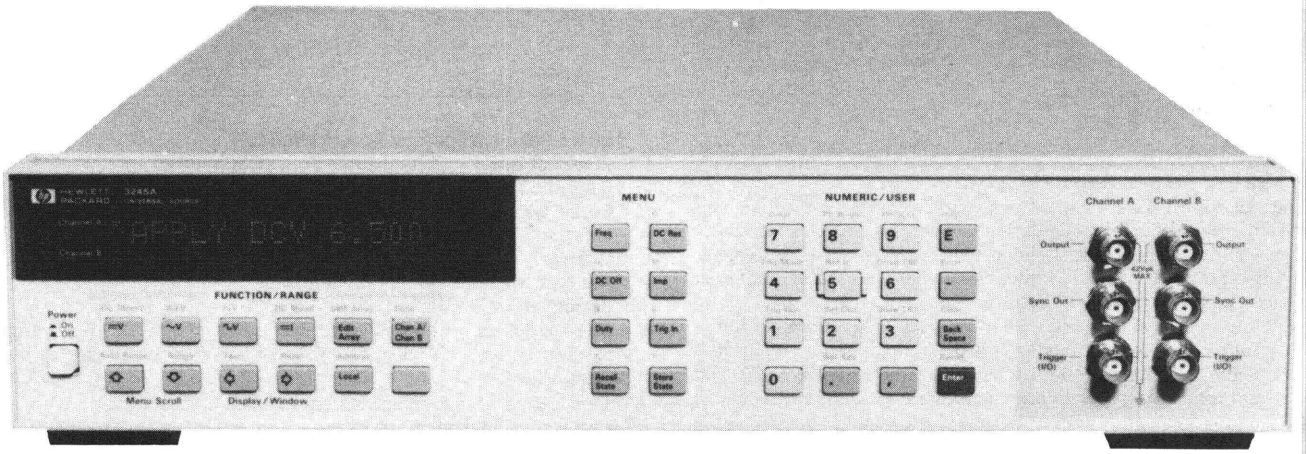
FREQUENCY, FUNCTION & WAVEFORM SYNTHESIZERS

Universal Source

HP 3245A

- **Precision DC Outputs with 6 1/2 Digits of Resolution**
- **Synthesized AC With 0.4% Amplitude Accuracy**
- **Sine, Square,** Triangle, and ARB to 1 MHz
- **Ramp and Pulse** to 100 KHz
- **Floating Outputs**
- Non volatile **storage** of up to 14 setups
- Second Channel Output Available
- Phase Continuous Frequency Changes
- **Optional Software** for Waveform Modification
- **Downloadable** Subroutines



Model 3245A

DESIGNED FOR HP-IB SYSTEMS

Description

The HP 3245A Universal Source offers a unique mix of precision DC capabilities with versatile AC performance, including arbitrary waveform generation. This versatility can be put to advantage on the bench, where the HP 3245A may well be all the source you will ever need. The HP 3245A can also fit into your Computer Aided Test System, providing the capabilities of AC, DC, and second channel options in a single 3.5" tall instrument.

Precision DC

The HP 3245A provides precision DC outputs of both voltage and current. In the high-resolution mode, you get 24-bit resolution with 60 ppm, 90-day accuracy. The low-resolution mode provides 12-bit resolution with 100 usec settling times. This type of precision means you can use the HP 3245A to test A/D converters, Voltage to Frequency converters, VCO's, transducers, and anywhere that a highly accurate DC voltage or current is required. There are two output ranges in the high resolution mode; ±1 volt and ±10 volts. In the low resolution mode, there are 7 ranges. In current, there are four ranges of output, from 0.1 mA to 100 mA. Output impedance is selectable as either zero ohms or 50 ohms.

Accurate AC

The HP 3245A can generate AC voltage outputs, including sine, triangle, and square waves, at frequencies of up to 1 MHz. Variable duty-cycle pulse and ramp outputs can be generated at up to 100 kHz. In the AC mode, the HP 3245A can make phase continuous frequency changes "on-the-fly". AH AC waveforms are synthesized, and have 0.001 Hz resolution and 50 ppm frequency accuracy. 90-day amplitude accuracy for Sine, Ramp, and ARB is 0.35% of output + 0.41% of range.

Second Channel Option

The addition of a second channel allows for the generation of two waveforms, either independent, or phase related to one another. The second channel output can be phase synchronized to the first channel, or to an external input. Such capabilities are especially useful if you are doing modem testing, tone sequence generation, DTMF generation, or FSK generation, or anywhere where two outputs are required.

Arbitrary Waveform

The HP 3245A offers arbitrary waveform operation at a full 1 MHz bandwidth. This is acomplished by a sampling technique whereby the values loaded into RAM are sampled at approximately 4.3 MHz and then run through a 1.25 MHz 5-pole low-pass filter. This allows full 1 MHz rep rate while maintaining 0.001 Hz resolution at any frequency. The HP 3245A can also store multiple arrays that can be accessed for arbitrary waveform generation. Array depth is 2048 bytes.

Waveform Generation Software

A powerful software package, useful for creating specialized waveforms, is available as an option to the HP 3245A. This menu driven software facilitates the capture of a waveform using a seperate hardware digitizer, such as the HP 3458A. The waveform can then be modified, if desired. The waveform can then be played back via the HP 3245A. The use of a graphics tablet makes the modifying of waveforms especially easy. The software also contains a library of standard waveforms which can be used as is, or mixed with other waveforms to generate complex outputs.

System Operation

The HP 3245A includes features that make it especially powerful in system applications. Because it contains many BASIC-like constructs, such as IF .. THEN and FOR .. NEXT, it is possible to have the HP 3245A do much of the work that normally would require intervention from the host computer. Now, subroutines can be downloaded to the HP 3245A, which can then run stand-alone, minimizing host computer interaction. Built in math capabilities add to the power of the HP 3245A. Electronic calibration is both easy and accurate, and does not require that the instrument be removed from a rack or opened up to perform a calibration.

All the above features combine to make the HP 3245A a truly universal source, combining precision DC outputs, accurate AC waveforms, and arbitrary waveform capabilities, all in a single instrument.

DC Volts Output

High Resolution Mode

Range	0 ΩMode Resolution	50 ΩMode Resolution
1V	1 μV	.5 μV
10V	10 μV	5 μV

Low Resolution Mode

Range	0 ΩMode Resolution	50 ΩMode Resolution
.078125V	—	40 μV
.15625V	79 μV	79 μV
.3125V	157 μV	157 μV
.625V	313 μV	313 μV
1.25V	625 μV	625 μV
2.5V	1250 μV	1250 μV
5V	2.5 μV	2.5 mV
10V	5.0 mV	—

Current Compliance: 100 mA on all ranges
Settling Time (Delay 0):
High Resolution Mode:
.1%of step:20mSEC
.001% of step:40mSEC
(1 SEC if function changed)
Low Resolution Mode:
.1% of step (0 Mode): 100 *μSEC*
(50 Mode): 25 *μSEC*
.5% of step (50 Mode): 5 μSEC
Overshoot:
High Resolution Mode: <5% of step + .15% of range
Low Resolution Mode: <30% of step + 2% of range

DC (< 10 Hz noise): ± (% of programmed output + volts), impedance mode, > 1Mohm load. Tcal is the temperature of calibration from 18°C to 28°C. One hour warm-up.

24 Hour: Tcal ±1C

Range	High Resolution Mode	Low Resolution Mode
10 V	0.0007% + 85 μV	0.09% of Output + 0.02% of range
1 V	0.0008% + 15 μV	(for all ranges)

90 DAY: Tcal ±5°C

High Resolution Mode		Low Resolution Mode	
Range	Accuracy	Range	Accuracy
10V	.0038% + 180 μV	10V	.17% + 37mV
1V	.0042% + 31 μV	5V	.17% + 19mV
		2.5V	.17% + 9.2mV
		1.25V	.17% + 4.6mV
		.625V	.17% + 2.5mV
		.3125V	.17% + 1.3mV
		.15625V	.17% + .73mV

DC Current Output

Resolution

Range	High Resolution	Low Resolution
0.1mA	0.1nA	50nA
1mA	1nA	500nA
10mA	10nA	5μA
100mA	100nA	50μA

90 DAY: Tcal ±5C. After one hour warm-up.

High Resolution Mode		Low Resolution Mode	
Range	Accuracy	Range	Accuracy
100mA	.0202% + 3.3 μA	100mA	.32% + 400 μA
10mA	.0074% + 220 nA	10mA	.30% + 52 μA
1mA	.0052% + 20 nA	1mA	.25% + 3.8 μA
0.1mA	.0052% + 3.3 nA	0.1mA	.25% + .38 μA

AC Volts Output Characteristics (sine, square, ramp, arbitrary)
Frequency Range:
0 to 1 MHz for sine, arbitrary and square (at 50% duty cycle)
0 to 100 kHz for ramp
0 to 100 kHz for square w/Duty cycle not equal to 50%

Amplitude and/or Offset Resolution:

Range (Peak-Peak)	50 ΩMode Resolution	0 ΩMode Resolution
.15625V	79 μV	—
.3125V	157 μV	157 μV
.625V	313 μV	313 μV
1.25V	625 μV	625 μV
2.5V	1250 μV	1250 μV
5V	2.5 mV	2.5 mV
10V	5.0 mV	5.0 mV
20V	—	10.0 mV

Amplitude can be set from 10% to 100% of range.

AC Amplitude Accuracy (Sine, Ramp, Arbitrary)
24 Hour: Tcal ± 1C 0.16% of output + .25% of range
90 Day: Tcal ±5C 0.29% of output + .36% of range

Sinewave Characteristics (50 Mode):

Frequency	Harmonic and Spurious Levels (ampl ≥50%) of range)*	THD (ampl ≥ 50% of range)	Flatness in reference to 1 kHz
<3kHz	< – 62 dB	< – 56 dB	.07 dB
to 10 kHz	< – 62 dB	< – 50 dB	.07 dB
to 30 kHz	< – 55 dB	< – 48 dB	.07 dB
to 100 kHz	< – 46 dB	< – 46 dB	.20 dB
to 300 kHz	< – 40 dB	—	.60 dB
to 1 MHz	< – 40 dB	—	2.00 dB

*additional fixed spurious response >4MHz: 500 μVrms

Squarewave Characteristics (50 Mode):
risetime: <250 nSEC, 10% to 90%
settling time: < 1 *μSEC* to 1% of amplitude
overshoot: < 5% of peak-to-peak amplitude
duty cycle range: 5% to 95%, 0 to 100 kHz
50% above 100 kHz
duty cycle accuracy: ±(0.8% of period + 120nSEC)
Frequency Resolution: .001 Hz
Frequency Accuracy: ±50 ppm, 18 to **28 C**
Frequency Temperature Coefficient: ±1 ppm/C
Phase Offset:
Range: —360 to +360 degrees
Resolution: < .001 degrees
Ramp Linearity to 1 kHz (50 Mode):
.3% of p-p value measured @ 50% duty cycle from 10% to 90% point
Ramp Duty Cycle Range: 5% to 95% with < .1% resolution)

Ordering Information	Price
HP 3245A Universal Source	$4200
Option 001 Second Channel Output	$2500
Option 005 Waveform Generation Software	$400
Option 907 Front Handle Kit	**$51**
Option 908 Rack Flange Kit	**$31**
Option 909 Rack flange and Handle Combination Kit	$73
Option W30 Extended Warranty	$126