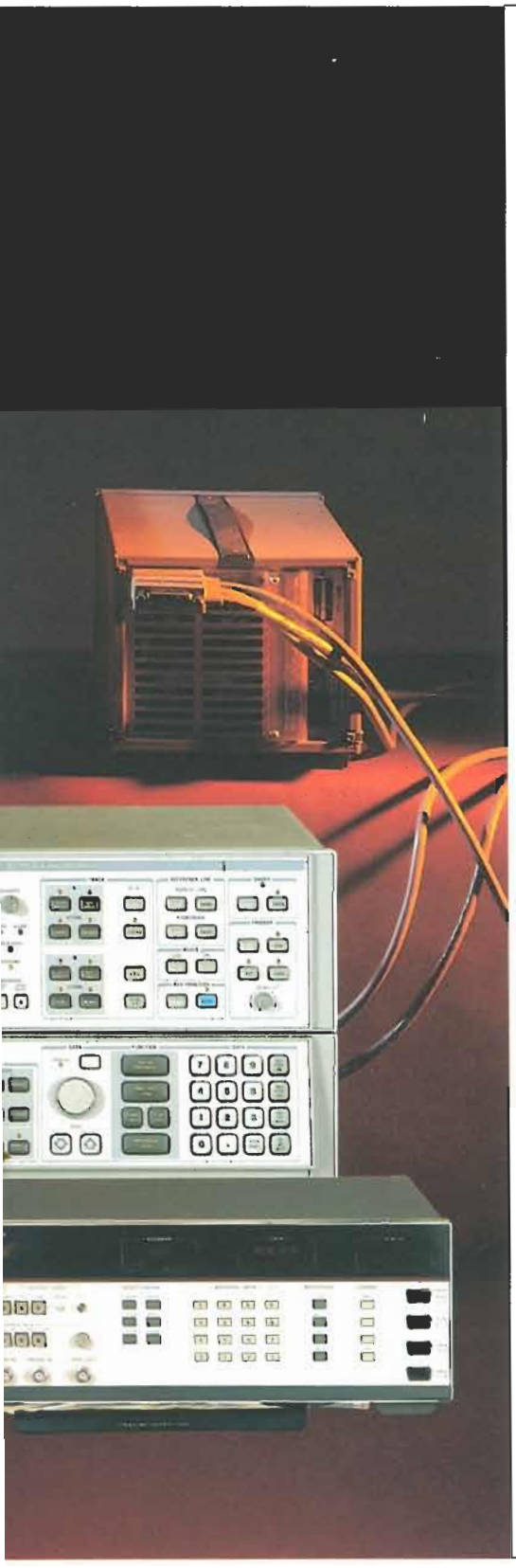
When you choose to configure a system with HP "Designed For Systems" components, and you need service, pick up the phone and call one reliable source. One of HP's hundreds of field service people will respond to your need.

DESIGNED FOR HP-IB SYSTEMS

HP-IB: Not just a standard, but a decade of experience.

System Instruments

System components you simply plug together to get to your application solution quickly.



While the first HP instrument (the HP 200A oscillator) was introduced in 1939, it was not until the early 1970s that the Hewlett-Packard Interface Bus (HP-IB) began to show up on HP instruments. The first of these included the 3490A digital voltmeter, the 3320A/3330A frequency synthesizers, and the 5345A electronic counter.

It is also interesting to note how today's HP instruments differ from their predecessors in areas other than the addition of HP-IB. For example, you can see from the front panels of these newer instruments the power that now resides within them. A decade of design experience with new circuit design techniques, new and better microprocessors, and proven applications and software support have combined to bring you greater simplicity of operation, with even more testing sophistication and capability.

As proof of this, you can probably remember the many steps you had to go through in the past to make your function generator sweep over a desired frequency range. In comparison, with today's keyboard control over the same function, you simply perform a few keystrokes, and you're running your tests.

Ever since its development in the mid-sixties, HP-IB has always defined a universal hardware approach for device interconnection (cable, connectors, drivers and receivers). It also has defined the protocol for handshake operations, commands and communications. Because HP-IB is an internationally-accepted standard, even early HP-IB instruments (such as the 3490A digital voltmeter) are compatible with current instruments, peripherals, and controllers. Thus, when you specify HP-IB compatible products, obsolescence is never a problem; you simply modify your system as required to meet current measurement needs.

HP's long experience in designing and manufacturing HP-IB instruments has also resulted in more cost-effective ways to incorporate this interface. This means that HP-IB is now an available option (or is a standard feature) on most of today's third-generation instruments. The benefits to the systems designer include a wide selection of instrument options — with over 119 HP-IB instruments to choose from, including fully-programmable stimulus and response instruments, with the very latest in performance characteristics.

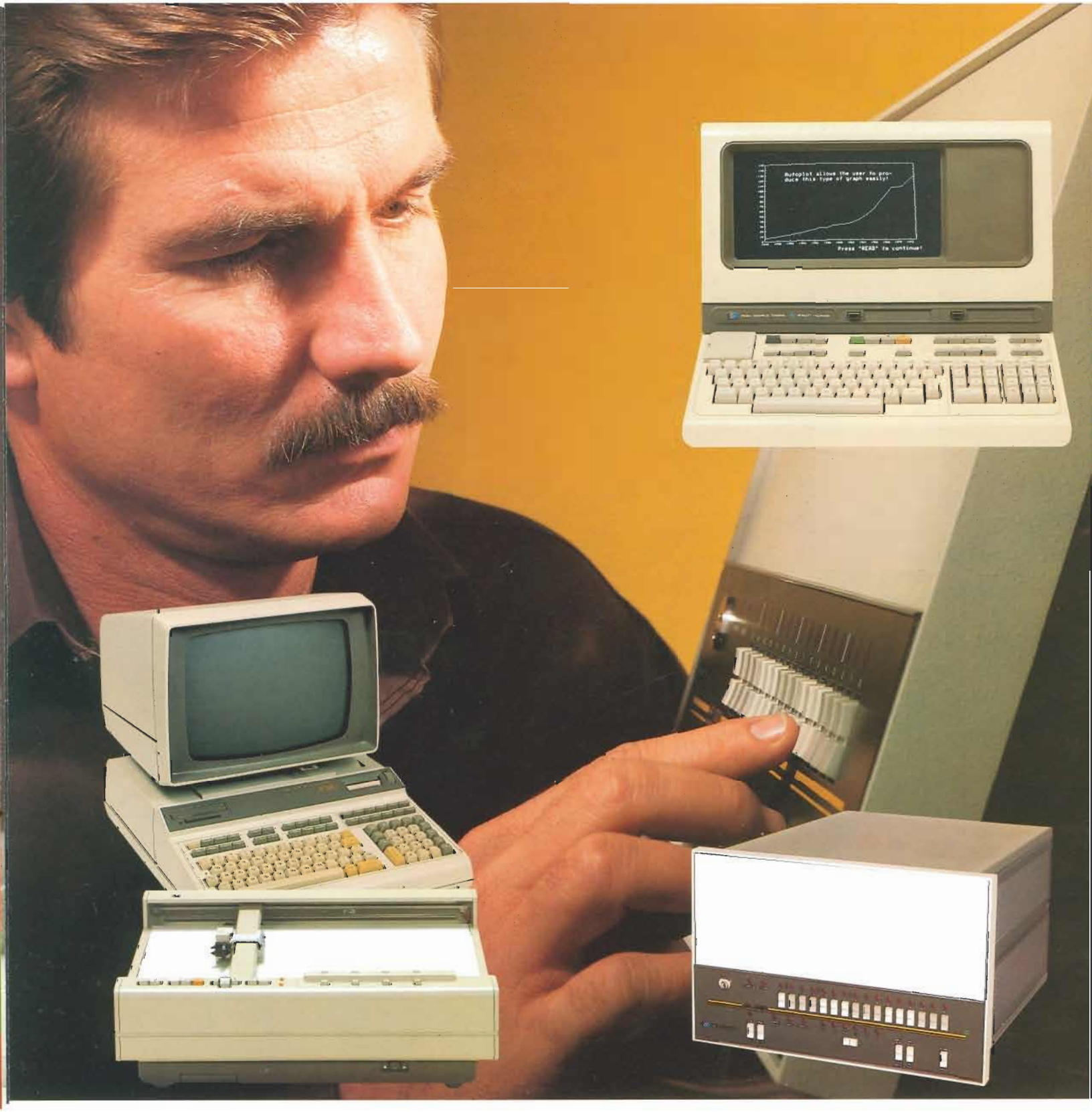
What's more, you needn't compromise performance when designing an HP-IB system. In fact, whatever your automated test and measurement needs might be, chances are that HP has bus-compatible instruments ready to plug in and begin working.

Now that test instruments of all kinds and computers can be made to play together so well, we also see the future thrust of HP's instrument design efforts taking on an ever widening systems approach. Therein lie the challenges and the contributions to be made to testing.

DESIGNED FOR HP-IB SYSTEMS

HP-IB: Not just a standard, but a decade of experience.

Desktop Computers



System computers that are more powerful and more versatile than ever.

You'll be happy to know that HP gives you the same freedom of choice in system-designed computers as in HP compatible instruments. For example, HP currently offers four desktop computers, along with four different HP computer systems, all of which are system-designed. So no matter what kind of controlling computer you need, HP can probably supply just the one you want.

Desktop computers.

HP desktop computers are optimized for a single user, and provide one keyboard per computer. They feature a high-level language that's pre-programmed in ROM, and are configured in one integrated package that includes printer, tape cassette, display and keyboard. BASIC language provides many of these computers with a familiar and easy-to-use programming language. And their operating systems are defined by firmware, which allows built-in editing for quick and easy program development. Interfacing is also very easy, because the physical connection is an off-the-shelf card with a pre-programmed I/O driver in its read-only memory.

The history of HP desktop computers obviously does not extend back as far as does the history of HP instruments. However, the first HP desktop computer, the HP 9100A, was introduced more than 11 years ago. The 9100A was designed to function as an engineering problem-solving computer, was priced at about $5,000, and offered 200 bytes of R/W memory.

In 1971, HP introduced the HP 9810A. This desktop unit contained HP's first interfacing capability (via BCD, an RS-232 port, or 8-Bit parallel). Its read/write memory had grown to 2000 bytes, yet it was priced at less than the 9100A, or from $3,000 to $7,000.

From these early beginnings, HP went on to introduce, in 1972, the HP 9820A and the HP 9830A. The Hewlett-Packard Interface Bus (HP-IB) was first incorporated in the HP 9820A, which also featured 4k bytes of R/W memory, and algebraic language. On the other hand, the HP 9830A was Hewlett-Packard's first true, desktop computer, with its BASIC language, ripherals as hard disc memory and line printers.

Another example of the evolution of the desktop computer into a powerful and versatile tool is the HP 9825A, which was first produced in 1976. The HP 9825A is still a very popular HP-IB system controller featuring high-level, HPL language; two-level priority interrupt; and high-speed direct memory access (DMA).

Today, HP desktop computers, such as the HP 9825A and 9835A, typically feature a R/W memory 1000 times larger than that of the original HP 9100A. They are also much easier to use, with additions such as Assembly language, CRT, and an I/O ROM that delivers buffered I/O, direct memory access, fast R/W, 15 levels of priority interrupt, and built-in I/O drivers.

In short, in the 11 years that HP has been dedicated to the development of better and more useful desktop computers, much has been accomplished. Today's HP devices are more powerful and more sophisticated than any comparable device in HP history. What's more, they are designed for easier and more convenient man/machine interface to make your system design task simpler.

System-designed computers.

HP 1000 Series computers offer a high degree of flexibility, including multi-language, multi-programming and multi-terminal capability in a wide variety of board, box and system configurations.

This series of computers provides multiple languages that are determined by software, and that are user-selected at run time. These can be either interpretive or compiled, with BASIC, FORTRAN, Micro-programming and ASSEMBLY offering you familiarity, flexibility and speed. Just as important, the HP 1000 Series family also offers large data base management capability, and each member can communicate with other computers and peripherals over an HP-supported Distributed Systems Network. Also, for high-speed data manipulation and computation-intensive applications, many firmware packages, such as Vector Instruction Set, Scientific Instruction Set, Polynomial In-

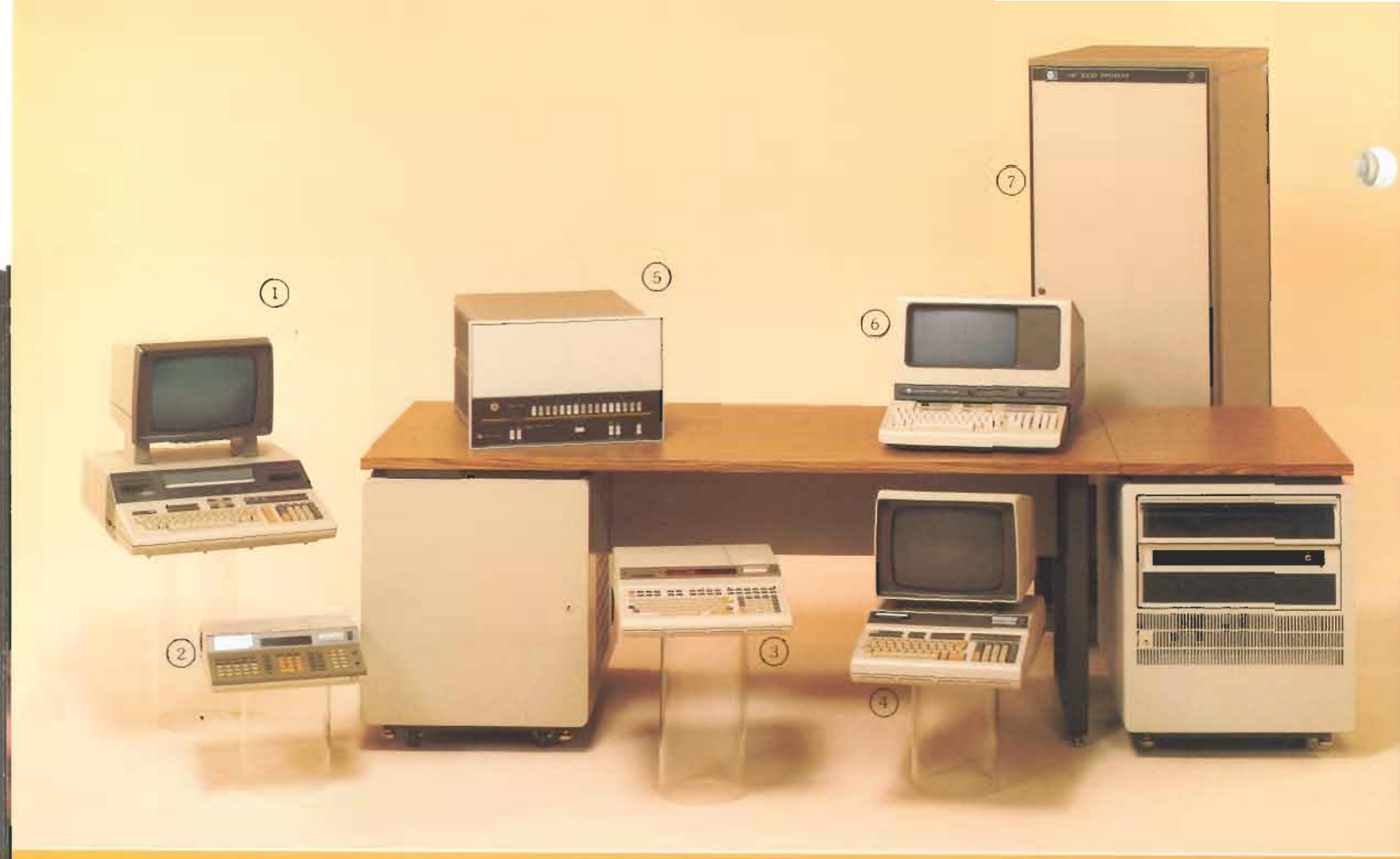
allow the HP 1000 to compete, in many applications, with much larger and more expensive machines.

Interestingly enough, the first HP computer ever produced, the HP 2116A (introduced in 1966), was developed specifically to provide computer control of the manufacturing of many of HP's own test and measuring devices. It offered 16k bytes of memory at a cost of $1.87 per byte.

As HP began to apply its traditional expertise and technological leadership in instrumentation to the development of computers, better and more sophisticated models soon emerged. For example, over the years, HP introduced the first real-time operating system, an executive system designed to operate in real time for controlling instrument bays. HP also introduced the first disc-based, batch operating system on a minicomputer-based time sharing system.

Today, HP's Series 1000 computers have event-driven interrupt structures that allow them to easily communicate and interact with their environment on a real-time basis. They incorporate such technological advances as semiconductor memory, and silicon-on-sapphire large scale integrated (LSI) circuits, making them not just instrument controllers, but problem-solving computers with the power to perform functions that used to be left to very large, "mainframe" computers. In fact, our most recent computer, the HP 1000 Series F, not only offers improved speed, performance and reliability, but on a per-word basis, is actually 10 times less expensive than the original HP 2116A.

Over the past 13 years, HP's involvement in computer systems has grown from a handful of people to ten HP divisions which, together, account for almost 50% of all HP sales worldwide. As we look ahead, we believe it is reasonable to forecast significant breakthroughs in all of HP's computer product lines in terms of large scale integration of components, ease of use, data communication, price and reliability. In short, HP computers of the future, like those of today, will be on the leading edge of computer technology.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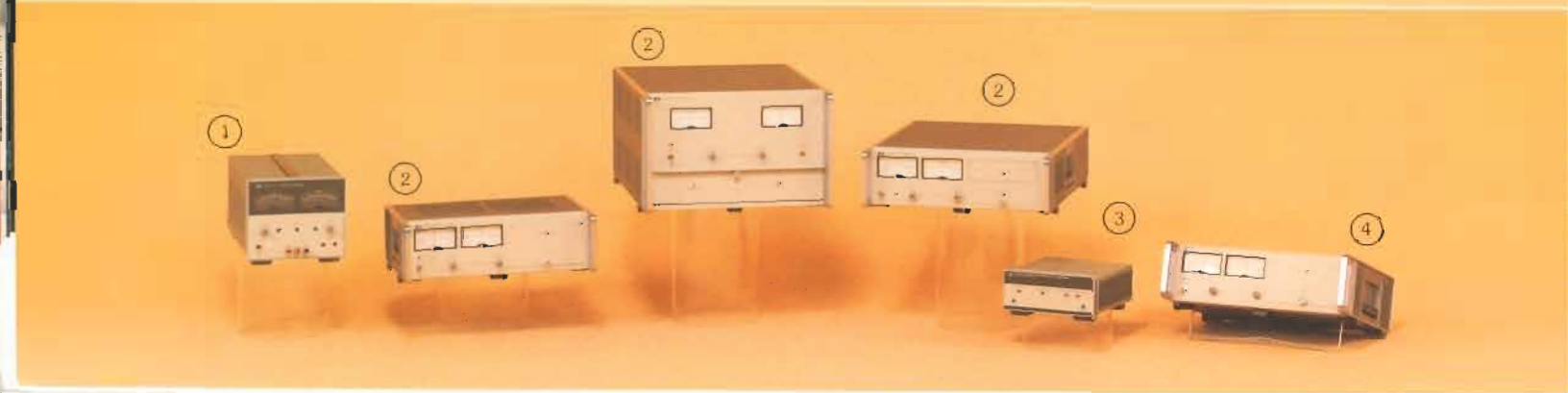
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For maximum flexibility and minimum design effort: 119 different HP system-designed instruments and controllers.

Computers.

(1) System 45B Desktop Computer. Offers CRT, built-in 80-column printer, dual cartridge tape drives, four I/O slots, full graphics capability, I/O capabilities similar to the 9825 and System 35, and up to 449k bytes of read/write memory.
(2) 9815 Desktop Computer. A low-cost desktop often used as an alternative to microprocessor-based systems. Includes built-in tape cartridge drive, 16-character printer, single line display, and two optional I/O channels.
(3) 9825 Desktop Computer. HP's fastest desktop, with Direct Memory Access operating at minicomputer speeds. Has priority interrupt, and three I/O channels, each of which is capable of handling up to 14 instruments via HP-IB bus.
(4) System 35A/B Desktop Computer. Includes most of the capabilities of the 9825, plus enhanced BASIC language, optional CRT, read/write memory of up to 256k bytes, and optional Assembly language programming.
(5) HP 1000 Series Computers. Three multiprogrammable series to choose from: The reliable M Series for cost-critical applications; the E series for double the performance; and the high-speed F Series with floating point hardware and many firmware instruction sets that provide maximum performance for demanding scientific and computational tasks. Memory ranges from 64k bytes to 2 million bytes. Each features 4 or 14 I/O slots, expandable to 46 channels.
(6) 2645A Display Terminal. A large, easy-to-read display that presents up to 1920 characters in a 24 line by 80 column format. Full editing capability provides transmission character by character, or variable length blocks of information. The 2645A can operate at speeds up to 9600 bits per second, is teletypewriter compatible, and includes optional features such as a 20 mA current loop, and asynchronous or synchronous polling.
(7) HP 1000 Computer Systems. A complete family consisting of two memory-based and two disc-based systems for demanding computation and measurement/control applications. All models have the power and flexibility to perform several tasks for several users simultaneously. Programming languages can be FORTRAN, BASIC, ASSEMBLY or Microcode. Computers can be interconnected for sharing files and other resources with HP's distributed system network (D/S 1000). The new RTE-IVB operating system can manage up to 960 million bytes of disc storage for large data base management applications (IMAGE/1000). System usefulness for process control, simulation and modeling can be extended with GRAPHICS/1000 software.

Stimulus.

(1) 8660C Synthesized Signal Generator. Three RF and 5 modulation plug-ins give the 8660C versatile AM, FM, ΦM and pulse modulation in the 10 kHz-2600 MHz range. Features digital sweep. The 8660A has thumbwheel frequency control.
(2) 8662A Synthesized Signal Generator. A 10 kHz to 1280 MHz AM/FM generator offering extremely low phase noise and spurious signals, full keyboard control, store-recall of front panel setups, and digital sweep with markers.
(3) 8672A Synthesized Signal Generator. Provides clean, accurate signals, 2-18 GHz. Has synthesizer stability/accuracy with better than 3 kHz resolution, plus calibrated AM/FM, and wide output range (+3 to 120 dBm).
(4) 3335A Synthesizer/Level Generator. Includes performance characteristics, output impedances and special connectors that make it ideally suited for the telecommunications industry as well as traditional synthesizer applications up to 80 MHz. Amplitude accuracy ±0.5 dB; flatness ±0.07 dB.
(5) 8671A Synthesizer. Provides synthesizer accuracy and stability, 2-6.2 GHz. Includes 1 kHz tuning resolution, high spectral purity, calibrated FM, and fixed output level (>+8 dBm).
(6) 3330B Synthesizer. Covers a frequency range of 0.1 Hz to 13 MHz. Amplitude can be controlled to a resolution of 0.01 dB over a 100 dB range. Nine digits of frequency and four digits of amplitude are displayed on the front panel.
(7) 3325A Synthesizer/Function Generator. Is also a phase continuous linear/log sweep generator. Has micro-hertz resolution below 100 kHz along with sinewave frequency coverage from 0.000001 Hz to 20.999 999 999 MHz. Precision waveforms are sine, square, triangle and ramp.
(8) 3320B Synthesizer. Offers a frequency range of 0.01 Hz to 13 MHz in seven frequency ranges. Three digits plus a ten-turn, two digit vernier provides 1 part in 10^6 frequency resolution. The 3320A has a maximum 1 volt rms into 50 ohm output with a continuous +13 dBm to 0 dBm amplitude vernier.
(9) 8620C Opt 011 Sweep Oscillator. Versatile RF/Microwave swept signal source. Uses series of RF plug-ins to cover 10 MHz-22 GHz. Two precision broadband plug-ins (10 MHz-2.4 GHz and 2-18.6 GHz) are especially attractive for systems applications.
(10) 5359A Time Synthesizer. Capable of generating extremely precise digital delays from 0 to 160 ms in steps of less than 50 ps. Can also generate pulse trains with frequency or periods selectable to 10 MHz and with controllable pulse widths.
(11) 8160A Programmable Pulse Generator. High precision pulse generator for automated testing. 50 MHz, ±20 V amplitude with single or optional dual output. Keystroke programming with up to nine stored settings in nonvolatile memory. Variable transition times may be set as low as 6 ns.
(12) 59308A HP-IB Timing Generator. Provides two modes of operation: a pacing function, which provides output at a specific rate, and a timing function which provides a delay with respect to a trigger for a specified period of time. Timed intervals can be selected by front panel thumbwheels or programmed via the HP-IB.
(13) 8165A Programmable Signal Source. A 50 MHz, 10 V amplitude signal source with seven waveforms plus burst, gate, AM, FM, and sweep modes. Nonvolatile memory will store up to ten settings. Accurate, versatile stimuli for system or bench applications.
(14) 8170A Logic Pattern Generator. Easy keyboard entry of modes and data for functional testing of multichannel, digital hardware with 8 or 16 channels and 8k (or optional 32k) nonvolatile memory at 2 MHz. Offers three-state output, two-or-three-wire handshake and external address mode; output at CMOS or TTL levels. Additional RS-232-C interface for data transfer.

Stimulus.

(1) 6002A Autoranging DC Power Supply. Rated 200 watts output. With option 001, program up to 50 volts or up to 10 amps maximum. 50 mV or 10 mA resolution. Other systems oriented features.
(2) 6129C, 6130C and 6131C. A family of Digital Voltage Sources for systems with dc output ratings of ±50 V, 5 A; ±50 V, 1 A, and ±100 V, 0.5 A. Programmable using the 59301A. High speed bipolar output with 10 mV resolution included.
(3) 59501A HP-IB Power Supply Programmer/ Isolated D to A Converter. Designed to interface over eighty different models of HP Power Supplies. Provides isolation; programs in percent of full scale. Also an excellent general purpose system D/A.
(4) 6140A Digital Current Source. A system power supply with dc output rating of ±100 mA programmable using the 59301A. 100 V dc of compliance and resolution down to 1 μA.

Response.

(1) 5300 Measuring System. A versatile modular measurement system which includes 8 separate snap-on modules and three snap-in between modules. An HP-IB interface is available to provide output capability via the bus.
(2) 5342A Microwave Counter. A microprocessor controlled automatic microwave counter with frequency capabilities to 18 GHz (24 GHz optional) and the ability to measure input power. The eleven-digit LED display simultaneously presents frequency and amplitude.
(3) 5341A Microwave Frequency Counter. A fast acquisition, high sensitivity 4.5 GHz Microwave Counter using an automatic heterodyne measurement technique.
(4) 5328A Universal Counter. HP's most popular Universal Systems Counter with frequency, period, time interval, totalize, channel C and DVM capabilities.
(5) 5340A Microwave Frequency Counter. A 10 Hz to 18 GHz Automatic Microwave Counter with optional frequency extension to 23 GHz utilizing microwave samplers incorporated in phase lock loops. Features include automatic amplitude discrimination, high AM and FM tolerance, high sensitivity to -35 dBm and optional frequency extension to 23 GHz.
(6) 5345A Electronic Counter. A 500 MHz plug-in Universal Systems Counter with very high input amplitude sensitivity (20 mV) and the ability for single shot time interval measurements to 2 ns.
(7) 5363B Time Interval Probes. Provides two high impedance, low capacitance time domain probes for the digital measurement of rise times and propagation delays with accuracies calibrated to less than 1 ns.
(8) 5370A Universal Counter. A microprocessor-based time interval counter capable of making single shot time interval measurements with ±20 ps resolution, high resolution frequency and period measurements. Offers statistical data such as mean, standard deviation, max, min, etc., for repetitive input time intervals.

Response.

(1) 3437A System Voltmeter. A 3½ digit, high speed dc voltmeter for system applications. Measures dc volts, provides trigger-delay and burst readings. Maximum reading rate is 5000 readings per second.
(2) 3490A Multimeter. Five digit integrating digital multimeter that measures dc and ac voltage and resistance. Built-in self test capability.
(3) 3438A Digital Multimeter. A low-cost autoranging, 3½ digit multimeter with five functions of ac V, dc V, ac I, dc I and Ω. Interfaced to the HP-IB in the talk only mode. Function and Range are selected manually on the front panel. Autoranging on Volts and Ohms.
(4) 3455A Digital Voltmeter. A microprocessor controlled 5½ to 6½ digit integrating digital multimeter. Has auto-calibration and self test. Reading rates up to 24 readings per second. True rms ac. Math functions provide user with unique computational capability.
(5) 436A Power Meter. A general purpose digital power meter for manual and automatic RF and microwave power measurements. Depending on sensor used can measure power from -70 dBm (100 pW) to +44 dBm (25 watts) at frequencies from 100 kHz to 18 GHz. Programmable via HP-IB or BCD interface for full remote control of all power meter functions.
(6) 1610A/B Logic State Analyzer. General purpose measurements on virtually any digital system with synchronous, real-time traces to 10 MHz. 32-bit wide display with 64 word memory. Menu setup for format and specification offers sophisticated triggering modes (seven-word sequential triggering, sequence restart), selective tracing, graph, and time and state counts. 1610B has three clocks for demultiplexing.
(7) 1615A Logic Analyzer. For 8-bit timing and/or 16-bit state measurements in digital systems. Captures and triggers on glitches. Menu setups for format and trace parameters offer extensive triggering capability, six clock qualifiers, time or event delays, direct time readouts, and selective tracing from 2 MHz to 20 MHz with a 256-word memory.
(8) 1602A Logic State Analyzer. Portable (10 lb.), easy-to-use with key-per-function; 16-bit wide display, 64-word memory. Data entered in selected base, pattern trigger, and digital delay. Economical answer for field applications and production testing.
(9) 1640A Serial Data Analyzer. Analysis and simulation for serial interfaces and computer networks. Nonintrustive monitoring as an analyzer, menus for triggers on protocol, errors, or time intervals with 2048 character memory. As simulator, can be configured to act as network component.

Response.

(1) 8501A Storage-Normalizer. Companion to 8505A Network Analyzer. Enhances network measurements through normalization, digital storage, signal averaging, display magnification and CRT labeling.
(2) 8505A RF Network Analyzer. 500 kHz-1.3 GHz test system measures magnitude and phase of transmission and reflection coefficients; also group delay and deviation from linear phase — all with unprecedented precision and resolution. Has 100 dB dynamic range, built-in signal source; is fully programmable.
(3) 8503A/B S-Parameter Test Sets (50Ω or 75Ω). Companion to 8505A Network Analyzer. Covers 500 kHz to 1.3 GHz. Measures all four S-parameters. Contains bias networks for transistor characterization.
(4) 5420A Digital Signal Analyzer. Uses digital processing to perform a range of analog measurements. Useful in the study of mechanical vibration and noise. Utilizes the HP-IB to drive compatible digital plotters directly.
(5) 8901A Modulation Analyzer. Measures the frequency, power, and modulation (AM, FM, or ΦM) of 150 kHz to 1300 MHz signals with the speed and convenience of auto tuning and single-key measurements. Built-in AM and FM calibrators are optional.
(6) 8568A Spectrum Analyzer (100 Hz-1.5 GHz). State-of-the-art in RF signal analysis. 10 Hz resolution bandwidth, -135 dBm to +30 dBm measurement range, 85 dB dynamic range, counter frequency accuracy. Fully programmable.
(7) 3585A Spectrum Analyzer. A swept analyzer covering the frequency range of 20 Hz to 40.1 MHz. Center frequency . . . and span settings have 0.1 Hz resolution and 1 x 10^{-7}/mo stability. This frequency precision and stability enables the 3 Hz resolution bandwidth filter to be used even at 40 MHz. Auto-calibration feature included.
(8) 3582A Spectrum Analyzer. A powerful dual channel, real-time (FFT) spectrum analyzer in the frequency range of 0.02 Hz to 25.599 kHz. Features such as 70 dB dynamic range, transfer function measurement with noise source capabilities and coherence measurements make the 3582A unique in its price class.
(9) 8566A Spectrum Analyzer (100 Hz-22 GHz). State-of-the-art in microwave signal analysis. 10 Hz resolution bandwidth, -137 dBm to +30 dBm measurement range, 80 dB dynamic range, counter frequency accuracy. Fully programmable.

Response.

(1) 4262A Digital LCR Meter. Measures L, C, R, D & Q at test frequencies of 120 Hz, 1 kHz and 10 kHz over a wide impedance range. Includes 3½ digits, microprocessor control, self test and deviation measurement capability.
(2) 4271B 1 MHz Digital LCR Meter. Ideal for 1 MHz evaluation of semiconductor devices in wafer or packaged form. 4½ digits; 0.1% basic accuracy.
(3) 4274A Multi-Frequency LCR Meter. Multi-frequency capability plus a variable test signal level from 1 mV rms to 5 V rms allows evaluation of a device under test at or near actual circuit conditions. 4½ or 5½ digits. Microprocessor controlled LCR meter features 11 parameter measurements at 11 spot frequencies between 100 Hz and 200 kHz.
(4) 4275A Multi-Frequency LCR Meter. High frequency companion to the 4274A. Features 10 spot frequencies between 10 kHz and 10 MHz with a variable test level of 1 mV rms to 1 V rms.
(5) 4191A RF Impedance Analyzer. Measures 14 impedance parameters over a frequency range of 1 to 1000 MHz and an impedance range of 1 mΩ to 100 kΩ. Features 4½ digits, microprocessor control, automatic calibration, internal synthesizer with both linear and log sweep, deviation measurement capability, and self test.
(6) 4140 pA Meter/DC Voltage Source. A very stable picoammeter . . . with 1 x 10^{-15} A resolution, two programmable dc sources (0 to ±100 V) and control circuitry which allows totally synchronized I-V and C-V measurement. 3½ digits, microprocessor control.


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Response.

(1) 4944A Transmission Impairment Measuring Set. Tests eight transmission impairments including non-linear distortion on voice grade circuits. Measures all tariffed parameters on C or D conditioned leased lines. Portable with self test.
(2) 4943A Transmission Impairment Measuring Set. Tests eight transmission impairments on voice grade circuits used for data. Measures all tariffed parameters on C conditioned leased lines. Portable with self test and analog outputs.
(3) 3745A/B, 3747A/B Selective Level Measuring Sets. A comprehensive, cost-effective solution to a wide range of fdm measurement problems. Accurate, fast selective level measurements to 90 MHz. Built-in CCITT or Bell frequency plans.
(4) 3771A/B Data Line Analyzers. Simultaneous measurement of phase hits, gain hits, dropouts and impulse noise. Also, level, phase jitter, weighted noise, noise-with-tone, and frequency shift, CCITT or Bell standards.
(5) 3779A/B Primary Multiplex Analyzers. An automatic test system for pcm/fdm terminals in one instrument. A-A, A-D, D-A and end-to-end measurements. CCITT, CEPT or Bell Compatible.

Miscellaneous.

(1) 59309A Digital Clock. Displays month, day, hour, minute and second, and upon command will output time via the interface bus.
(2) 2804A Quartz Thermometer. Has ±0.04 degrees Celsius absolute accuracy and 0.0001 degree resolution. Interchanging probes does not affect accuracy. DAC and HP-IB options increase usefulness in bench and system applications.
(3) 2240A Measurement and Control Processor. An intelligent analog/digital subsystem. Processes, conditions, and controls a variety of I/O signals using plug-in function cards. Offloads computer using easy to learn HP-measurement and control language (HP-MCL). For product test and equipment control.
(4) 59301A ASCII-to-Parallel Converter. Accepts a string of up to 16 ASCII characters via the HP-IB and converts them to 1-2-4-8 BCD.
(5) 59303A Digital to Analog Converter. Converts any three consecutive digits in an HP-IB string to a dc voltage.
(6) 6940B Multiprogrammer. A versatile I/O expander and converter for desktop computers and computers. Multiprogrammer plug-in cards allow the computers to read and write analog and digital data to processes and units under test. The 6940B interfaces to HP-IB via the 59500A Multiprogrammer Interface Kit.
(7) 6942A Multiprogrammer. A microprocessor-based I/O expander and converter. Teams with a desktop computer or computer to form the nucleus of automatic test, measurement and control systems. 6942A plug-in cards can make a wide variety of measurements and can provide a wide variety of stimuli.

Miscellaneous

(1) 59306A HP-IB Relay Actuator. Consists of six form-C relays that provide for control of external devices either manually from front panel pushbuttons or remotely via HP-IB.
(2) 3777A Channel Selector. A 2-wire/4-wire balanced line selector for up to 30 channels. Provides test-point access for maintenance and production testing of pcm and fdm systems.
(3) 59307 HP-IB VHF Switch. Consists of two single-throw, 4-pole switches which can operate from dc to 500 MHz into 50 ohms. Switches are independent and bi-directional, and can be operated either from front panel pushbuttons, or via HP-IB.
(4) 3495A Scanner/Multipler. Switches analog signals to an appropriate measuring device. Can also control external devices with relay actuator closures. Ideal for data logging and data acquisition applications.
(5) 11713A Attenuator/Switch Driver. Routes signals and sets levels in coax systems. Controls 1 or 2 step attenuators (HP Models 8490 or 33320 series) and 1 or 2 SPDT switches (HP 8761 or 33311).
(6) 12050A Fiber Optic HP-IB Link. Extends HP-IB to 100 metres using fiber optics. Real-time performance (20k byte/sec) and excellent noise immunity make the link ideal for computer based, environmentally demanding remote instrumentation applications.
(7) 59403A Common Carrier Interface (CCI). Converts HP-IB data and control lines to a serial bit stream of information. Transmits serial code over a twisted pair dedicated line up to 1000 metres, to another CCI which converts the information back to standard HP-IB format.
(8) 37201A HP-IB Extender. Control over unlimited distances. Provides transparent extension of HP-IB systems over twin-pair cable or via modems and the telephone network. Automatic error detection and correction. Multi-point (multi-drop) capability.

Peripherals.

HP also offers a complete choice of peripherals that may be used with desktop computers and/or computers. Included among these are the (1) 1350S Graphics Display System, (2) 3964A/68A Instrumentation Tape Recorders, (3) 2645A Display Terminal, (4) 9875A Cartridge Tape Unit, (5) 9872B/S Four-color Plotter, (6) 5150A Thermal Printer, (7) 9876A Thermal Graphics Printer, (8) 7906M/S Hard Disc Drive, and (9) the 9885M/S Flexible Disc Drive. For information on any of these, fill out and mail one of the response cards you will find adjacent to the inside back cover of this brochure, or call your HP Field Engineer.

Also available but not pictured . . .

3040A/3042A Network Analyzer. Characterizes active and passive two-port devices. Measures amplitude, phase and group delay response from 50 Hz to 13 MHz.
3044A/3045A Spectrum Analyzer. Tracking detector permits frequency and amplitude measurements from 10 Hz to 13 MHz region. 150 dB measurement range, 0.01 dB resolution.
3052A Data Acquisition System. Basic system contains an HP 3437A System Voltmeter, HP 3455A high accuracy and resolution Digital Multimeter, HP 3495A Scanner/Multiplexer, rack and software.
3060A Board Test System. Includes a full range of measurement capability from in-circuit component testing to functional testing and signature analysis for at-speed testing of microprocessor circuits.
3336A/B/C Synthesizer/Level Generator. Covers a frequency range of 10 Hz to 20.9 MHz. The 3336A (CCITT) and 3336B (Bell) have performance characteristics that make them ideally suited for the telecommunications industry. 3336C is designed for traditional synthesizer applications.
DTS-70 Digital Test Station. Quickly isolates shorts, opens, manufacturing errors and bad components on digital printed circuit boards.
3586A/B/C Selective Level Meter. "A" and "B" models meet the FDM measurement requirements of the telecommunications industry. "A" model meets CCITT standards, "B" model meets Bell standards; and "C" model is designed for traditional wave analysis applications. "A", "B" and "C" models operate from 50 Hz to 32.5 MHz.
5312A HP-IB Interface Module. Makes the 5300 Measuring System compatible with HP-IB. Outputs 15 characters of information, with variable sampling rate.
5353A Channel Plug-In. Provides a third input to 500 MHz for the 5345A Counter.
5354A Automatic Frequency Converter. A 4 GHz plug-in for the 5345A Electronic Counter with the ability to make CW and Burst frequency measurements.
5355A Automatic Frequency Converter. A microprocessor-based plug-in for the 5345A Electronic Counter capable of CW and Burst frequencies from 400 MHz to 26.5 GHz.
7225A Graphics Plotter. For lower cost graphics. Utilizes an 8½ x 11 (ISO A4) format.
7245A Thermal Plotter/Printer. Includes vector plotting and matrix printing, on the same page, bi-directional and long axis plotting.
8507B Automatic Network Analyzer (500 kHz - 1.3 GHz). System based on 8505A Network Analyzer, includes test set and 9825A Desktop Computer.
8409B Automatic Network Analyzer (0.1 - 18 GHz). System based on HP 8410 Microwave Network Analyzer; includes synthesized sources, test sets, and System 45B computer.
8581A Automatic Spectrum Analyzer (100 Hz - 1.5 GHz). System based on 8568A Spectrum Analyzer; includes 9825A Desktop Computer.
8582A Automatic Spectrum Analyzer (100 Hz-22 GHz). System based on 8566A Spectrum Analyzer; includes 9825A Desktop Computer.

Application notes, training and documentation that make your job even easier.

As indicated previously, HP "Designed For Systems" instruments and computers are backed by documentation that is both complete and comprehensive.

Some HP instruments include an introductory operating guide that provides you with information on how to best prepare for the arrival of your instrument. Every HP-IB compatible product comes with an operating manual designed to help you get it working fast. These manuals typically include a description of all controls, connectors and indicators; all normal operating procedures; and even a detailed, step-by-step guide to the implementation of master-slave operation procedures.

If you require even more detailed operating instructions or service information, you should know that HP also makes available an Operating and Service Manual on each of these system-designed products.

HP also now offers a total of more than 104 different application notes. Typically, these application notes not only describe the specific applications, but provide you with detailed instructions on how to apply the instrument correctly, how to accomplish specific measurements — in conjunction with the controlling computer — and how it can best be configured into a total measurement system.

For that matter, many of these application notes include software samples to help you get to your solution even faster. If the instrument has any peculiarities which could affect its operation, software listings of "work arounds" are included, so that you will not have to reinvent the wheel each time something fails to work as expected.

In addition to operating software samples, many of these application notes include the results of actual performance tests, to help you know exactly what to expect when the equipment is hooked up.

HP also offers a variety of customer training classes that might be of help to you. These classes are held at different locations throughout the country, and at different times of the year. Many of them have been designed to give you complete information on various HP system-designed instruments and computers. Others teach you how to flowchart, write and debug computer programs in HP BASIC, which includes many of the powers of FORTRAN and APL; or how to operate and program HP desktop computers in our high-level, HPL language. And still others give you practical advice as to how various HP instruments and computers can best be assembled into a working system. For more details on these training classes, dates and locations, call your HP field engineer.

Finally, HP backs all system-designed instruments and computers with complete, post-warranty support. For example, after the warranty period, support can be continued by purchasing an HP Maintenance Agreement and/or Software Subscription Service to enjoy such additional features as a yearly fixed cost, always-current system software, regularly-scheduled preventive maintenance, priority response, and all necessary service performed on-site — to save you hours of disassembling, packing, shipping and waiting.

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For more information, call your local HP sales office or East (301) 948-6370 • Midwest (312) 255-9800 • South (404) 955-1500 • West (213) 877-1282. Or write, Hewlett-Packard, 1501 Page Mill Rd., Palo Alto, California 94304.
In Europe, Hewlett-Packard S.A., 7, rue du Bois-du-Lan, P.O. Box, CH-1217 Meyrin 2-Geneva, Switzerland. **In Japan**, Yokogawa-Hewlett-Packard Ltd., 29-21, Takaido-Higashi 3-chome, Suginami-ku, Tokyo 168.

5953-3846

PRINTED IN U.S.A.