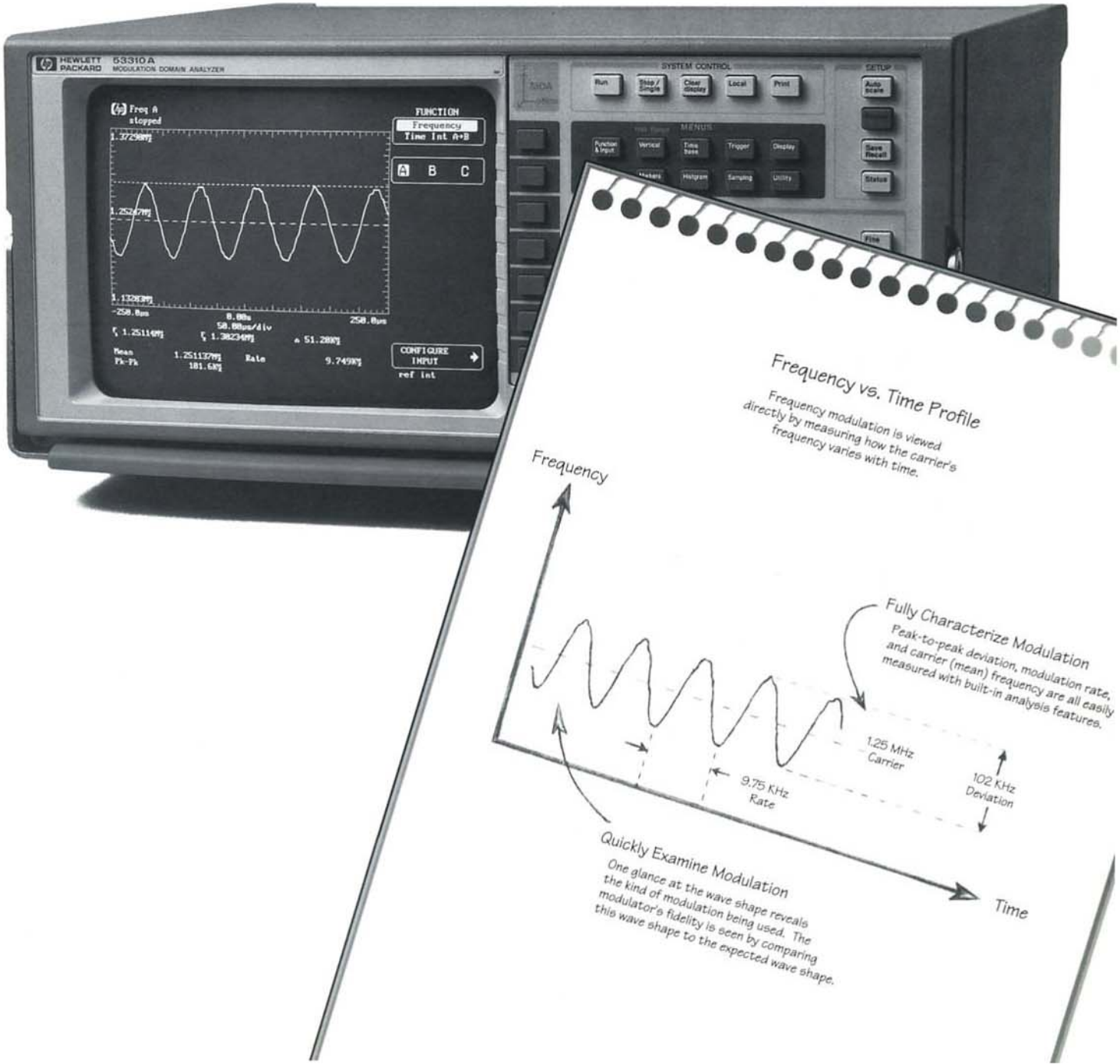
HEWLETT PACKARD

Simple Analysis of Frequency Modulation

Application Brief AN 1200-6

HP 53310A Modulation Domain Analyzer



HEWLETT PACKARD

Quickly Characterize Frequency Modulation

Situation

Intentionally changing an oscillator's frequency to carry information has been a fundamental design technique used by electronic engineers for years. Today, frequency modulation is the basis for many of the modulation schemes used in high capacity communications systems. Modern radar systems use frequency modulation for pulse compression to improve range resolution. Thus, characterizing an FM circuit's performance remains a basic and important engineering task.

Problem

It has always been difficult to determine what is happening in an FM signal using an oscilloscope. Spectrum analyzers provide the carrier's frequency and some indication of the peak-to-peak deviation and rate; however, the modulating wave shape remains unknown. Frequency profiling the signal often requires a complex system consisting of a frequency counter, pulse generator, computer, and plotter. Also, the signal must be repetitive and remain stable during the lengthy analysis.

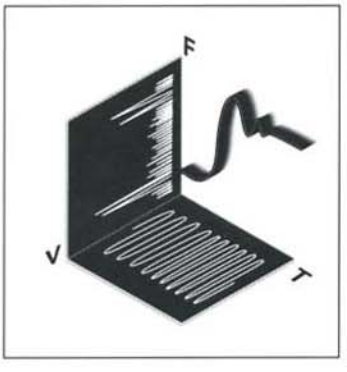
Solution

The HP 53310A Modulation Domain Analyzer fully characterizes an FM signal in a fraction of a second. It immediately displays the modulation wave shape while critical parameters such as peak-to-peak deviation, modulation rate, and carrier frequency are all available at the touch of a button. The HP 53310A's rapid display update rate provides immediate feedback to changes, making circuit adjustments easy.

The Modulation Domain Gives You a New Way to View Your Complex Signals

Better ways to analyze your complex signals don't come along often. Now Hewlett-Packard brings you the Modulation Domain - a way of looking at frequency or time interval measurements that directly and clearly reveals both intentional and unintentional modulation.

For frequency analysis, it's the missing piece of the puzzle. The Time Domain shows you amplitude (voltage) vs. time. The Frequency Domain gives you amplitude vs. frequency. The Modulation Domain plots frequency vs. time - an intuitive and insightful way of examining your signal's dynamic frequency modulation.



For timing measurements, the Modulation Domain's view of time interval vs. time allows you to both see and quantify timing jitter directly - taking you one step beyond the Time Domain's qualitative view.

Related Applications

- FM radio characterization
- FCC regulation monitoring
- EW radio fingerprinting
- Residual FM characterization
- Modulator/demodulator design
- Power supply interference

For more information, call your local Hewlett-Packard Test and Measurement Sales Office listed in your telephone directory.

December 1990

5091-0390E