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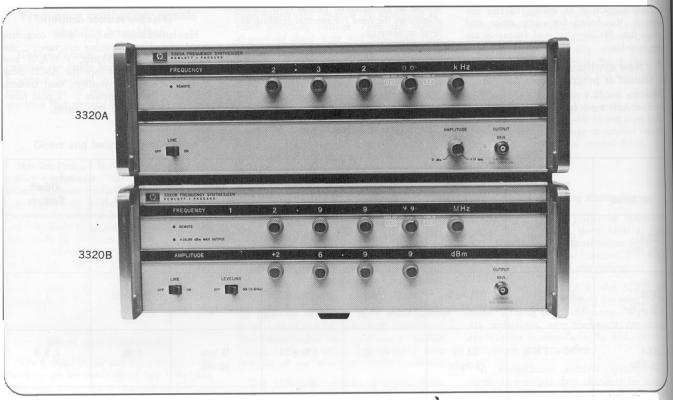
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FREQUENCY SYNTHESIZER

.01 Hz to 13 MHz frequency standard/test osc.

Models 3320A, 3320B



Description

The 3320A/B Frequency Synthesizer has the frequency accuracy, stability, and resolution demanded by many of today's exacting applications. The ease and flexibility of adding greater stability means the 3320A/B can be tailored to your needs as they emerge. Spectral purity and low signal-to-phase noise complement the frequency qualities of the 3320A/B.

The 3320B is more than a synthesizer. It offers precise level control, superior frequency response, low harmonic distortion and high power output.

Two choices of digital remote control afford great flexibility for today's system applications. High precision in both frequency and amplitude means that expensive system monitoring is unnecessary.

Frequency

The 3320A/B Frequency Synthesizer has a broad frequency range of 0.01 Hz to 13 MHz in seven frequency ranges.

Three digits plus a ten-turn two-digit continuous vernier, plus 30% overrange capability, gives the 3320A/B one part in 10^6 frequency resolution across its total frequency range.

Amplitude

The 3320A has a maximum one volt rms into 50 ohms output (+13 dBm) with a continuous +13 dBm to 0 dBm amplitude vernier.

The 3320B features a four-digit leveling loop with a 0.01 dB level resolution of a calibrated output from +26.99 dBm to −69.99 dBm (−73.00 dBm under remote control).

Frequency response of ±0.05 dB over the range of 10 Hz to 13 MHz, and level accuracy of ±0.05 dBm absolute at 10 kHz, complement the level capability of the 3320B.

Programmability/Remote Control

The 3320A/B is a versatile signal source. Digital remote control capability may be purchased installed in the instrument, or may be added later if the need arises.

The 3320A with its Option 003 allows parallel BCD remote control of frequency only. The first digit of the frequency vernier and the frequency range may be controlled digitally, as well as the main frequency digits.

The 3320B has two remote control options. Both options allow full control of all functions except the last vernier digit and the line switch. Option 004 is parallel BCD remote control capability. Option 007 is a unique bit-parallel/word-serial ASCII programming option. This option is advantageous where several 3320B's need to be controlled, since only one programming device is needed. The ASCII programming option has eight input lines, thus allowing direct interface to the HP 3260A Marked Card Programmer, photo reader, or any other eight-bit controller. This buss line programming means a saving of computer interface slots and a simplification of software.

Specifications, 3320A/B

Frequency range: 0.01 Hz to 13 MHz in 7 ranges.

Frequency ranges: 10 MHz, 1000 kHz, 100 kHz, 10 kHz, 1000 Hz; 100 Hz and 10 Hz (optional). 30% overrange on all ranges.

Frequency resolution:

Range	Vernier Out (local or remote)	Vernier In (local)	Vernier In (remote)
10 MHz	10 kHz	10 Hz	1 kHz
1000 kHz	1 kHz	1 Hz	100 Hz
100 kHz	100 Hz	0.1 Hz	10 Hz
10 kHz	10 Hz	0.01 Hz	1 Hz
1000 Hz	1 Hz	1 mHz	0.1 Hz
100 Hz	0.1 Hz	0.1 mHz	0.01 Hz
10 Hz	0.1 Hz	0.01 mHz	0.01 Hz

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Frequency **accuracy**
Vernier out: ±0.001% of setting for 6 mo, 0°C to 55°C.
Vernier in: ±0.01% of range for 6 mo, 0°C to 55°C.

Frequency **stability**
Long term: ±10 parts in 10^8 of setting per year (vernier out) with ambient temperature reference. Optional high stability crystal reference oven available (Option 002).
Signal-to-phase noise (integrated): >40 dB down in 30 kHz band, excluding ±1 Hz, centered on carrier. 10 MHz range, vernier out. Improves on lower frequency ranges.

Harmonic **distortion:** with output frequencies >0.1% of range at full output amplitude, any harmonically related signal will be less than the following levels.
—60 dB with output from 5 Hz to 100 kHz.
—50 dB with output from 100 kHz to 1 MHz.
—40 dB with output from 1 MHz to 13 MHz.

Spurious: >60 dB down.

Internal frequency standard: **20 MHz crystal.**

Phase **locking:** the 3320A/B may be phase locked with a 200 mV to 2 V rms signal that is any subharmonic of 20 MHz.

Rear **panel output:** front or rear panel output is standard.

Auxiliary outputs
Tracking **outputs:** 20 MHz to 33 MHz offset signal. >100 mV rms/50Ω.
1 **MHz reference output:** 220 mV rms/50Ω (> dBm/50Ω).
Low **level output:** same frequency as main output but remains between 50 mV rms and 158 mV rms (into 50Ω) depending on main output level setting.

3320A Amplitude **Section**
Amplitude: maximum 1 v rms ±10% into 50Ω.
Amplitude **range:** 0 dBm to +13 dBm range through ¾ turn front panel control (not programmable).
Frequency response: ±2 dB over total range.
Output impedance: 50Ω (75Ω, Option 001).

3320B Amplitude Section
Amplitude **range:** +26.99 dBm (½ watt) to —69.99 dBm -73.00 dBm under remote control) into 50Ω. (+26.99 dBm = 5 V rms into 50Ω).
Amplitude **resolution:** 0.01 dB.
Frequency **response (10 kHz reference):**

dB	10 Hz	13 MHz	
±0.5 dB	±0.05 dB		+26.99 dBm
	±0.1 dB		– 3.00 dBm
	±0.2 dB		–23.00 dBm
	±0.4 dB		–53.00 dBm
			–73.00 dBm

Amplitude **accuracy (absolute):** +26.99 dBm, ±0.05 dB at 10 kHz and (20°C to 30°C).
Output **impedance:** 50Ω (75Ω, Option 001).

Options

Option 001 **(3320A/B) 75 ohm**
Amplitude **range (3320B only):** +24.99 dBm to —69.99 dBm (—75.00 dBm under remote control) into 75Ω.

Option 002 **(3320A/B) crystal oven***
5 MHz crystal in temperature stabilized oven.
Long term **stability:** ±1 part in 10^8/day; ±1 part in 10^7/mo.
Frequency **accuracy:** ±1 part in 10^7 of setting per mo. For field installation order accessory kit HP 11237A.

Option 003 (3320A only) **BCD remote control***
Allows digital remote control of frequency only on 3320A. The most significant digit of the vernier may be programmed, thus giving four **digits**, plus 30% overrange, control of frequency in seven **ranges** (two are optional).

Frequency switching and settling time: ±0.1% or range, 15 ms; ±0.001% of range, 60 ms.
For field installation order accessory kit HP 11238A.

Option 004 (3320B only) BCD remote control*
Allows digital remote control of frequency and amplitude. **Four digits of frequency, overrange, frequency range, Vernier In/Out, four digits of amplitude, and leveling loop response times are all controlled digitally.
Frequency switching and settling time: ±0.01% of range, 15 ms; ±0.001% of range, 60 ms.
Amplitude switching and setting time: <1.5 s to rated accuracy.

Option 007* (3320B only) ASCII remote control
Allows bit-parallel word-serial remote control of all functions. **A 3320B with this option will recognize an address and then accept instructions in a serial fashion. Instructions are a seven-bit parallel ASCII code. Due to the addressing feature, up to ten 3320B's (with this option) may be programmed from one programmer. The HP 3260A Marked Card Programmer may be used as a programmer for this option.
This option requires eight digital input lines for full control. **Seven of the eight are programming input lines and one is a data command line.
Full digital isolation is standard with this option.
Logic Level Requirements for all Digital Remote Control Options.

State	Requirements
"Low" (logical "1")	0 V to 0.4 V (5 mA max.) or contact closure to ground through <80 ohms.
"High" (logical "0")	+2.4 V to +5 V or removal of contact closure to ground.

Option 005 (3320A/B) 100 Hz, 10 Hz Ranges*
Adds two lower frequency range, 100.0 Hz and 10.00 Hz, yielding greater resolution for low frequency outputs (see resolution section of specifications). These two ranges are fully programmable if digital remote options are installed.
For field installation, order accessory kit HP 11240A.

General 3320A/B

Operating temperature: 0°C to 55°C.
Storage temperature: —40°C to +70°C.
Power requirements: 115 V or 230 V ±10%, 48 Hz to 63 Hz, 110 VA max, (400 Hz operation on special basis).
Weight
3320A: 32 lbs (14,4 kg); shipping, 47 lbs (21,3 kg).
3320B: 34 lbs (15,4 kg); shipping, 49 lbs (22,2 kg).
Dimensions: 16¾″ wide, 19⅜″ deep, 5-7/32″ high (425 x 491,5 x 132,6 mm).
Accessories furnished: rack mounting kit.
Prices: HP 3320A, $1900: Option 001, 75Ω output, N.C.; Option 002, crystal oven, add $290; Option 003, BCD remote control, add $300; Option 006, 100 Hz/10 Hz ranges, add $200.
HP 3320B, $2550: Option 001 75Ω output, Option 002, crystal oven, add $290; Option 004, BCD remote control, add $400; Option 006, 100 Hz/10 Hz ranges, add $200; Option 007, ASCII remote control, add $595.
Kit for interfacing to Hewlett-Packard 2100 Series computers. HP 11232A for interfacing 3320B Option 007.
Useful accessories
HP 11048C, 50Ω feedthrough, $15; HP 11094B, 75Ω feedthrough, $15; HP 3260A Marked Card Programmer allows the 3320B with ASCII remote to be easily programmed by a punched or marked card.

*Field installable
**Except last vernier digit and line switch.

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