

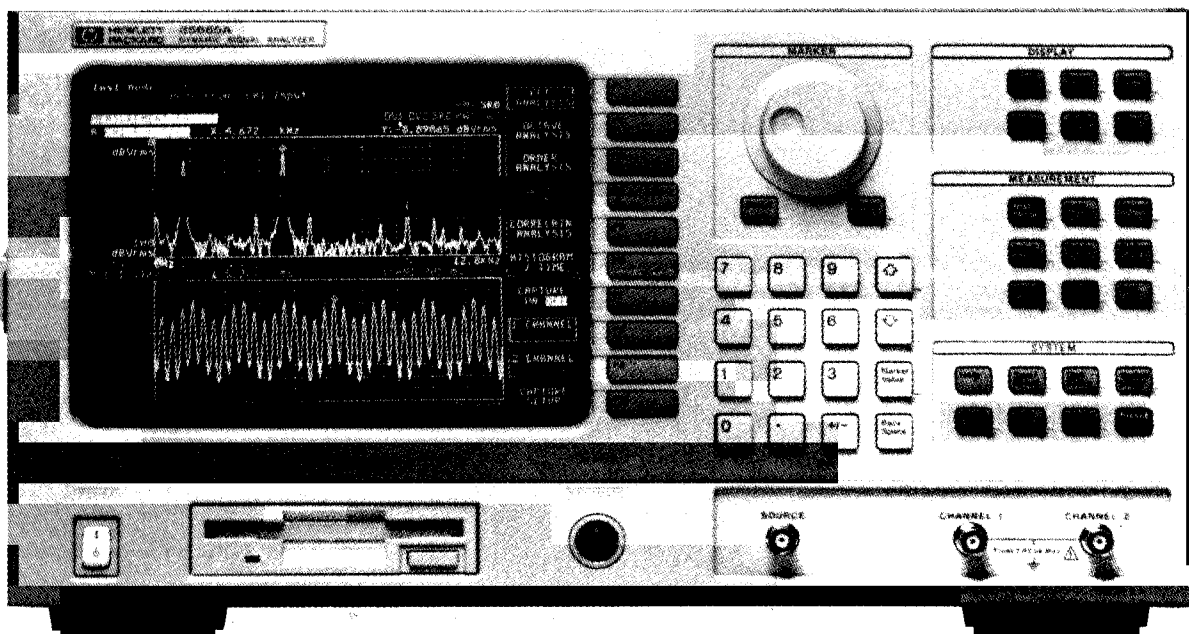
# SIGNAL ANALYZERS

## Dual-Channel Dynamic Signal Analyzer, 244 $\mu$ Hz to 102.4 kHz

HP 35665A

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- Network, spectrum, waveform, transient analysis
- Flexible option structure—buy only what you need
- Up to 6.4 MB deep transient capture (optional)
- HP Instrument BASIC (optional)
- 1.44 MB internal LIF/MS-DOS<sup>®</sup> disk drive
- Fast update rate for interactive measurements
- High-speed processing: 8 traces/s, 12.8 kHz real-time fast average
- Computed order tracking for more stable measurements (optional)
- 31.5 kHz real-time octave measurements (optional)
- Fast swept-sine measurements (optional)



DESIGNED FOR  
HP-IB  
SYSTEMS

HP 35665A

### HP 35665A Dynamic Signal Analyzer

The HP 35665A is a flexible FFT-based analyzer that provides time, spectrum, network and amplitude domain measurements with a broad range of measurement options applicable in electronics, servomechanical and electronic control systems, machinery vibration, and general noise and vibration troubleshooting applications. The measurement options include:

- Computed order tracking measurements
- Real-time octave measurements (complies with ANSI S1.11)
- Swept-sine measurements
- Curve fit/synthesis
- Arbitrary waveform source

Measurement options expand the electronics test capability of the standard HP 35665A into other application areas. With the addition of HP Instrument BASIC programs, even the most complex applications can be reduced to a single keystroke. The multi-faceted measurement modes of the HP 35665A have the measurement functionality of a spectrum analyzer, network analyzer, acoustic sound-level meter, acoustic intensity analyzer, vibration analyzer, audio oscilloscope and amplitude domain analyzer in a single package.

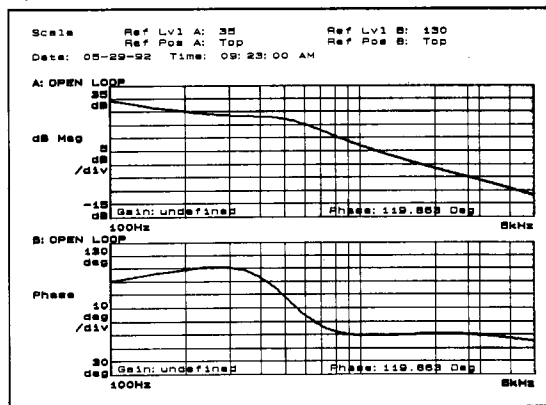
### Add More Options as Your Needs Evolve

Your analysis requirements can change as test needs expand and change. The HP 35665A allows you to configure your own solution to meet both your test requirements and your budget. As your needs evolve, expanding the capability of your analyzer is as easy as ordering the firmware upgrade kit that you can install yourself. Any combination of measurement options is available, with no sacrifice in measurement speed.

### Fast Swept-Sine and Broadband Control Systems Measurements

Swept-sine measurements typically offer higher signal-to-noise ratios, noise rejection and measurement accuracies than broadband techniques. The optional swept-sine measurements (Option 1D2) add this traditional measurement technique to the HP 35665A, but in an implementation that offers faster measurement results than before. Fast input auto-ranging during the measurement process increases dynamic range to greater than 130 dB.

Fast test time in production settings is even more critical with swept-sine tests since the instrument measurement time is usually the limiting factor in device throughput.



### Advanced Modeling and Analysis Cut Design Time

The addition of curve fit and synthesis (Option 1D3) allows design engineers to measure real-life devices, compare the actual response to the design goals, model compensation circuits, and predict the end effect of the compensation circuits on the newly modified model. Curve fit and synthesis capability enhances design productivity by reducing the need to build prototypes and by simplifying the design optimization task.

### Real-Time Octave for Compliance Testing

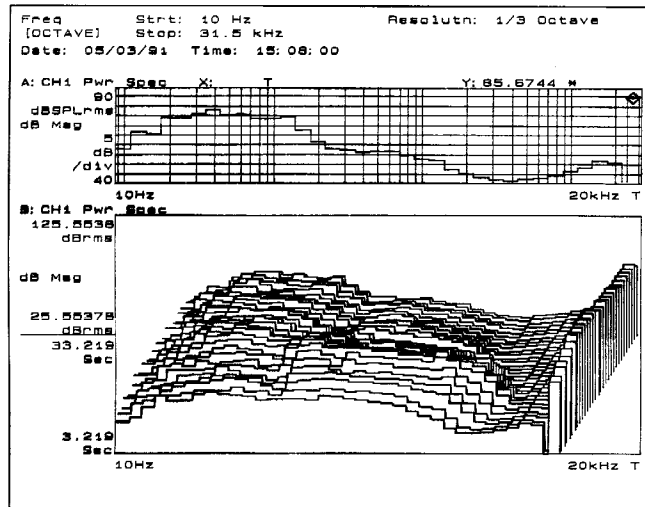
Real-time octave measurements (Option 1D1) provide continuous 1/1, 1/3 and 1/12 octave measurements per ANSI S1.11 (1986, order 3, type 1-D, extended and optional range), ANSI S1.4 and IEC 651-1979 type 0 impulse specifications. These high-performance measurements used to require separate real time analyzers. Now these same high-performance measurements are available at a fraction of the cost of previous solutions.

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# SIGNAL ANALYZERS

## Dual-Channel Dynamic Signal Analyzer, 244 $\mu$ Hz to 102.4 kHz (cont'd)

HP 35665A



### Computed Order Tracking Eases Machinery Analysis

The HP 35665A computed order tracking option (Option 1D0) adds Hewlett-Packard's order tracking capability to the HP 35665A. This algorithm digitally resamples the incoming signal resulting in extremely stable and repeatable order measurements that were not possible using analog ratio synthesis and filtering. In situations involving quickly varying and fast run up tests, this option provides unprecedented stability. It is only available on HP measurement hardware.

The internal tachometer input provides a powerful and flexible triggering facility that virtually eliminates the need for external signal-shaping circuitry.

### HP Instrument BASIC for Powerful Automation

HP Instrument BASIC (Option 1C2), a subset of HP BASIC, provides the test automation power of an external computer inside the HP 35665A. In production applications, HP Instrument BASIC, along with other production oriented features, such as limit lines, enables the HP 35665A to control external HP-IB test equipment, like voltmeters and counters, address external peripherals, like disk drives, printers and plotters, and fully automate a production test procedure with custom graphics and interactive operator prompts.

HP Instrument BASIC is also useful in research and development and field applications. Complex test sequences can be recorded and simplified to a single key press. Tests can be repeated easily by operators not familiar with the measurement problem.

Measurements like electronic filter characterization (Q, 3 dB bandwidth, shape factor), acoustic intensity, Cepstrum displays, Hilbert Transforms and multi-plane balancing can also be derived using HP Instrument BASIC.

### Specification Summary

#### Frequency

**Measurement range:** 244  $\mu$ Hz to 102.4 kHz (1-channel mode); 122  $\mu$ Hz to 51.2 kHz (2-channel mode)

**Spans:** 195.3 mHz to 102.4 kHz (1-channel mode) 97.6 mHz to 51.2 kHz (2-channel mode)

**Measurement resolution:** 100, 200, 400, and 800 lines

**Frequency resolution:** Frequency span/measurement resolution (minimum 244  $\mu$ Hz 1-channel mode 122  $\mu$ Hz 2-channel mode)

**Windows:** Hann, flat top, uniform, force, exponential

#### Amplitude

**Range:** 3.99 mVpk to 31.7 V pk, manual or auto

**Accuracy:**  $\pm 2.92\%$  (0.25 dB) of reading  $\pm 0.025\%$  of full scale

**Dynamic range:** 72 dB (FFT mode);

120 dB (swept-sine measurement mode)

80 dB (octave mode per ANSI S1.11)

**Noise:**  $< -130$  dBV/ $\sqrt{\text{Hz}}$  160 Hz to 1.28 kHz

$< -140$  dBV/ $\sqrt{\text{Hz}}$  1.28 kHz to 102.4 kHz

**Single channel phase:**  $\pm 4.0$  degrees relative to external trigger

#### Frequency Response Channel Match

**Amplitude:**  $\pm 0.04$  dB at full scale

**Phase:**  $\pm 0.5$  deg at full scale

**Input Impedance:** 1 M $\Omega$   $\pm 10\%$  shunted by  $< 100$  pF

**Coupling:** ac, dc, ICP current source, engineering units, A-weight filter, integration and differentiation via math functions.

**Source Types:** Fixed sine, random, chirp, burst random, pink noise, burst chirp, swept-sine (Opt 1D2), arbitrary waveform (Opt 1D4)

**Display Results:** Frequency response, power spectrum, linear spectrum, coherence, cross spectrum, power spectral density, time, auto-correlation, cross-correlation, orbit (lissajous), histogram, PDF, CDF

**Trace Types:** Log magnitude, linear magnitude, dB magnitude, phase, real, imaginary, Nyquist, Bode, unwrapped phase

**Trace Formats:** Single, upper/lower, front/back, setup, waterfall, waterfall skew, grid on/off, display blanking

**Update-Rate:**  $> 8$  traces per second

**Transient Capture:** Continuous (real-time) data recording to RAM

**Maximum rate:** 262,144 samples/s for 1-channel mode

**Maximum capture length:** 200 ksamples (standard), 1.2 Msamples (Opt 1C1), 3.2 Msamples (opt ANA)

**Saved Data and Measurement Memory:** 400 KB (standard), 2.4 MB (Opt 1C1), 6.4 MB (Opt ANA)

#### Option 1D0 Computed Order Tracking

Computed ratio synthesis, computed tracking filters

**Displays:** Spectral map, order map, order track [mag + phase] or orbit

**Trigger:** Time or RPM, external or free run

**Tachometer Input:** 0.5 to 2048 pulses per revolution

**Trigger level:**  $\pm 20$  V maximum, user-selectable level

**Slope:** Positive or negative

User-selectable trigger holdoff

**Option 1D1 Real-Time Octave Measurements** (All frequencies in nominal band center frequencies)

**Measurements:** 1/1 Octave (Full), 1/3 Octave, 1/12 Octave

**Real-time frequency range:**

1/1 octave measurements: 0.063 Hz to 16 kHz bands

1/3 octave measurements: 0.08 Hz to 31.5 kHz bands

1/12 octave measurements: 0.997 Hz to 12.34 kHz live measurements, 0.997 Hz to 49.35 kHz for post-processed time capture

**Span:** 1 to 12 octaves—all modes

#### Option 1D2 Swept-Sine Measurements

**Sweep types:** Up, down, linear, log, manual

**Input ranging:** Fixed range, or auto-range during measurement

**Resolution:** Selectable frequency resolution during measurement

**Source level control:** Auto-level feature adjusts source level to maintain constant signal level at selected input channel.

#### Option 1D3 Curve Fit/Synthesis

20 pole, 20 zero multiple degree of freedom curve fit, auto-order selection, user-selected pole/zero location with fit: table format: polynomial, pole/zero, partial fraction expansion

### Ordering Information

	Price
<b>HP 35665A</b> Dynamic Signal Analyzer	\$13,250
<b>Opt 1D0</b> Computed Order Tracking Measurements	\$2,500
<b>Opt 1D1</b> Real-Time Octave Measurements	\$2,000
<b>Opt 1D2</b> Swept-Sine Measurement	\$1,000
<b>Opt 1D3</b> Curve Fit/Synthesis	\$2,000
<b>Opt 1D4</b> Arbitrary Waveform Source	\$500
<b>Opt 1C2</b> HP Instrument BASIC	\$500
<b>Opt 1C1</b> Add 2 MB Memory	\$1,250
<b>Opt ANA</b> Add 6 MB Memory	\$3,000
<b>Opt 1F0</b> U.S. PC-Style Keyboard (other selected local keyboards are available)	\$170