Response plot of Microwave Radio Link 70 MHz IF bandpass filter showing insertion loss and group delay *vs* frequency. HP 8505 permits simultaneous measurement of these parameters so that interactions of adjustments can be optimized for lowest distortion.

New network analyzer brings powerful measurement capabilities— including automation—to design and manufacture of high-frequency products.

Measurements in the medium-to-high-frequency range (500 kHz to 1.3 GHz) are significantly expanded, speeded, and simplified with the new HP 8505 Network Analyzer. In combination with the HP Interface Bus and a controller such as the HP 9830 desk-top computer, it is a powerful, extremely accurate automatic system. The measurements it makes let designers produce higher-performance equipment to help cope with the dynamic growth in the communications field.

Characterizing circuits to predict their performance is a fundamental activity in both the design and test of communications components and systems. Over the past 10 years there has been a dramatic growth in the use of network analyzers to perform this task. By providing plots of gain or loss, phase shift, and complex impedance *vs* frequency, network analyzers have given electronic engineers practical insights into circuit and component behavior.
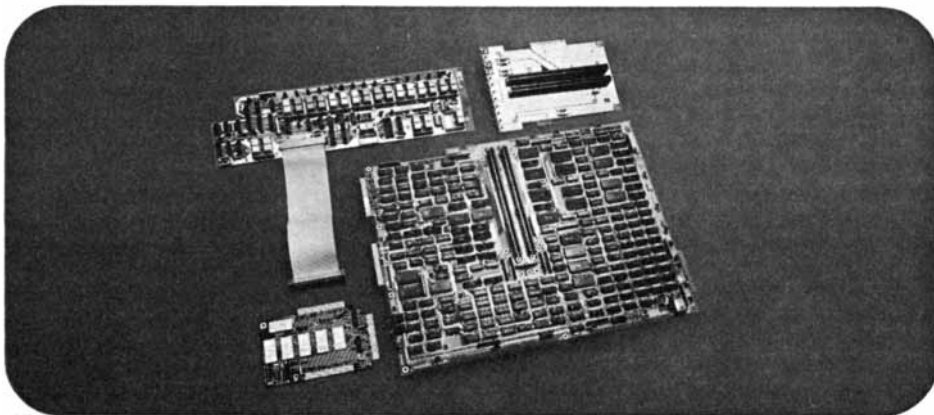
The new HP 8505 makes these network measurements with a greater frequency range (500 kHz to 1.3 GHz), greater dynamic range (100 dB), better resolution, and higher accuracy than its predecessors, and with considerably more convenience. It also makes direct measurements of electrical line length, deviations from linear phase, and group delay. Heretofore, these measurements were extremely difficult, tedious, and often impractical to make. The HP 8505 makes them simply, directly, and accurately. Its capabilities facilitate more precise designs, which improve system performance—for example, reducing distortion in com-

munications channels, with results you can appreciate when you pick up the phone to talk overseas.

The 8505 is also the most highly programmable network analyzer presently available. With an HP 9830 as controller, and the Hewlett-Packard Interface Bus (HP's implementation of IEEE standard 488-1975), the analyzer can perform automatically. HP cassette-recorded programs, including accuracy enhancement, diagnostics, and performance verification, simplify system start-up. Key advantages of automating the network analyzer are extreme measurement accuracies by virtue of the system's ability to measure, store, and then subtract vector errors; ability to make many measurements quickly; and ability to manipulate data and put the answers in the desired format. In other words, to deliver "computed measurements": results, not just undigested data.

A singular contribution of the automatic system is its "Learn" mode, whereby measurements can be automated without programming. A single keystroke command on the desk-top controller will cause it to "read" and store the analyzer's front-panel switch settings and registers. The user can set up test sequences with the front-panel controls, store them in the controller, and recall them when needed. By recording these data on tape cassette, an entire test procedure can be created without writing a single program line.

A factory-assembled automatic network analyzer that includes the 8505, a 9830B desk-top computer with printer, an s-parameter test set, cassette programs, and appropriate cables and fixtures is available as Model 8507A for $45,490*. The 8505 alone costs $22,500*.

Now HP makes available microprogrammable computer power in component form.

To system designers who would like to take advantage of economical microprocessors but need a higher level of performance, HP offers the new 21MX-K *minicomputer on a board*. Designed to fill the need for high-power processing in a low-cost form, it integrates easily into OEM systems and is fully compatible with the entire 21MX family of computers, software, and peripherals.

The 21MX-K is essentially the powerful processing board of HP's popular 21MX computer, packaged as a component for use by system designers.

An extraordinarily fast 24-bit processor, the 21MX-K can be used as a high-performance alternative to microprocessors and microcomputers. It executes a register-to-register *add* in a 325-nanosecond cycle and, through instruction pipelining, it can combine and execute up to six instructions in a single machine cycle.

An optional instruction set ROM transforms the 21MX-K into a full microprogrammable minicomputer, with 128 instructions including floating point, multiply and divide, integer arithmetic and bit/byte manipulation. In this configuration, designers will find that it is relatively easy to tailor the 21MX-K to their specific applications, using the same high-level microprogramming tools that are available with all 21MX computers.

Incorporating true minicomputer features and performance, the 21MX-K is fully capable of serving the needs of high-performance instrumentation and data systems such as spectrometers, numerical control units, smart terminals, graphic display systems, medical diagnostic instruments—even intelligent remote satellites in a distributed computing network.

The 21MX-K processor is hardware- and software-compatible with the entire family of HP 21MX minicomputers. It supports connections to a broad range of peripherals from teletype to high-speed disc; and it is supported by the complete library of 21MX software including all languages, operating systems and diagnostics.

In addition to the processor and instruction ROM, other 21MX-K components include a front panel control assembly and cages for I/O and memory cards. Accessories include memory systems, user control store and writable control store.

Prices for the processor board (OEM quantity 100) are $975* without and $1205* with the instruction ROM.

For more information on these products, write to us. Hewlett-Packard, 1505 Page Mill Road, Palo Alto, California 94304.   *Domestic USA prices only.

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