650

SIGNAL ANALYZERS

20 Hz to 40 MHz Spectrum Analyzer

Model 3585A

- 80 dB dynamic range
- 3 Hz resolution bandwidth
- ±0.4 dB amplitude accuracy
- 1001 × 1024 Digital Storage Display

HP 3585A
(Shown with Opt. 907)

DESIGNED FOR HP-IB SYSTEMS

Uncompromising Baseband Signal Analysis

The HP 3585A Spectrum Analyzer delivers high performance where it counts - at baseband frequencies. With unmatched accuracy, resolution, and dynamic range, the 3585A is HP's best solution for signal analysis at the critical frequencies comprising voice, picture, or digital information.

In today's high speed, high density information processing systems, maintaining the integrity of data signals requires more measurement performance than ever before. The 3585A provides 80 dB of spurious-free dynamic range, a sharp 3 Hz resolution bandwidth, and fully synthesized tuning. Its 20 Hz – 40.1 MHz frequency range is more than adequate to cover most information bandwidths.

Measurement performance is critically important at baseband frequencies, because signal degradation occurring here is typically not recoverable elsewhere in the system. As a result, test requirements for baseband signals and circuits often demand a level of performance that only a high-performance, low-frequency signal analyzer such as the HP 3585A can provide.

Inside the HP 3585A

The HP 3585A is a swept hetrodyne, triple conversion circuit with several major improvements. Frequency tuning is accomplished by a fully synthesized, phase continuous local oscillator, assuring excellent frequency stability for narrowband analysis across the entire frequency range. Internal microprocessors manage several functions including front panel operation, 1001-point digital vector storage display, and periodic calibration of amplitude and frequency offsets. An accurate internal narrowband frequency counter can discriminate between the frequencies of closely spaced sinusoids with 0.1 Hz resolution. Finally, the HP 3585A contains fast-settling narrow resolution bandwidth filters that are among the best in the industry.

Fast, Flexible Frequency Sweeps

Well-designed filters and the phase-continuous, synthesized local oscillator team up to give the HP 3585A very fast sweep speeds. A 40-MHz sweep using the 30-kHz resolution bandwidth takes only 200 milliseconds, fast enough for high-resolution spectrum surveillance. A 1-MHz sweep using a 1-kHz bandwidth takes only 2 seconds.

Sweep width can be set to any arbitrary span between 0 and 40.1 MHz, or adjusted from 100 Hz to 40 MHz in a 1,2,5 step format. Resolution bandwidth and sweep time automatically track the selected frequency span to ensure optimum performance, or can be manually controlled.

1001 × 1024 Digital Storage Display

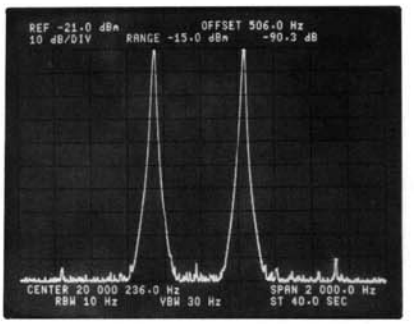
The high performance of the HP 3585A is further complemented by a built-in 1001 × 1024-point display. Measured analog signals are converted to 1001 digital data points prior to storage and display, allowing each point to be accessed individually using the display marker.

Front Panel Convenience

The HP 3585A's microprocessor-controlled front panel and CRT readout simplify complicated measurements. Frequency and amplitude settings may be entered directly using the keypad, incrementally stepped, or varied continuously using the rotary pulse generator.

An autoranging input attenuator eliminates the task of manually adjusting attenuation to achieve the correct mixer level. The input Range can also be manually adjusted from −25 dBm to +30 dBm in 5-dB steps.

With its primary marker set to a signal peak or other point of interest, the HP 3585A displays amplitude and frequency numerically on the CRT. A second marker numerically displays amplitude and frequency offsets between the two markers. Programmable Offset Step allows an operator to move easily between harmonically-related signals or evenly-spaced communication channels.



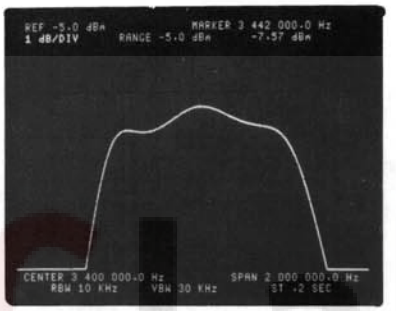
Offset Marker indicates a spurious sideband at −90.3 dBc, 506.0 Hz away from the carrier.

Versatile Noise and Distortion Analysis

Quiet and rock-stable, the HP 3585A excels as a noise and distortion analyzer. Its own uncompromising sensitivity and spectral purity are assured by its advanced front end design, synthesized local oscillator and built-in, oven-stabilized reference.

The HP 3585A can measure spurious, harmonic, and intermodulation products at levels typically 100 dB or more below the fundamental. Using its 3 Hz resolution bandwidth, power line sidebands below −95 dBc can typically be measured at frequency offsets of only 50 or 60 Hz. Total harmonic distortion and intermodulation distortion measurements can be automated using HPIB programming.

A built-in noise level key displays RMS noise density normalized to a 1 Hz bandwidth at the marker position, allowing easy comparison of measurements made with different resolution bandwidths.

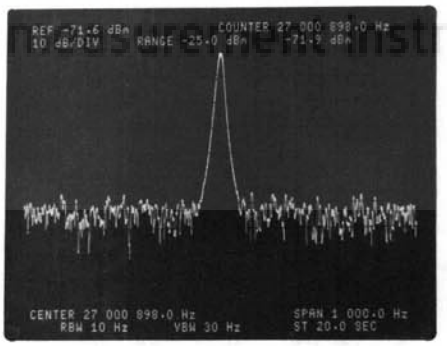


1 dB/div. frequency response for a bandpass amplifier centered at 3.442 MHz. Because this 2 MHz sweep takes only 0.2 seconds, the operator can observe circuit adjustments almost instantly.

Frequency Response Measurements

With its built-in tracking generator, digital trace storage, and narrowband frequency counter, the HP 3585A Spectrum Analyzer can accurately measure the frequency response of crystals, filters, and amplifiers. Small amplitude variations are resolved to 0.01 dB using the marker readout and the 1 dB/division expanded amplitude scale. Unwanted effects of test fixtures and cables are removed simply by storing the frequency response of the test setup in Trace B and subtracting it from measured data in Trace A.

With its wide dynamic range capability and high-resolution display, the HP 3585A is ideal for measuring and viewing the analog portions of 14 or 16-bit digital audio systems. It can also measure the frequency response of digital modem filters with better than ± 0.4 dB accuracy.



Built-in counter allows a 27 MHz carrier to be displayed with 0.1 Hz resolution and 1×10^{-7} / mo. stability

HF Radio Applications

In addition to its many uses as a baseband signal analyzer, the HP 3585A finds a home in HF radio applications as well. Synthesized tuning and high-resolution display make wideband surveillance of the entire 30-MHz HF radio spectrum easy. Fast-settling resolution bandwidth filters speed the analysis of modulated HF carriers.

HP 3585A displays detailed instructions for an automatic filter test downloaded from an external computer.

SIGNAL ANALYZERS
20 Hz to 40 MHz Spectrum Analyzer (cont.)

Specifications

Frequency

Measurement range: 20 Hz to 40.1 MHz

Displayed Frequency Span

Range: 0 Hz to 40.1 MHz variable with 0.1 Hz resolution or 10 Hz to 40 MHz in 1, 2, 5 steps

Accuracy: −0% + 0.2% of frequency span setting

Displayed Center, Start/Stop, and Manual Frequency

Range: 0 Hz to 40.1 MHz with 0.1 Hz resolution

Accuracy: 1×10^{-7}/month of frequency

Marker

Readout accuracy: ±0.2% of frequency span ± resolution bandwidth

Counter accuracy: ±0.3 Hz ± 1×10^{-7}/month of counted frequency for a signal 20 dB greater than other signals and noise in the resolution bandwidth setting

Resolution Bandwidths

Range: 3 dB bandwidths of 3 Hz to 30 kHz in a 1, 3, 10 sequence

Accuracy: ±20% at the 3 dB points

Selectivity: 60 dB/3 dB <11:1

Amplitude

Measurement range:

1 MΩ input: −31 nVrms to +7.08 Vrms

50/75 Ω input: −137 dBM to +30 dBM

All receiver inputs can be overdriven by up to 12.3 dB above the range setting, with some degradation in distortion performance.

Displayed Range

Scale: 10 division CRT vertical axis with Reference Level at the top graticule line

Calibration: 10, 5, 2 and 1 dB/division from the Reference Level

Input range: −25 dBm to +30 dBm in 5 dB steps

Reference Level Range (relative to input range): −100 dB to +10dB

Reference level accuracy (using 1 or 2 dB/div., at midscreen with sweep rate reduced by 4 or at the manual frequency)

50/75 Ω Input

+10 dB to −50 dB	−50 dB to −70 dB	−70 dB to −90 dB
±0.4 dB	±0.7 dB	±1.5 dB

1 MΩ Input - add to above

20 Hz to 10 MHz	10 MHz to 40.1 MHz
±0.7 dB	±1.5 dB

Amplitude Linearity (referred to reference level)

0 dB to −20 dB	−20 dB to −50 dB	−50 dB to −80 dB	−80 dB to −95 dB
±0.3 dB	±0.6 dB	±1.0 dB	±2.0 dB

Frequency Response (referred to center of span)

50/75 Ω input: ±0.5 dB

1 MΩ Input

20 Hz to 10 MHz	10 MHz to 40.1 MHz
±0.7 dB	±1.5 dB

Marker Amplitude Accuracy

Midscreen at the reference level: use Reference Level accuracy from +30 dBm to −115 dBm, add Amplitude Linearity below −115 dBm.

Anywhere on screen: add Reference Level Accuracy, Amplitude Linearity and Frequency Response.

Dynamic Range

Spurious Responses (image, out of band, and harmonic distortion)

50/75 Ω input: <−80 dB referred to a single signal equal to or less than Input Range

1 MΩ input: <−80 dB except second harmonic distortion <−70 dB

Intermodulation Distortion

50/75Ω input: <−80 dB referred to the larger of two signals each ≥6 dB below Input Range except 2nd order IM from 10 MHz to 40 MHz <−70 dB

1 MΩ input: <−70 dB

Residual responses (no signal at input): <−120 dBm using −25 dBm range

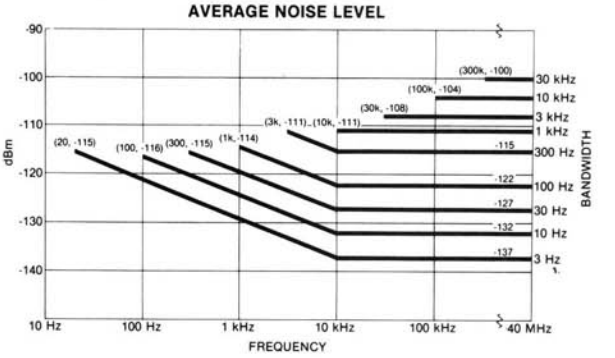
Residual phase noise (typical at 40 MHz, −10 dBm input):

5 KHz offset: −112 dBc/Hz

100 KHz offset: −120 dBc/Hz

Average Noise Level

50/75 Ω Input



1 MΩ input: Below 500 kHz add 12 dB to above

Sweep

Modes: continuous, single or manual

Trigger: free Run, Line, or External

Time: 0.2 s full sweep to 200 s/Hz of Frequency Span (swept time excluding auto calibration cycles)

Input

Signal Inputs

50/75 Ω: >26 dB return loss, BNC connector

1 MΩ: ±3% shunted by <30 pF, BNC connector

Maximum Input Level

50/75 Ω: 13 V peak ac plus dc relay protected against overloads to 42 V peak.

1 MΩ input: 42 V peak ac plus dc (derate by factor of two for each octave above 5 MHz.

External trigger input: negative going TTL level or contact closure required to initiate sweep.

External reference input: 10MHz (or subharmonic to 1 MHz), 0 dBm minimum level

Output

Tracking Generator

Level: 0 dBm to −11 dBm with a single turn knob

Frequency accuracy: ±1 Hz relative to analyzer tuning

Frequency response: ±0.7dB

Impedance: 50 Ω; >14 dB return loss

Probe power: +15 Vdc, −12.6 Vdc; 150 mA max.

IF: 350 kHz, −11 dBV to −15 dBV at the reference level

Video: 10 V at the reference level

Frequency reference: 10.000 MHz ± 1×10^{-7}/month, +10 dBm into 50Ω

HP-IB Interface Functions

Sh1, An1, T6, L4, SR1, RL1, TP0, DC1, DT1, C0

General

Environmental

Temperature: operating 0°C to 55°C

Humidity: <95% RH except 300 Hz BW <40% RH

Warm-up time: 20 minutes at ambient temperature

Power requirements: 115 V (+11% −25%), 48–440 Hz
230V (+11% −18%), 48–66 Hz
180 watts 3A max

Weight: 39.9 kg (88 lb)

Size: 229 mm (9″) H × 426 mm (16.75″) W × 635 mm (25″) D

Ordering Information

Opt. 907: Front Handle Kit	add $75
Opt. 908: Rack Flange Kit	add $40
Opt. 909: Combined Opt. 907 and 908	add $105
Opt. 910: Extra Manual	add $200
HP 3585A Signal Analyzer	**$23,700**