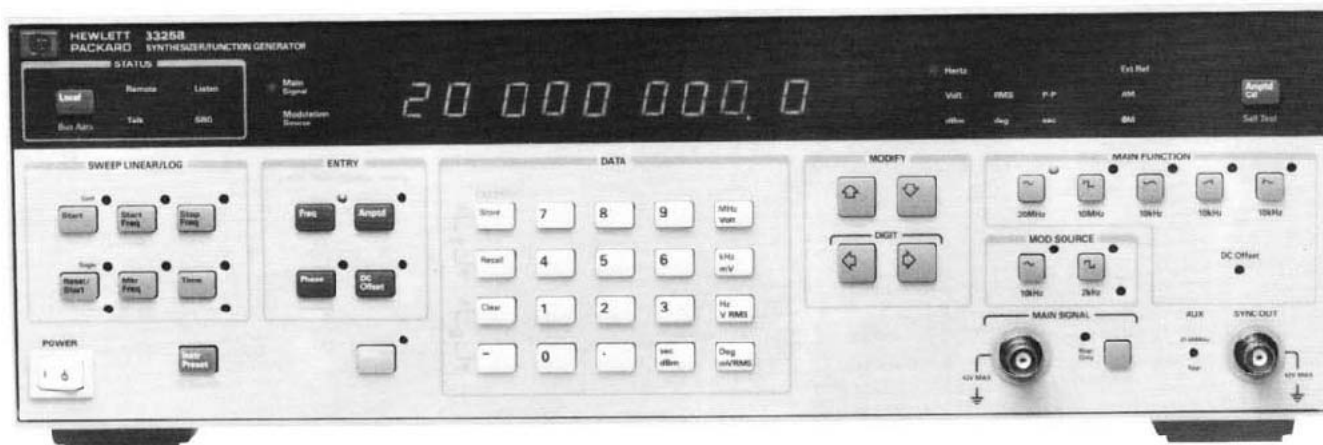


FREQUENCY, FUNCTION & WAVEFORM SYNTHESIZERS

1 μ Hz to 21 MHz Synthesizer/Function Generator

Model 3325B

- Synthesizer
- Function Generator
- Internal Modulation Source
- Log, Lin, Discrete Sweep
- Excellent Signal Purity
- HP-IB or RS232 Programmable



HP 3325B



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 3325B's can be locked together for multi-phase applications.

Function Generator Versatility

Precision squarewaves to 10.999,999 MHz have 20 ns risetimes with synthesizer accuracy and precision. Triangle and ramp waveshapes are also available with .05% 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 non-volatile 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 RS232 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. An isolated interface, combined with floating outputs and inputs assures trouble free operation in a systems environment. The main output can be switched to the rear panel by a simple front panel keystroke, or under program control for optimum systems configuration.

Easy to Maintain

General or specific self-tests can be initiated from the front panel or by remote control. Pass/fail indications and specific self-test status reports are provided on the display and through the remote interfaces. Elapsed time and instrument identification information is available from the HP 3325B's memory to determine when calibration is required.

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 Vp-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	1.000 mV	10.00 V	1.000 mV	10.00 V	1.000 mV	10.00 V
rms	0.354 mV	3.536 V	0.500 mV	5.000 V	0.289 mV	2.887 V
dBm (50 Ω)	-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)

Sinewave Amplitude Accuracy

1 MHz to 100 kHz: ±0.1 dB, ≥3 Vpp; ±0.2 dB, <3 Vpp
 100 kHz to 20 MHz: ±0.4 dB, ≥3 Vpp; ±0.6 dB, 0.1 to 3 Vpp

Squarewave Amplitude Accuracy

1 MHz to 100 kHz: 1%, ≥3 Vpp; 2.2%, <3 Vpp
 100 kHz to 10 MHz: 11.1%, ≥3 Vpp; 13.6%, <3 Vpp

Triangle Amplitude Accuracy

1 MHz to 2 kHz: 1.5%, ≥3 Vpp; 2.7%, <3 Vpp
 2 kHz to 10 kHz: 5%, ≥3 Vpp; 6.2%, <3 Vpp

Sinewave 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.

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

Frequency Range	Harmonic Level
0.1 Hz to 50 kHz	-65 dB
50 kHz to 200 kHz	-60 dB
200 kHz to 2 MHz	-40 dB
2 MHz to 15 MHz	-30 dB
15 MHz to 20 MHz	-25 dB

Squarewave Characteristics

Rise/fall time: ≤20 ns, 10% to 90% at full output
Overshoot: ≤5% of peak to peak amplitude, at full output
Settling time: <1 μs to settle to within .05% of final value.

Phase Offset

Range: ±719.9° with respect to arbitrary starting phase or assigned zero phase
Resolution: 0.1°
Accuracy: ±0.2°

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

Sinewave Amplitude Modulation

Modulation depth at full output for each range: 0-100%
Modulation frequency range: dc to 400 kHz (0-21 MHz carrier frequency)
Sensitivity: ±5 V peak for 100% modulation

Sinewave Phase Modulation

Range: ±850°, ±5 V input
Modulation frequency range: dc -5 kHz

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.
Amplitude Range: 0.1 Vp-p to 12 Vp-p.
Amplitude Accuracy: ±200 mV, typical.
Impedance: Drives 10 kOhm or greater load.
Sinewave Purity: -34 dBc or better, typical.
Waveforms: Sine, square, arbitrary.

Auxiliary Inputs and Outputs

Reference input: for phase-locking HP 3325A to an external frequency reference signal from 0 dBm to +20 dBm into 50 Ω. Reference signal must be a subharmonic of 10 MHz from 1 MHz to 10 MHz.

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 Ohm. 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.

1 MHz reference output: 0 dBm output for phase-locking additional instruments to the HP 3325B.

10 MHz oven output: 0 dBm internal high stability frequency reference output for phase-locking HP 3325B. (Opt. 001 only)

HP-IB Interface Functions: SH1, AH1, T6, L3, SR1, RL1, PP0, DC1, DT1, C0, E1.

Option 001 High Stability Frequency Reference

Aging rate: ± 5 × 10⁻⁸/week (72-h warm up); ± 1 × 10⁻⁷/month (after 15 days continuous operation).
Ambient stability: ± 5 × 10⁻⁸ (0° 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.
Flatness: ±10% relative to programmed amplitude
Sinewave distortion: harmonically related signals will be the same as the standard instrument to 1 MHz
Maximum output current: 20 mA pk.
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 H x 425.5 W x 497.8 mm D (5.25" x 16.75" x 19.63").

Ordering Information*

	Price
HP 3325B Frequency Synthesizer	\$4,590
Opt 001: High Stability Frequency Reference	\$765
Opt 002: High Voltage Output	\$255
Opt 907: Front Handle Kit (standalone orders P/N HP 5061-0089)	\$56
Opt 908: Rack Flange Kit (standalone orders P/N HP 5061-0077)	\$33
Opt 909: Rack Flange and Handle Combination Kit (standalone orders P/N HP 5061-0083)	\$82
Opt W30: Extended Warranty	\$170

*HP-IB cable not supplied. See page 561.
 Fast-Ship product—see page 766.