

ELECTRONIC COUNTERS

Our Highest Performance Universal Systems Counter (cont'd)

Model 5335A

Trigger Level

Range: $\times 1$, +5 to -5 V; $\times 10$, +50 to -50 V.

Resolution: $\times 1$, 10 mV; $\times 10$, 100 mV.

Accuracy ($\times 1$): ± 20 mV, $\pm 0.5\%$ of reading.

Time Base

Standard Crystal

Frequency: 10 MHz.

Aging rate: $< 3 \times 10^{-7}$ /month.

Temperature: $< 4 \times 10^{-6}$, 0 to 50°C.

Line voltage: $< 1 \times 10^{-7}$ for 10% change.

High stability crystal: see Option 010.

External time base input: rear panel BNC accepts 5 or 10 MHz, 200 mV rms into 1 k Ω ; 5 V rms maximum.

Time base out: 10 MHz, > 1 V p-p into 50 Ω via rear panel.

Statistics

Sample size: selectable between either $n = 100$ or $n = 1,000$ samples.

Std. dev.: displays a standard deviation of selected sample size.

Mean: displays mean estimate of selected sample size.

Smooth: performs a weighted running average and truncates unstable least significant digits from display.

Math

All measurement functions, with exception of GATE TIME, Totalize in Scale Mode, and TRIG LVL, may be operated upon by Math functions. Offset, Normalize, and Scale may be used independently or together as follows:

$$\text{Display} = \frac{\text{Measurement} + \text{Offset}}{\text{Normalize}} \times \text{Scale.}$$

Number value range: $\pm 1 \times 10^{-9}$ to $\pm 9 \times 10^9$.

Last display: causes value of previous display to Offset (negative value), Normalize, or Scale all subsequent measurements.

Measurement t-1: causes each new measurement to be Offset (negative value), Normalized, or Scaled by each immediately preceding measurement.

Hewlett-Packard Interface Bus

Programmable controls: all measurement functions, Math, Statistics, Reset, Range Hold, Ext. Arm Enable/Slope, Check, Gate Adj. (~ 1 ms to 1 s), Gate Open/Close (gate times to ∞), Gate Mode, Cycle, Preset, Slope, Common A, Auto Trigger.

Special functions: FREQ B, PULSE B, TIME B \rightarrow A, TOT A-B, LEARN, MIN, MAX, all internal diagnostic routines.

Interface functions: SH1, AH1, TS, TEQ, L4, SL1, RL1, PP0, DC1, DT1, C0, E1 (see page 542).

Data output: fixed output format consisting of 19 characters plus CR and LF output is typically 8 ms.

Option 040: adds complete systems programmability; see column at right.

General

Gate: minimum, manual, or continuously variable (NORM/FAST) via Gate Adj. control.

NORM: 20 ms to 4 s NOMINAL.

FAST: 100 μ s to 20 ms NOMINAL.

MIN: minimum gate time. Actual time depends on function.

MANUAL: each press opens or closes gate.

Cycle: determines delay between measurements.

NORM: no more than 4 readings per second, nominal.

MIN: updates display as rapidly as possible (~ 15 readings per second, depending on function).

SINGLE: one measurement taken with each press of button.

Arming: Ext. Arm Enable key allows rear panel input to determine Start and/or Stop point of a measurement. External gate defined by both Start and Stop armed. All measurements are armable except Manual Totalize, Phase, and Trigger Level.

Start arm: + or - slope of arm input signal starts measurement.

Stop arm: + or - slope of arm input signal stops measurement. When used, Start Arm must occur before Stop Arm.

Ext. arm input: rear panel BNC accepts TTL into 20 k Ω . Minimum Start To Stop Time: 200 ns.

Trigger level out: dc output into 1 M Ω via rear panel BNCs for Channel A and B; not adjusted for attenuators.

Accuracy at dc ($\times 1$): ± 15 mV $\pm 0.5\%$ of TRIG LVL reading.

Gate out: TTL level into 50 Ω ; goes low when gate open; rear panel BNC.

Range hold: freezes decimal point and exponent of display.

Reset: starts a new measurement cycle when pressed.

Check: performs internal self test and lamp test.

Display: 12-digit LED display in engineering format; exponent range of +18 to -18.

Operating temperature: 0 to 50°C.

Power requirements: 100, 120, 220, 240 VAC (+5%, -10%), 48-66 Hz; 130 VA max.

Weight: net, 8.8 kg (19 lb 8 oz). Shipping, 13.6 kg (30 lb).

Dimensions: 425.5 mm W x 132.6 mm H x 345.4 mm D (16 $\frac{1}{4}$ in. x 5 $\frac{1}{4}$ in. x 13 $\frac{1}{2}$ in.), not including removable handles.

Options

Option 010: High Stability Time Base (oven)

Frequency: 10 MHz.

Aging rate: $< 5 \times 10^{-10}$ /day after 24-hour warm up.

Short term: $< 1 \times 10^{-10}$ rms for 1s average.

Temperature: $< 7 \times 10^{-9}$, 0 to 50°C.

Line voltage: $< 1 \times 10^{-10}$ for 10% change.

Warm-up: within 5×10^{-9} of final value in 20 minutes.

Option 020: DC Digital Voltmeter

Range: 4 digits, autoranging, autopolarity, in ± 10 , ± 100 , ± 1000 V ranges.

Sensitivity: 100 μ V, 1 mV, 10 mV, 100 mV for ± 1 V, ± 10 V, ± 100 V, ± 1000 V readings.

LSD displayed: same as sensitivity.

Input type: floating pair.

Input impedance: 10 M Ω $\pm 1\%$.

Option 030: 1.3 GHz C Channel

Input Characteristics

Range: 150 MHz to 1.3 GHz.

Sensitivity: 10 mV rms sinewave (-27 dBm) to 1 GHz. 100 mV rms sinewave (-7 dBm) to 1.3 GHz.

Frequency C

Range: 150 MHz to 1.3 GHz, prescaled by 20. LSD Displayed, Resolution, and Accuracy are same as Frequency A.

Ratio C/A

Range: channel A, 0 to 200 MHz.
channel C, 150 to 1300 MHz.

Option 040: Complete Systems Programmability

Adds remote selection of low pass filter, ac/dc coupling, $\times 1$ - $\times 10$ attenuation, dc trigger level and input impedance for both Channel A and B.

Definitions

Duty cycle: percentage of time a signal is high or low, depending on Slope A setting. Trigger point is high/low dividing point.

$$\text{DUTY CY} = \frac{\text{PULSE}}{\text{PER}} \times 100\%.$$

Slew rate: effective slope between 10% and 90% points of rising or falling signal depending on Slope A setting.

$$\text{SLEW} = \frac{V_B - V_A}{T_I}$$

Phase: angle, with respect to B signal, between 50% points of channel A and B signals, trigger slopes selected by Channel A and B slope switches.

$$\text{PHASE} = \frac{(T_{I1} + T_{I2}) 360^\circ}{2 \text{ PER}}$$

T_{I1} is time between 50% points of A then B signals using slopes defined during Phase measurement.

T_{I2} is time between 50% points of A then B signals using complement slopes to T_{I1} .

Front handles: supplied with instrument.

Ordering Information

HP 5335A Universal Counter

Opt 010 Oven Oscillator

Opt 020 DVM

Opt 030 C Channel

Opt 040 Expanded HP-IB Control

Opt 908 Rack Flange Kit for use without handles.

Opt 913 Rack Flange Kit for use with supplied front handles.

Price

\$4000

+ \$800

+ \$550

+ \$800

+ \$750

+ \$32

+ \$65