- Spectrum analysis, 1/3 and 1/1 octave analysis
- Time capture (40 k sample)
- High speed (7.5 kHz real time rate)
- High accuracy, ±.15 dB
- 80 dB dynamic range, to 640 μHz resolution bandwidth
- Non-volatile memory option stores 127 measurements

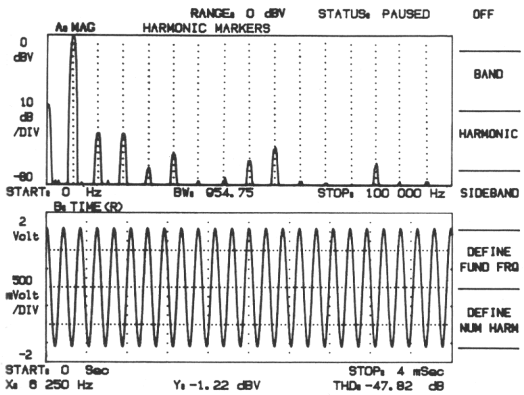
DESIGNED FOR HP-IB SYSTEMS

HP 3561A

HP 3561A Dynamic Signal Analyzer

The HP 3561A is a versatile real-time spectrum analyzer for analysis of electronic, acoustic, and vibration signals up to 100 kHz. The patented design of the input provides outstanding measurement performance, ± .15 dB amplitude accuracy, 80 dB dynamic range and ±0.003% frequency accuracy. The analyzer also has a built-in tracking generator for stimulus-response measurements. With built-in waveform math, magnitude and phase measurements are possible. Digital processing is used to provide ultra-narrow resolution bandwidths up to 640 μHz. Digital processing also speeds up measurements; a measurement with 1Hz resolution bandwidth requires only a 1.5 second sweep.

In addition to spectrum measurements, the HP 3561A displays time waveforms similar to oscilloscope displays. A 40 k sample time buffer captures transients for examination in the time domain or analysis in the frequency domain. The HP 3561A is also an excellent analyzer for acoustic testing. It offers 1/3 and 1/1 octave measurements and an analog A weighted filter.



Harmonic marker function computes total harmonic distortion (THD) directly in dB or percent.

Spectrum Analysis

The HP 3561A uses digital processing to achieve high performance and increase measurement speed (up to two orders of magnitude for resolution bandwidths 1 Hz or less). Results can be displayed in rms volts, volts squared, milliwatts, dBV, and dBm. Other engineering units can be displayed by entering a calibration factor and a label.

In addition to standard marker features like marker to peak and peak track, the HP 3561A provides advanced marker features. Harmonic markers aid analysis and automatically compute total harmonic distortion (THD). Band markers automatically compute rms band level or average band power, depending on the display units selected. Sideband markers make it easy to identify the frequency spacing of modulation sidebands and automatically compute the power.

Waveform Recording

The HP 3561A is well-suited for transient capture and analysis because it has a high-performance, 13-bit analog-to-digital converter with exceptional linearity. The A-to-D sampling rate is 256 kHz, and the analog anti-alias filter at the input prevents signals above 100 kHz from corrupting measurements. Lower sampling rate can be selected by changing the analysis span. To control transient capture measurements, the analyzer triggers on the analog level at the input, and it can be set to trigger on positive or negative slope. Trigger delays of 40 k samples pre-trigger and 1023 k samples post-trigger can be selected.

The HP 3561A signal analyzer lets you capture long transients with its 40 K sample time buffer. Segments of the time buffer (1024 samples) can be expanded for easy viewing or can be transformed into spectrums so you can see the spectral content.

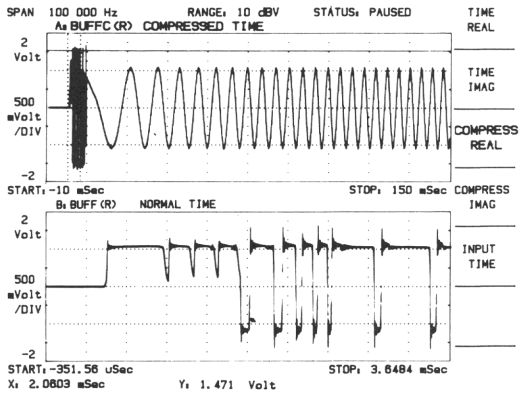


Figure 3: Up to 40,000 samples of a transient waveform can be captured, with analysis in either the time domain or the frequency domain.

Acoustic Analysis

Calibrated sound pressure level (SPL) measurements are possible using the Engineering Units feature of the analyzer. The sensitivity of the microphone can be measured and entered into the analyzer so the display directly reads out calibrated dBA. The built-in analog A weight filter is selectable for sound level measurements.

The HP 3561A makes 1/3 and 1/1 octave measurements by digitally synthesizing the 'proportional to bandwidth' filters in custom VLSI ICs. This custom processing allows the display to update quickly and indicates any short-term changes in noise level. Both the 1/3 and 1/1 octave displays show the total sound level of the band on the right of the display. This eliminates the need for a separate sound level meter.

Vibration Analysis

When used with an accelerometer or other motion transducer, the HP 3561A is an excellent diagnostic tool for vibration analysis. The cause of vibration problems can often be deduced by analyzing the spectral components of the vibration signal, and analysis is easy with HP 3561A harmonic, band, and sideband marker functions. The analyzer also has a built-in power source for ICP-type quartz accelerometers.

SIGNAL ANALYZERS

Single-channel, Dynamic Signal Analyzer 0.000125 Hz to 100 kHz (cont'd)

HP 3561A

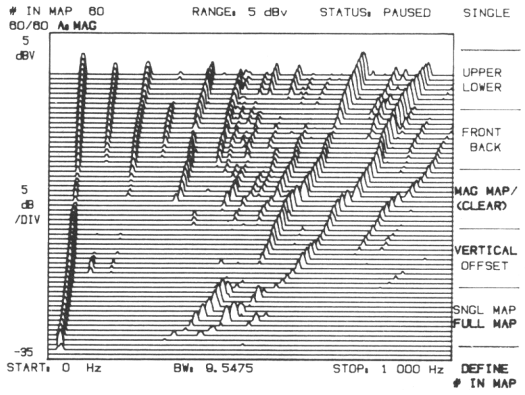


Figure 5: Spectral maps greatly reduce the time required to analyze changes in up to 60 successive measurements.

Internal Storage

The HP 3561A comes standard with non-volatile memory for 2 measurement traces and 6 setup states. Option 001 increases non-volatile memory so that 127 measurement traces (or any combination of measurement traces and setup states) can be saved; an entire 40 k sample time capture can be saved.

Display Formats

The HP 3561A comes with the standard single-trace format as well as the upper/lower and front/back dual trace formats. These formats are very flexible; a spectrum can be displayed in an upper trace while the time waveform can be displayed in the lower one. For trend analysis, the HP 3561A has a spectral map display format that displays up to 60 successive spectra. This display format is extremely useful for analyzing transients and vibrations in rotating machinery.

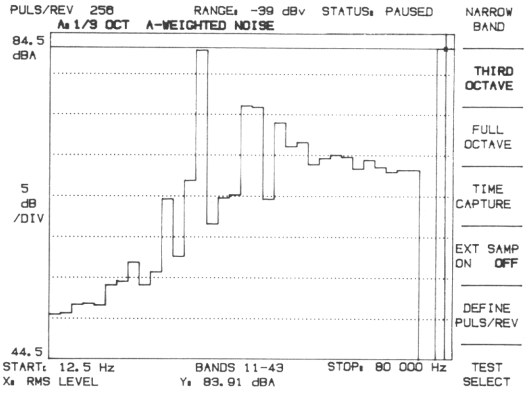


Figure 4: The combination of octave and narrowband analysis makes the HP 3561A a powerful instrument for noise and vibration analysis.

Portable Operation

The HP 3561A can run for over one hour with the HP 85901A portable ac power source.

Specifications

Frequency

Range: 0.000125 Hz to 100 kHz.
Spans: 0.01024 Hz to 100 kHz in a 1, 2, 2.5, 5, 10 sequence. Other spans are available but are too numerous to list here.
Accuracy: ± 0.003% of display center frequency.
Resolution: 0.25% of frequency span.
Window: flat top, hann, uniform, and exponential
Bandwidth

	Flat	Hann	Uniform
3 dB Bandwidth (% of frequency span)	0.90%	0.36%	0.22%

Real-time bandwidth: (typical) single display, 3 kHz. Fast average display, 7.5 kHz.

Amplitude

Measurement range: +27 to −120 dBV noise floor (22.4 VRMS to 1μV noise floor). Input range selected in 1-dB steps from +27 to −51 dBV. Optimum range determined automatically in autorange mode.
Dynamic range: 80 dB
Accuracy at the passband center

±0.15 dB	+27 to −40 dBV input ranges
±0.25 dB	−41 to −51 dBV input ranges
Flat top window:	+0, −0.01 dB
Hann window:	+0, −1.5 dB
Uniform window:	+10, −4.0 dB

Note: overall accuracy is the sum of the accuracy at the passband center plus the selected window accuracy
Resolution: Log 0.01 dB
Linear: 4 digits

Phase

Accuracy: ±2 degrees, dc-10 kHz; ±10 degrees, 10-100 kHz (signals no more than 40 dB below full range).
Resolution: 0.1 degree

Input

Impedance: $1X10^6\ \Omega \pm 5\%$ shunted by 95 pF maximum
Isolation: input low may be connected to chassis ground or floated up to 30 volts rms (42 volts peak) above ground
Coupling: signal may be ac or dc coupled. Low frequency 3-dB point <1 Hz in ac mode.
A-weighting: hardware A-weighting filter conforms to ANSI standard S1.4-1971 (R1976)
ICP current: nominal 4 mA current source provided, compatible with integrated circuit piezoelectric accelerometers

Output

Source: band-limited, band-translated, pseudo-random, random, or impulse, or TTL "synch" signals are available on rear panel. Level is selectable between 0.7 and 0.007 volts rms, nominal. Impedance 50Ω ±5Ω
Print/plot: controls HP-GL plotters and HP raster dump printers directly

Display

General: magnitude, phase, time and math traces can be selected. Units available are:
Horizontal: Hz, seconds, RPM, orders; linear, or log spacing
Vertical: dBV, dBm (selectable Z), volts, volts squared, and user-defined units
Scale: Linear or log magnitude scales may be selected. Full scale, dB/division, and degrees/division are user definable. Center scale user definable in phase or time traces.
Math: Arithmetic operations can be performed on new or recalled frequency spectra. Add, subtract, multiply, divide, integrate, differentiate and user-defined constants are provided. 1/BW is provided for Power Spectral Density (PSD) computations.

Internal Memory

	Non-volatile	Volatile
Standard	2 traces, 6 states	40 time records
Optional	traces + states + (1+2 time records) = 127	40 time records

Marker

Single, relative, harmonic, sideband, and power cursors are provided. THD can be calculated from up to 20 harmonics. Sideband power relative to specified carrier can be calculated from up to 10 sidebands. MKR to peak, MKR to center, MKR to full scale and marker peak track are provided.

General

Power: 100/120 V ac +5%, −10%, 48-440 Hz; 220/240 V ac +5%, −10%, 48-66 Hz
Weight: net, 15kg (33lb); shipping, 21.6kg (47.5lb)
Size: 197H x 335W x 595mmD (7.8″ x 13.2″ x 23.4″)
HP-IB interface functions: implementation of IEEE Std. 488-1978 SH1, AH1, T5, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT1, C0

Ordering Information

	Price
HP 3561A Dynamic Signal Analyzer	$12,000
Opt 001 Extended Non-volatile Memory	+$1,595
Opt W30 Extended Repair Service. See page 725.	+$290