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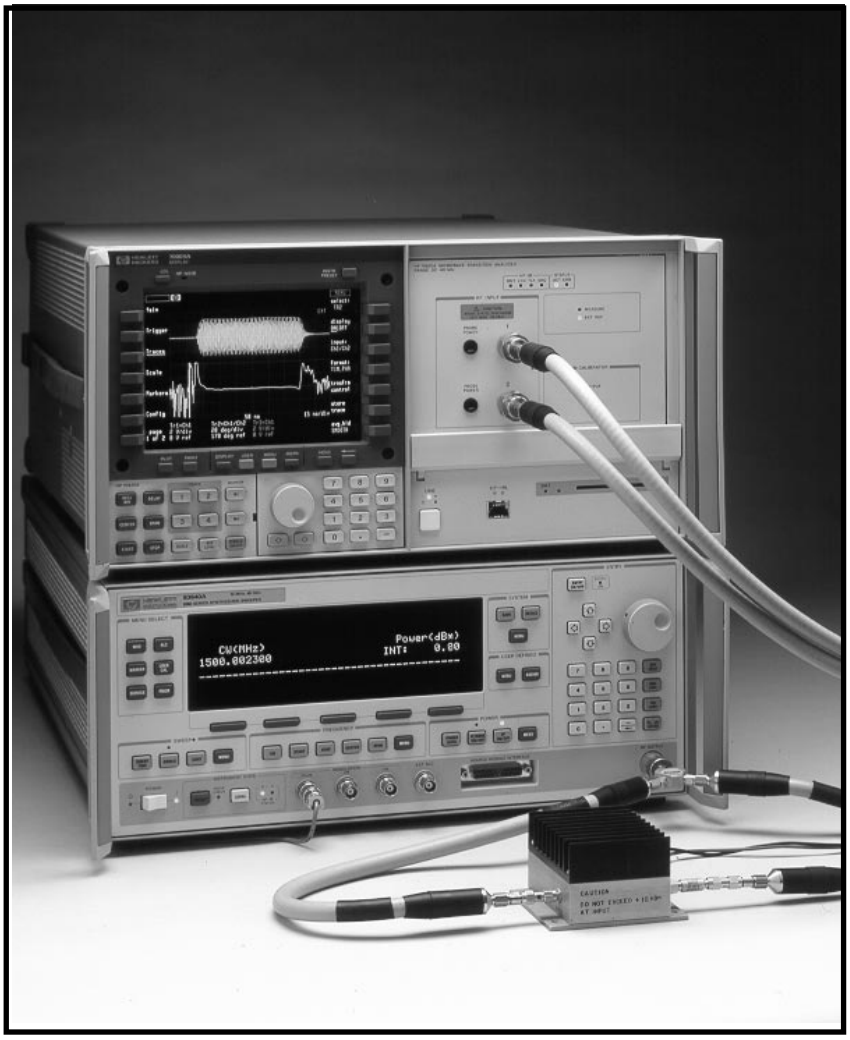
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Agilent Technologies

HP 71500A
Microwave Transition Analyzer



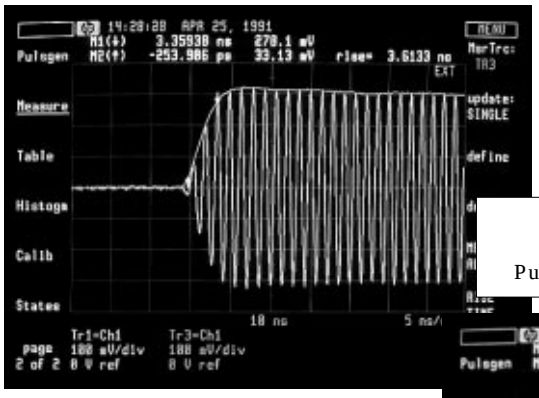
Non-linear component testing
dc to 40 GHz
Two channels

Measurements
Phase settling
Rise/fall times
On/off ratios
Delay
Switching time
Peak/average power
Group delay

Performance
1 ps Δt accuracy
Trigger to 40 GHz
10 ps rise time

The HP 72500A combines the HP 70820A microwave transition analyzer module and the HP 70004A color display and mainframe. Performance is optimized using a synthesized source.

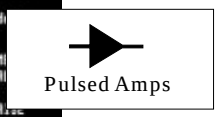
Measure Magnitude and Phase of Microwave Components in the Time Domain

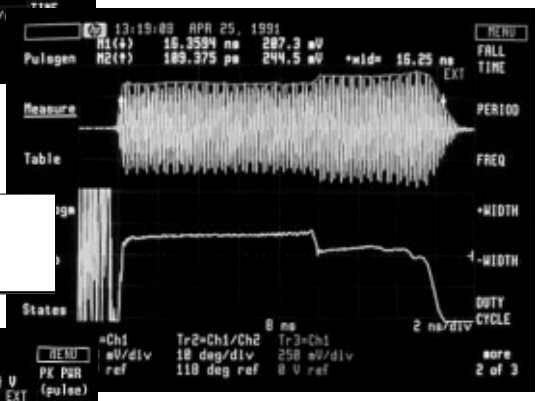


Traces shown with real and magnitude formats vs. time.

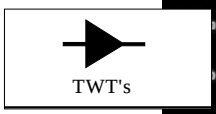
View microwave pulses in four formats:

- Real -- RF displayed similar to an oscilloscope
- Magnitude -- RF envelope shown with linear scaling
- Log magnitude -- RF envelope show with log scaling
- Phase -- RF phase displayed versus time in the pulse



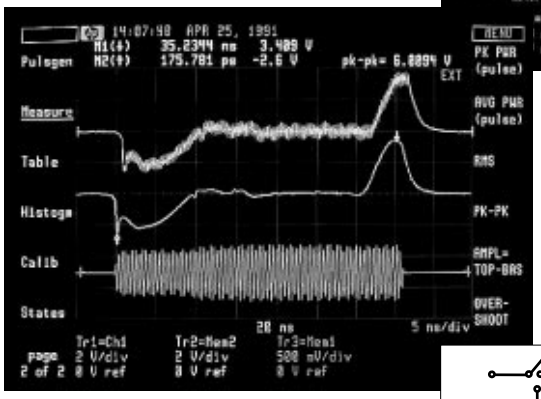


Traces shown are real and magnitude vs. time and phase vs. time.



Measure narrow pulses

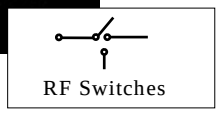
- Internal trigger to 40 GHz
- 100 ps pulse width
- Resolution: 0.1 dB and 1 degree at 8 GHz



Traces shown are RF plus video feedthrough, video feedthrough only, and RF only (rescaled).

Remove and separate video feedthrough without external filters

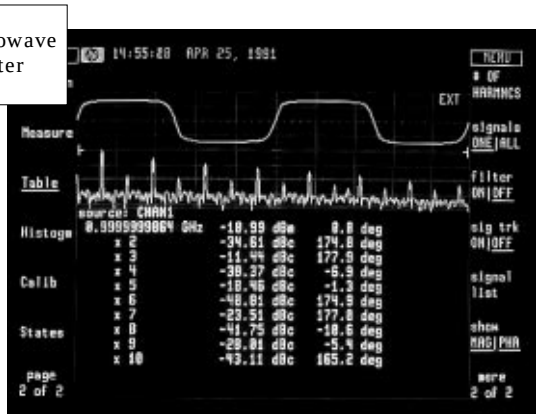
- Measure video feedthrough directly
- Measure RF carrier directly



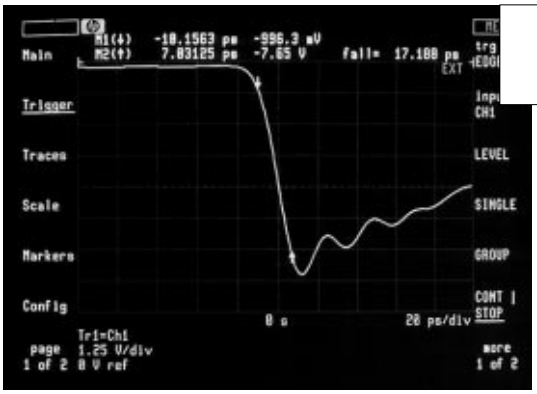


FFT: Provides the bridge from the time domain to the frequency domain

- Display frequency, magnitude, and phase simultaneously
- Display fundamental and harmonics to 40 GHz (repetitive) -- results in waveform and tabular formats
- Compare to CAE simulations

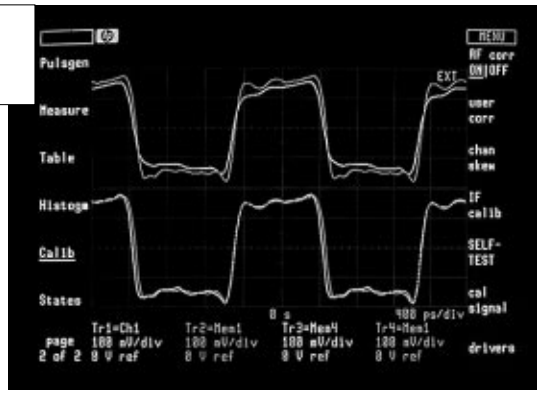


Traces shown are magnitude vs. time, FFT display, and harmonic table (includes phase).



Measure a 17 ps fall time.

NOR Gate

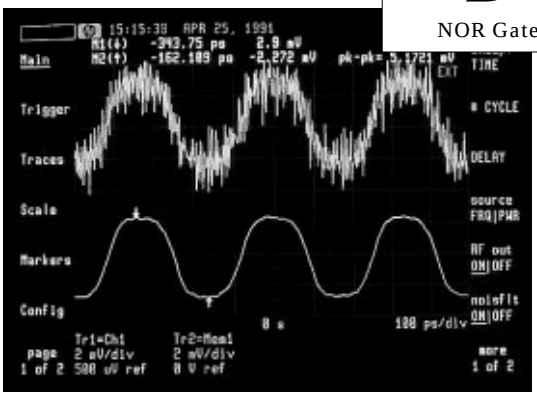


Correct for cable losses: Top trace compares to reference without corrections; bottom trace shows corrections.

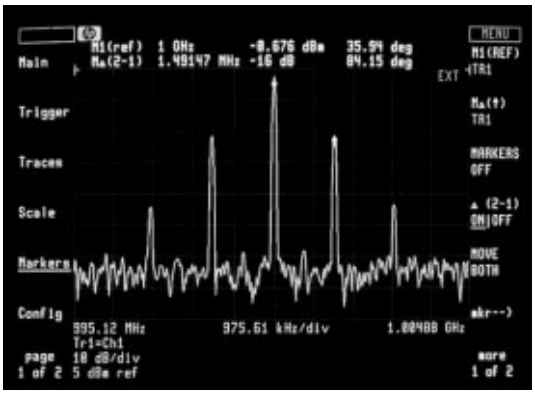
Time domain features for high-frequency design

- 1 ps Δt accuracy
- Noise filtering, faster than averaging
- 10 ps rise time
- Negative time without delay lines
- Trigger to 40 GHz without external hardware
- Phase triggering for low-level signals

NOR Gate



Noise filter removes noise signals faster than averaging.

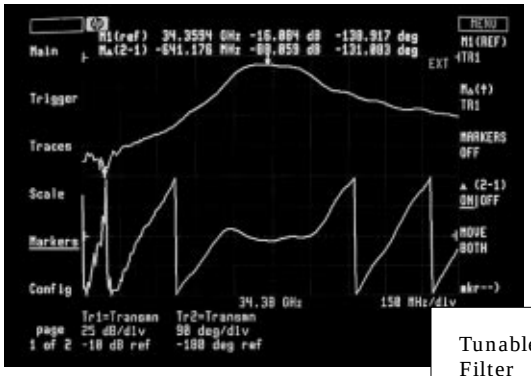


Measure phase of sidebands; determine whether AM or FM.

FFT: provides phase information for narrowband modulation analysis

- 10 MHz frequency spans
- 10 MHz single-shot bandwidth
- Unpreselected

Measure Magnitude and Phase of Microwave Components in the Frequency Domain

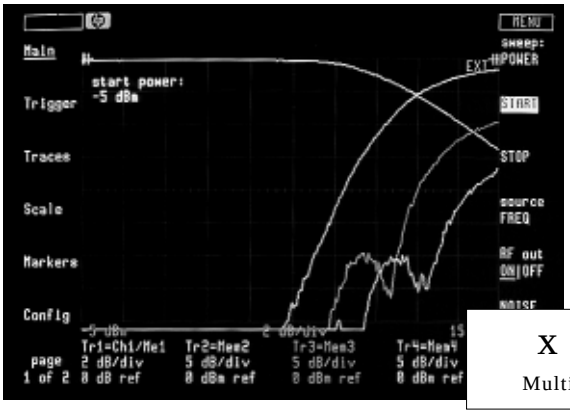


Tunable Filter

Traces shown are 34 GHz filter transmission measurement, magnitude and phase vs. frequency.

CW or pulsed network analysis

- 100 ps wide pulses
- Resolution: 0.1 dB and 1 degree at 8 GHz



x N Multiplier

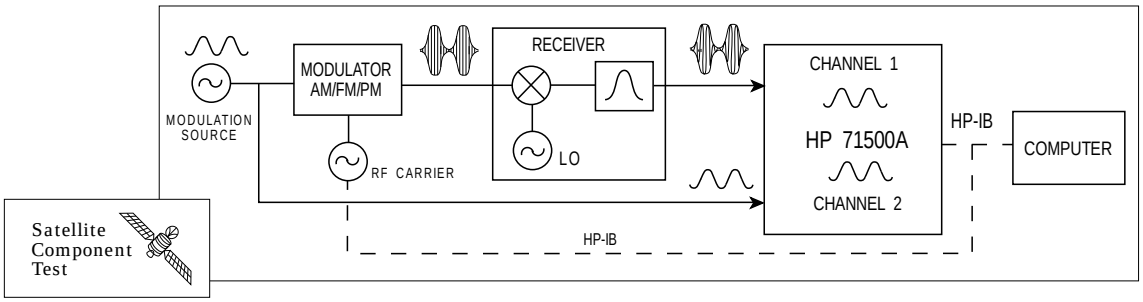
P_{out} vs. P_{in} display. Traces show are normalized gain compression of fundamental and 3rd, 5th, and 7th harmonics.

Swept harmonic responses of multiplier

- View n harmonics to 40 GHz
- Normalized gain compression
- AM to PM conversion in TWT's

Measure group delay of receivers

- Similar to microwave link analyzer
- Measure delay from baseband modulation (AM, FM, PM) waveform



Satellite Component Test

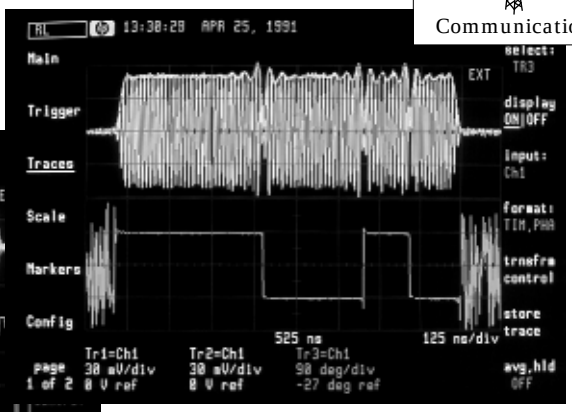
Communications

Display intrapulse parameters in the time domain

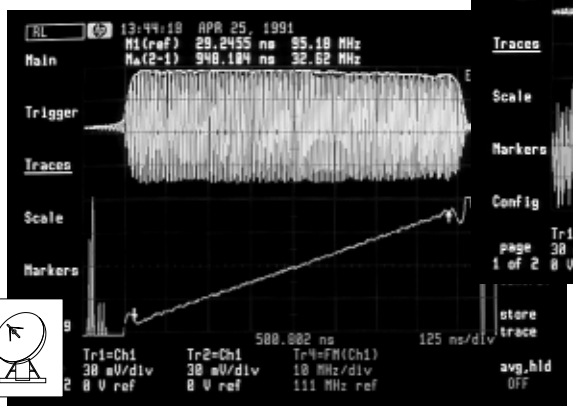
- Amplitude, phase, and frequency vs. time
- Modulation rates to > 1 GHz
- Max. frequency deviation

$$= \frac{500}{\text{time span(sec)}}$$

- Ideal for verifying signal simulators and synthesized radar systems



Phase modulation (phase vs. time).



Radar Component Test

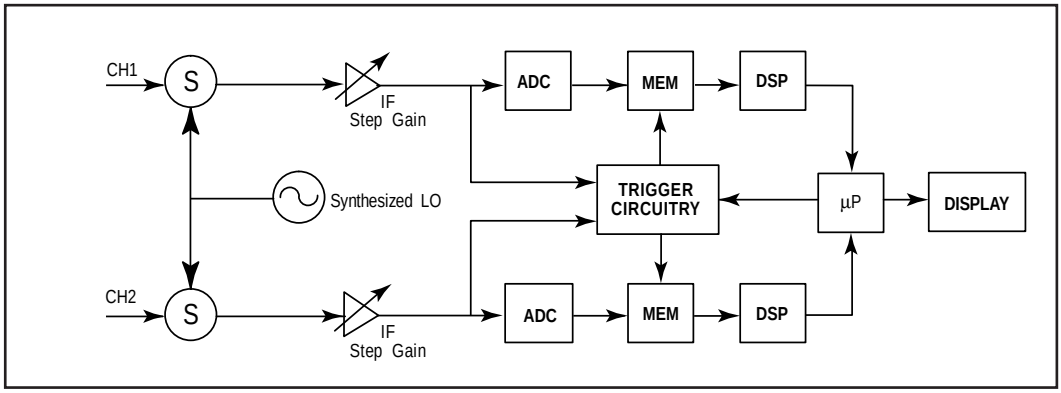
Linear chirp (frequency vs. time).

The HP 71500A Measures...

Fast magnitude and phase transitions.

The HP 71500A microwave transition analyzer is a two-channel, dc to 40 GHz, sampler-based instrument that makes CW and pulsed-RF measurements, specializing in fast transitions.

One digital signal processing (DSP) chip per channel demodulates the signal and performs extensive waveform math.

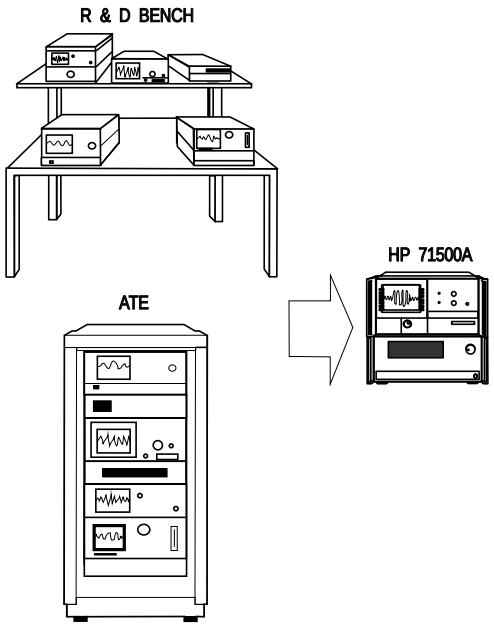


Block diagram of HP 71500A

Downsized solution for R&D and ATE

HP took the compact format of the modular measurement system (MMS) and integrated the measurement functionality from many instruments, including the oscilloscope, vector network analyzer, peak power meter, spectrum analyzer, and more. By incorporating many functions of dedicated test equipment, the HP 71500A provides a one-box solution — increasing the space on your R&D bench, as well as meeting today's requirements for downsized ATE stations.

The HP 71500A won't replace these instruments all the time. You may still require the 12-term error correction, Smith chart, speed, and s-parameter test set of a vector network analyzer; the four channels of an oscilloscope; or the preselection, wide-span, and dynamic range of a spectrum analyzer. But day to day, the HP 71500A provides unique capabilities along with traditional measurements that you'll want to evaluate.

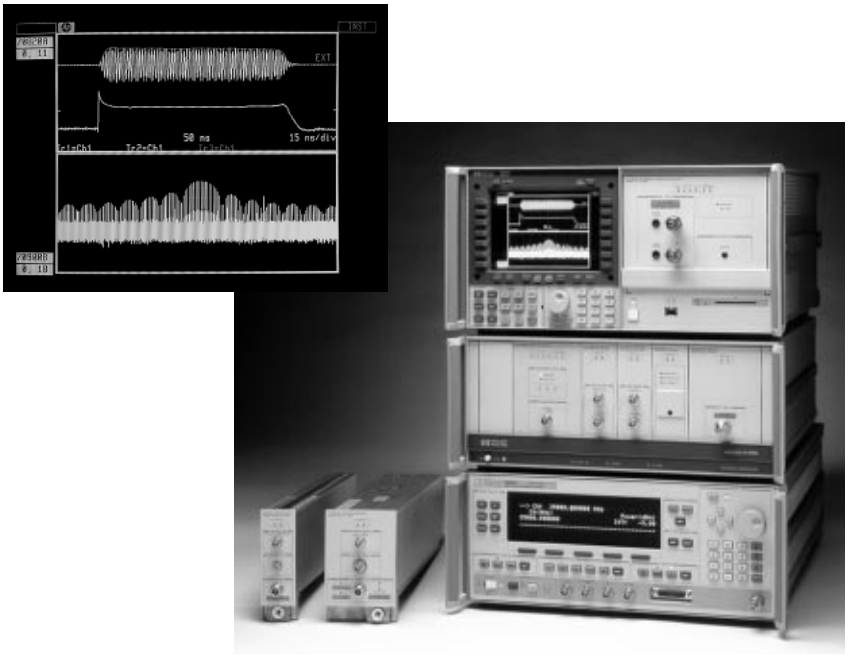


Capability for the bench; versatility for ATE systems.

Combine the HP 71500A with Other Modular Products

When your measurements require multiple instruments, you save rack and bench space by sharing common functions such as displays, cooling, and power supplies in the HP 70000 modular measurement system.

Shown here is an MMS system with HP 71500A traces in the upper display window and a microwave spectrum analyzer trace in the lower window.



Related Literature:

Technical Data Sheet
Specifications and ordering information — Lit# 5091-0792E

MMS Catalog
Modular Measurement System Catalog
Details on the complete HP 70000 product line — Lit# 5965-2818E

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