

FUNCTION GENERATORS & WAVEFORM SYNTHESIZERS

Synthesizer/Function Generator 1 μ Hz to 21 MHz

HP 3325B, 3326A

Test Equipment Depot www.testequipmentdepot.com
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- Fully synthesized microhertz resolution
- Functions—sine, square, triangle, ramps, arbs, dc offset
- Internal programmable modulation source
- Log, lin, discrete sweep
- Excellent signal purity
- dc to 60 MHz SYNC output



HP 3325B

DESIGNED FOR
MATE
SYSTEMS

HP 3325 Synthesizer/Function Generator

The HP 3325B is a 1 μ Hz to 21 MHz synthesizer/function generator with high performance, exceptional versatility and value. Testing is made fast and efficient in general purpose applications whether on the bench or in ATE systems.

Synthesizer Precision

HP 3325B frequency accuracy is determined by a precision frequency reference and can be set with a resolution of 1 μ Hz. It has up to -65 dBc harmonic and -70 dBc spurious levels for precision measurements. The phase of the output signal can be precisely controlled ± 719.9 deg with 0.1 deg resolution, and multiple HP 3325Bs can be locked together for multi-phase applications.

Function Generator Versatility

Precision squarewaves to 10,999,999 MHz have 20 ns rise times with synthesizer accuracy and precision. Triangle and ramp waveshapes are also available with .05 percent linearity up to 10,999,999 kHz. DC and phase offset can be added to these waveshapes. The modulation source can be used as an arbitrary function generator via HP-IB, providing user-defined waveshapes. These features make the HP 3325B one of the most versatile sources for bench or ATE system applications. Save-recall memory includes 10 nonvolatile memory locations for simple and rapid access to frequently used test setups.

Discrete Sweep

The enhanced feature set of the HP 3325B includes 100-segment discrete sweep capability which allows arbitrarily defined multi-segment linear or stepped sweeps and tone sequences. This complements its linear and log, phase continuous sweep capability.

Internal Modulation Source

A built-in programmable modulation source provides sine, square, and arbitrary waveshapes for internal amplitude or phase modulation, or for use as a second source. In addition, a rear panel sync output provides a TTL compatible dc to 60 MHz signal with 1 μ Hz resolution for use as a precision, high-resolution clock signal, and extended frequency coverage.

ATE Systems Compatibility

All functions, including frequency, amplitude, phase, modulation, sweep, and waveshapes, are programmable via HP-IB or RS-232 interface. The HP 3325B is fully compatible in form, fit, and function with the HP 3325A. All HP-IB programs written for the HP 3325A are fully compatible with the HP 3325B.

Specifications

Waveforms

Sine, square, triangle, negative, and positive ramps

Frequency

Range

Sine: 1 μ Hz to 20,999 999 999 MHz

Square: 1 μ Hz to 10,999 999 999 MHz

Triangle/ramps: 1 μ Hz to 10,999 999 999 kHz

Resolution: 1 μ Hz, < 100 kHz
1 mHz \geq 100 kHz

Accuracy: $\pm 5 \times 10^{-6}$, 20° to 30° C at time of calibration

Warm-up time: 20 minutes to within specified accuracy

Main signal output (all waveforms)

Impedance: 50 Ω

Connector: BNC; switchable to front or rear panel, nonswitchable with Option 002, except by internal cable change.

Amplitude

Range: 1 mV to 10 V_{p-p} in 8 amplitude ranges, 1-3-10 sequence (10 dB steps), into 50 Ω load

Function	Sine		Square		Triangle/Ramps	
	min	max	min	max	min	max
Units Displayed						
peak-peak rms	1.000 mV	10.00 V	1.000 mV	10.00 V	1.000 mV	10.00 V
dBm (50 Ω)	0.354 mV	3.536 V	0.500 mV	5.000 V	0.289 mV	2.887 V
	-56.02	+23.98	-53.01	+26.99	-57.78	+22.22

Resolution: 0.03% of full range or 0.01 dB (4 digits)

Amplitude accuracy

(without dc offset, relative to programmed amplitude and accuracy)

Sine wave amplitude accuracy

1 mHz to 100 kHz: ± 0.1 dB, ≥ 3 V_{pp}; ± 0.2 dB, < 3 V_{pp}

100 kHz to 20 MHz: ± 0.4 dB, ≥ 3 V_{pp}; ± 0.6 dB, 0.1 to 3 V_{pp}

Sine wave spectral purity

Phase noise: -60 dB for a 30 kHz band centered on a 20 MHz carrier (excluding ± 1 Hz about the carrier) with high-stability Option 001 installed.

Spurious: All non-harmonically related output signals will be more than 70 dB below the carrier (60 dB with dc offset) or less than -90 dBm, whichever is greater.

Sine wave harmonic distortion: Harmonically related signals will be less than the following levels (relative to the fundamental) at full output for each range:

0.1 Hz	50 kHz	200 kHz	2 MHz	15 MHz	20 MHz
-65 dB	-60 dB	-40 dB	-30 dB	-25 dB	

Square wave characteristics

Rise/fall time: ≤ 20 ns, 10% to 90% at full output

Overshoot: $\leq 5\%$ of peak-to-peak amplitude, at full output

Settling time: < 1 μ s to settle to within .05% of final value

DC offset

Range: dc only (no ac signal): 0 to ± 5.0 V/50 Ω

dc + ac: Maximum dc offset ± 4.5 V on highest range, decreasing to ± 4.5 mV on lowest range.

Resolution: 4 digits

Sine wave amplitude modulation

Modulation depth at full output for each range: 0 to 100%

Modulation frequency range: dc to 400 kHz (0 to 21 MHz carrier frequency)

Sensitivity: ± 5 V peak for 100% modulation

Sine wave phase modulation

Range: $\pm 850^\circ$, ± 5 V input

Modulation frequency range: dc - 5 kHz

FUNCTION GENERATORS & WAVEFORM SYNTHESIZERS

Two-Channel Synthesizer, DC to 13 MHz

HP 3325B, 3326A

495

Frequency sweep

Sweep time

Linear: 0.01 s to 1000s

Logarithmic: 1 s to 1000s single, 0.1 s to 1000s continuous

Discrete sweep

Number of segments: 100 maximum

Time/Segment: 0.01 s to 1000s, 0.01 s resolution

Maximum sweep width: Full frequency range of the main signal output for the waveform in use, except minimum log start frequency is 1 Hz.

Phase continuity: Sweep is phase continuous over the full frequency range of the main output.

Modulation source

Frequency range: Sine 0.1 Hz to 10 kHz, square 0.1 Hz to 2 kHz

Frequency accuracy: 0.1%, typical

Impedance: Drives 10 kΩ or greater load

Sinewave purity: -34 dBc or better, typical

Waveforms: Sine, square, arbitrary

Auxiliary inputs and outputs

Auxiliary frequency output: 21 MHz to 60.999 999 999 MHz, under range coverage to 19.000 000 001 MHz, frequency selection from front panel; 0 dBm; output impedance 50 Ω.

Sync output: Square wave with V (high) ≥ 1.2 V, V (low) ≥ 0.2 V into 50 Ω. Frequency range is the same as main signal for front panel sync and dc to 60 MHz for rear panel sync.

X-Axis drive: 0 to > +10 V dc linear ramp proportional to sweep frequency, linearity, 10-90%, ± 0.1% of final value

MATE/CIIL Compatibility

For MATE system applications, Option H05 provides internal CIIL compatibility.

Option 001 high stability frequency reference

Aging rate: ± 5 × 10⁻⁸/week (72 hr warm up); ± 1 × 10⁻⁷/month (after 15 days continuous operation).

Ambient stability: ± 5 × 10⁻⁸ (0° C to +55° C)

Warm-up time: Reference will be within ± 1 × 10⁻⁷ of final value 15 minutes after turn-on for an off time of less than 24 hours.

Option 002 high voltage output

Frequency range: 1 μHz to 1 MHz

Amplitude

Range: 4.00 mVpp to 40.00 Vpp (≥ 500 Ω, ≤ 500 pF load)

Accuracy: ± 2% of full output for each range at 2 kHz

Output impedance: < 2 Ω at dc, < 10 Ω at 1 MHz

dc offset range: 4 times the specified range of the standard instrument.

General

Operating environment

Temperature: 0° C to 55° C

Relative humidity: 95%, 0° C to 40° C

Altitude: ≤ 15,000 ft

Power: 100, 120, 220, 240 V, +5%, -10%, 48 to 66 Hz; 90 VA, 120 VA with all options; 10 VA standby

Weight: 9 kg (20 lb) net; 14.5 kg (32 lb) shipping

Size: 132.6 mm H × 425.5 mm W × 497.8 mm D (5.25 in × 16.75 in × 19.63 in)

Ordering Information*

HP 3325B Frequency Synthesizer	\$4,800 ☎
Opt 001: High Stability Frequency Reference	+ \$805
Opt 002: High Voltage Output	+ \$270
Opt H05: Internal MATE Programming	(call HP)
Opt W30: Extended Repair Service. See page 671.	+ \$115

*HP-IB cable not supplied.

☎ For off-the-shelf shipment, call 800-452-4844.



HP 3326A



HP 3326A Two-Channel Synthesizer

The HP 3326A Two-Channel Synthesizer combines two independent synthesizers, flexible modulation, and control circuitry into a single, powerful package. This instrument provides precise phase offset, two-tone sweep, fast frequency switching, internal amplitude and phase modulation, and pulse signals for bench or systems use.

With multiple channels and modes, the HP 3326A does the job of several sources. An internal switch selected signal combiner sums both source outputs into a single ultra-low IMD signal source. Phase continuous sweeps are available in linear and multielement discrete modes. DC offset is available in all modes, and all outputs are floating. Frequency resolution is 11 digits, with flexible triggering for frequency, amplitude, and phase changes and sweeps.

Specifications Summary

For complete specifications, refer to the HP 3326A data sheet.

Frequency (waveforms are sine, square, pulse, and dc)

Range: 0 Hz to 13 MHz

Resolution: 1 μHz below 100 kHz, 1 mHz at and above 100kHz.

Stability: ± 5x10⁻⁸/year, 20° C to 30° C

Output amplitude (sine mode)

Range: 1 mVpp to 10 Vpp in 8 ranges without DC offset

Accuracy: Relative to programmed value after self-calibration

	0.001 Hz	100 kHz	1 MHz	13 MHz
+23.98 dBm	±0.1 dB	±0.3 dB	±0.6 dB	±0.6 dB
+3.98 dBm	±0.2 dB	±0.5 dB	±0.8 dB	±0.8 dB
-36.02 dBm	±0.2 dB	±0.5 dB	±1.0 dB	±1.0 dB
-56.02 dBm				

Phase offset (channel A vs B in two-phase mode)

Range/Resolution: ± 720 degrees range, 0.01 degree resolution

Accuracy: After self-calibration, for equal-level sinewaves 1 V to 10

0.1 Hz	10 Hz	100 kHz	1 MHz	13 MHz
±0.5	±0.2	±0.3	±2.0	

Frequency sweep

Sweep types: Linear, discrete (2 to 63 discrete elements)

Sweep time: 5 ms to 1000 s, linear or per element

Option 001 High Stability Frequency Reference

Stability: ± 5 × 10⁻⁸/week after 72 hours continuous operation.

± 1 × 10⁻⁷/month after 15 days continuous operation.

Option 002 High Voltage Output

Frequency range: dc to 1 MHz

Amplitude range: 4 mV to 40 Vpp into > 1k Ω, < 200 pF load

dc offset: ± 20 V, independent of amplitude range. dc + ac peak must not exceed 20V

General

Power: 100, 120, 220, 240 V, +5%, -10%, 48 to 66 Hz; 290 VA max

Weight: Net, 2 kg (60 lb); shipping, 37 kg (81 lb)

Size: 177 mm H × 425.5 mm W × 497.8 mm D (7 in × 16 1/2 in × 19 1/2 in)

Ordering Information

HP 3326A Two-Channel Synthesizer	\$11,100
Opt 001 High Stability Frequency Reference	+ \$690
Opt 002 High Voltage Output	+ \$315
Opt 003 Rear Terminal Outputs (Rear only)	\$0
Opt W30 Extended Repair Service. See page 671.	+ \$250

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