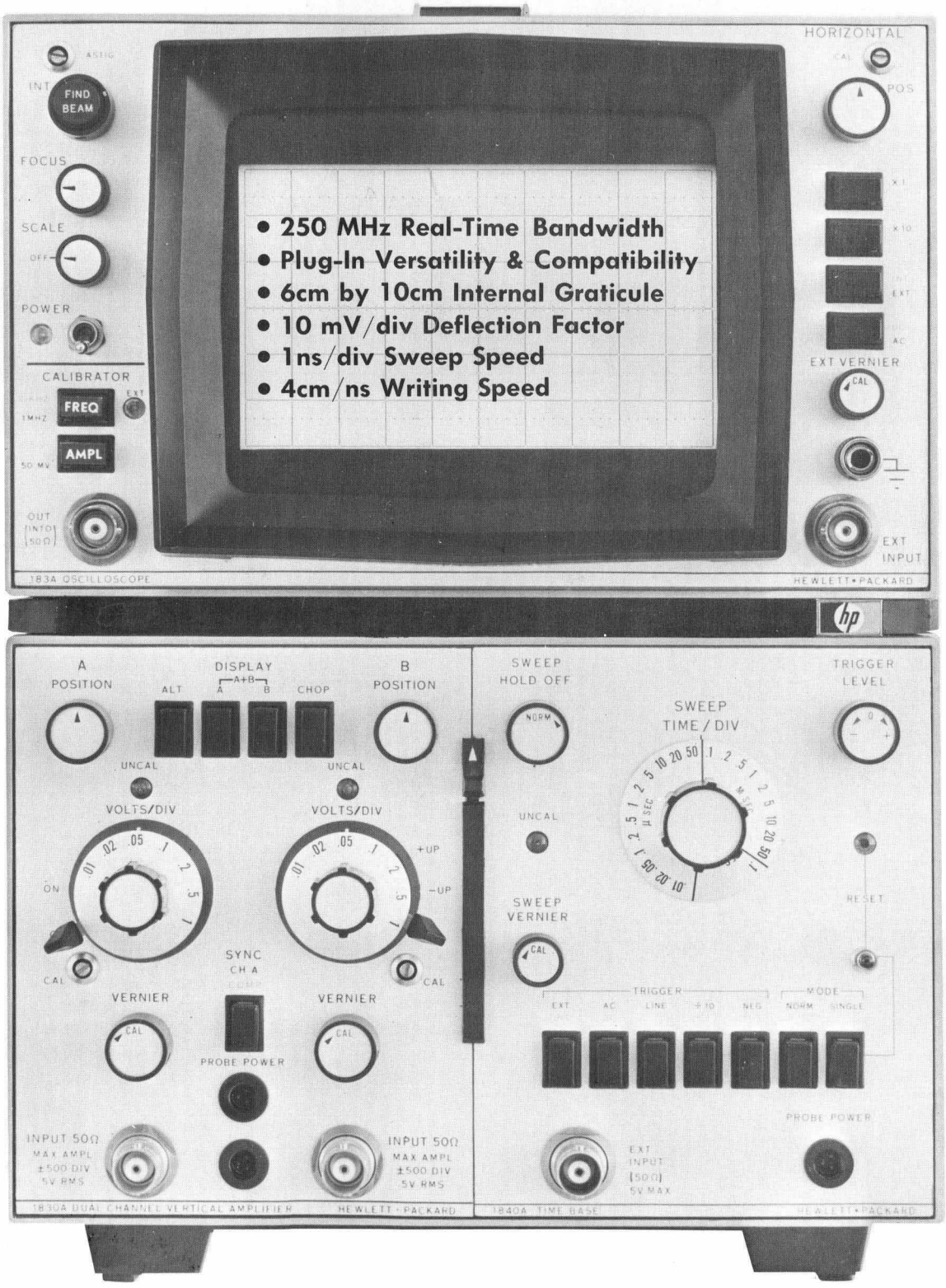
HEWLETT hp PACKARD

OSCILLOSCOPE SYSTEMS

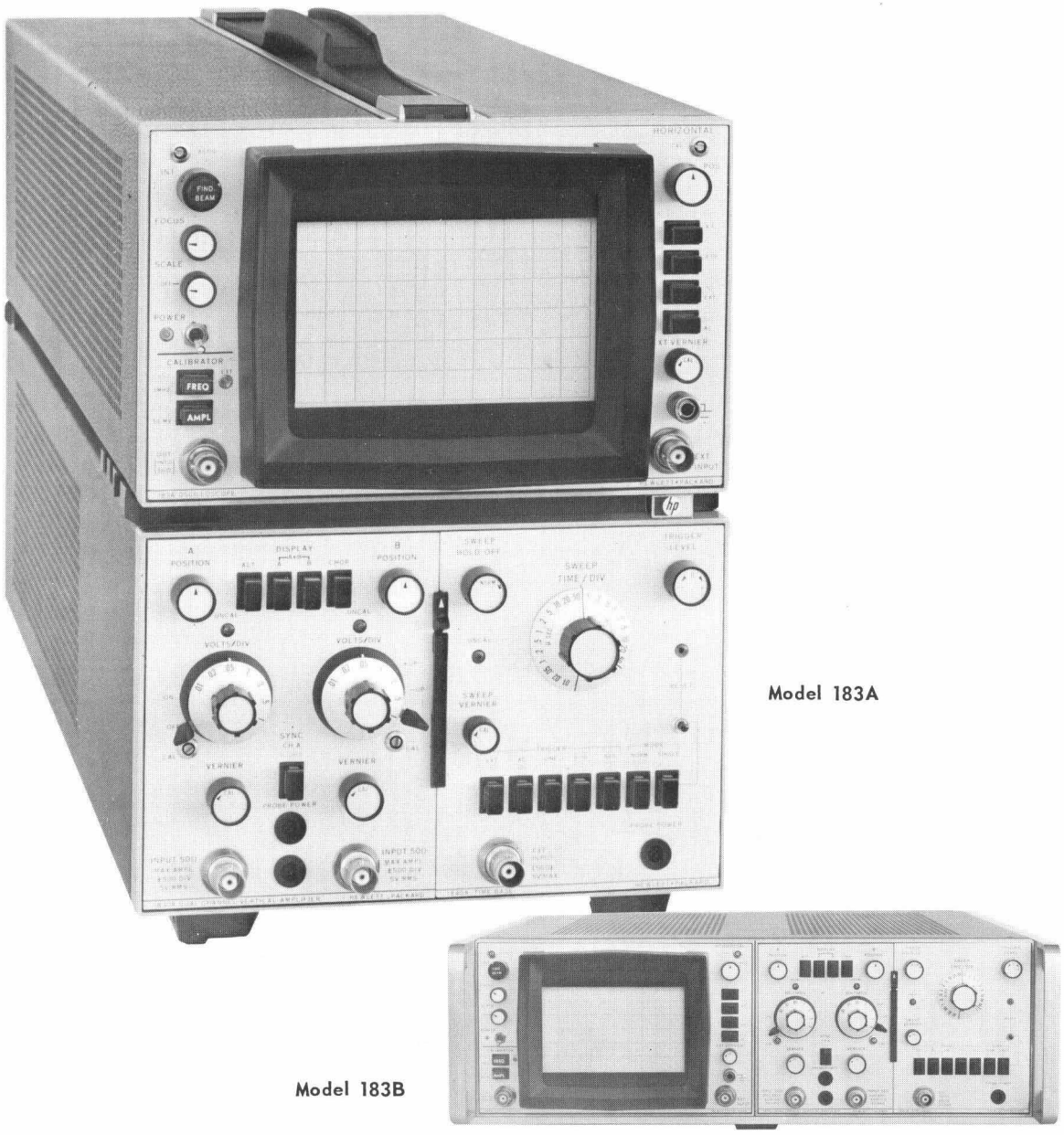
250 MHz PLUG-IN OSCILLOSCOPE

Models
183A/B Mainframe
1830A Plug-in
1840A Plug-in
180 System

TECHNICAL DATA 15 JAN 70



For more information, call your local HP Sales Office or East(201) 265-5000 . Midwest (312) 677-0400 . South (404) 436-6181
West (213) 877-1282. Or, write: Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. In Europe, 1217 Meyrin-Geneva



DESCRIPTION

A new member of the Hewlett-Packard 180 series Oscilloscope family, Model 183A/B with 1830A and 1840A plug--ins, brings you realtime frequency response from dc to 250 MHz with the same operating ease, serviceability, and plug-in versatility found in the 180 series. Now you can make repetitive and single-shot realtime measurements that were previously possible only with sampling Oscilloscopes or special purose low-sensitivity scopes designed for display of single-shot transients.

Fast risetimes are necessary when viewing digital words or groups of short-duration, fast-rise pulses from computers and high-speed digital systems. When a word rate is too slow for sampling scope display, this realtime scope clearly displays every word bit. The 250 MHz response also makes possible distortion free RF carrier modulation envelope displays.

High frequency performance and fast risetime (<1.5 ns), are essential when photographing fast, single-shot signals, as in nuclear and high-energy experiments. As an aid in capturing single-shot signals, Model 183 CRT has an internal pulsed flood-gun that illuminates the phosphor to increase film sensitivity. The pulsed flood-gun increases single-shot photographic writing speed (4 cm/ns*) and provides a neutral gray background with a well defined black CRT graticule. The CRT potential of 20 kV gives you the fast writing speed necessary for high frequency real time displays.

The 183A/B is a new generation laboratory oscilloscope mainframe, which will operate beyond 500 MHz. The 1830A vertical amplifier allows you to measure from dc to 250 MHz. As the integrated circuit state-of-the-art increases, you will only need a new vertical amplifier plug-in for wider bandwidth — not a new mainframe. The 183 distributed deflection plate CRT has a deflection factor of 3 V/cm which is compatible with solid-state circuits. The calibrator has a completely specified output that allows you to validate both vertical and horizontal plug-in performance.

High-frequency performance is obtained without restricting other general purpose applications. The mainframe works with all 1800 series plug-ins (minor modification is required because of different CRT capacitance of the 180 and 181 Oscilloscopes). These include: a 4 channel 50 MHz amplifier, dc offset plug-in, delaying sweep time base, and a 12.4 GHz sampling and time-domain reflectometer plug-ins.

With the present 1830A vertical amplifier plug-in, the Model 183A/B is a 250 MHz bandwidth dual-trace instrument that clearly displays, on a 6 cm by 10 cm internal graticule, two input signals in single, alternate, or chopped (time shared) modes. The plug-in input has a 50 ohm impedance that terminates a 50 ohm system and keeps VSWR to a minimum. This 50 ohm system provides a constant load impedance, and allows direct probing of high frequency signals with minimum signal degradation from capacitive loading. If higher probe resistances are desired, passive resistive-divider probes (Model 10020A) with a slight capacitive increase (0.7 pF) are available. Or, the 1:1, 500 MHz bandwidth, active probe Model 1120A, translates the 50 ohm input impedance to 100 k ohm/3 pF at the probe tip (<1 pF at ÷ 10).

The Model 1840 Time Base sweep circuits trigger reliably to 250 MHz by synchronizing signals which are generated in the 1830A. External input signals of 20 mV peak-to-peak will trigger Model 1840A to 250 MHz, increasing to 500 MHz triggering with 50 mV peak-to-peak signals. The time base provides sweep speeds of 0.01 μs/div and by using the mainframe X10 multiplier sweep speed increases to 1 ns/div.

*With 10,000 ASA films, P31 phosphor, f/1.3 lens, 1:0.5 object to image ratio, and pulsed flood gun fogging.

SPECIFICATIONS, 183A/B

CATHODE-RAY TUBE AND CONTROLS

TYPE: post accelerator, 20 kV accelerating potential; aluminized P31 phosphor (other phosphors available, see options); safety glass faceplate.

GRATICULE: 6 x 10 division parallax-free internal graticule. 0.2 division subdivisions on major axes. 1 div = 1 cm. SCALE control adjusts flood gun that illuminates CRT phosphor for viewing with a hood and controls the pulsed flood gun that increases photographic writing speed. Normal or pulsed mode flood gun operation selected by rear panel switch.

BEAM FINDER: returns trace to CRT screen regardless of horizontal or vertical position control settings, which allows easy positioning of off-screen traces.

INTENSITY MODULATION: approximately +2 V, dc to 15 MHz; blanks trace of normal intensity. Input R, 4.7 k ohms. (+15 V blanks any intensity trace.)

CALIBRATOR

PULSE TIMING: (±0.5% 10°C to 40°C, ±1.0% 0°C to +55°C).

Mode 1: Rep-rate; 2 kHz (0.5 ms period), Pulse Width; 50 μs.

Mode 2: Rep-rate; 1 MHz (1 μs period), Pulse Width; 100 ns.

AMPLITUDE: selectable 50 mV and 500 mV, ±1% into 50±0.5% ohms.

SOURCE IMPEDANCE: 50 ohms.

PULSE SHAPE: (measured with 1 GHz bandwidth).

Risetime (Neg): <1 ns.

Overshoot and Ringing: ±3% max.

Flatness (pulse top & baseline with perturbations averaged): ±0.5% after 5 ns.

EXTERNAL CALIBRATOR INPUT: rear panel input selectable with rear panel switch. Front panel light indicates when switch is in EXT position. The calibrator shaper network shapes an external negative Input which exceeds —0.5 V peak. Rep-rate dc to 10 MHz. Input impedance approximately 10 k ohms.

HORIZONTAL AMPLIFIER

BANDWIDTH: dc-coupled; dc to 8 MHz. ac-coupled; 2 Hz to 8 MHz.

DEFLECTION FACTOR: 1.0 V/div in X1, 0.1 V/div in X10; ±3% deflection with VERNIER in CAL position. Vernier provides continuous adjustment between ranges extends deflection factor to 10 V/div. Dynamic range, ±20 V.

INPUT RC: approximately 1 megohm shunted by approximately 20 pF.

MAXIMUM INPUT: 350 V (dc + peak ac).

SWEEP MAGNIFIER: X1, and X10; magnified sweep accuracy, ±5% (with ±3% accuracy time base plug-in). Allows 1 ns/div with 1840A.

OUTPUTS: two emitter follower outputs on rear panel for main and delayed gates or Vertical and Horizontal outputs when used with sampling plug-ins. Approximately 0.75 V with 1840A; outputs will drive impedances down to 1000 ohms without distortion.

GENERAL

WEIGHT: (without plug-ins) Model 183A, net 33 lb (15 kg); shipping 46 lb (20,9 kg). Model 183B, net 35 lb (15,9 kg); shipping 48 lb (21,8 kg).

ENVIRONMENT: 183A/B operates within specifications over the following ranges:

Temperature: 0°C to +55°C.

Humidity: to 95% relative humidity to 40°C.

Altitude: to 15,000 feet.

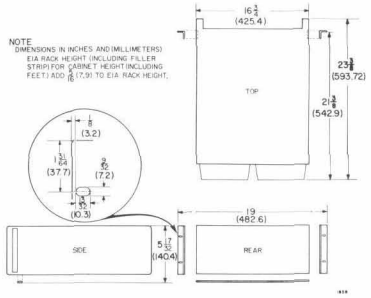
Vibration: vibrated in three planes of 15 minutes each with 0.010 inch excursion, 10 to 55 Hz.

POWER: 115 or 230V ±10%, 50 to 400 Hz, approx 115 watts at normal line with 1830A and 1840A plug-ins. Max mainframe power 155 watts.

DIMENSIONS

Cabinet: 7⅞" wide, 11⅜" high, 23⅜" deep behind panel (200 x 289 x 594 mm).

Rack: 19" wide, 5¼" high, 21⅜" deep behind panel (483 x 133 x 543 mm); 23⅜" deep over-all.



OPTIONS: CRT phosphor (specify by option number); P31 standard, P2, option 002; P7, option 007; P11, option 011, no extra charge.

PRICE: HP Model 183A (cabinet), $1750. HP Model 183B (rack), $1825.

SPECIFICATIONS, 1830A

MODES OF OPERATION

Channel A alone; Channel B alone, Channels A and B displayed alternately on successive sweeps (ALT); Chanels A and B displayed by switching (time shared) between channels, chop frequency of approx 250 kHz; Channel A plus Channel B; Channel A minus Channel B.

EACH CHANNEL

BANDWIDTH: dc to 250 MHz, 3 dB down from 6 div reference signal, 50-ohm source.

RISETIME: $\leq$1.5 ns. 10% to 90% with 6 div input step, 50 ohm-source.

DEFLECTION FACTOR

Ranges: from 0.01 V/div to 1 V/div (7 positions) in 1, 2, 5 sequence. $\pm$3% accuracy; calibration adjust on front panel.

Vernier: continuously variable between all ranges, extends deflection factor to 2.5 V/div vernier UNCAL (uncalibrated) light indicates when vernier is not in the calibrated position.

Signal Delay: $>$55 ns to allow viewing the leading edge of a pulse without external delay.

INPUT CHARACTERISTICS

Impedance: 50 ohms, nominal.

Reflection Coefficient: (measured with 1 ns TDR risetime) $\leq$10% on 10 mV/div and $\leq$5% from 20 mV/div to 1.0 V/div.

VSWR: $\leq$1.30 on 10 mV/div and $\leq$1.20 from 20 mV/div to 1.0 V/div at 250 MHz.

Maximum Input: 5 volts rms or $\pm$500 div peak, whichever is less.

DC Drift: short term drift/min and long term drift/hr $\leq$0.05 div after ½ hr from turn-on at constant ambient temperature.

POLARITY

Selectable + up or — up on Channel B.

PROBE POWER

Provides power for operating two HP active probes.

A + B OPERATION

Amplifier meets independent channel specifications for risetime and bandwidth. B channel may be inverted for A-B operation.

TRIGGERING

Channel A or composite (on displayed signal).

FREQUENCY: dc to $>$250 MHz on signals causing 1 division or more vertical deflection in all modes.

GENERAL

WEIGHT: net, 5 lb (2,3 kg); shipping, 8 lb (3,6 kg.).
ENVIRONMENT: same as Model 183A/B.
PRICE: HP Model 1830A, $850.

SPECIFICATIONS, 1840A

SWEEP

RANGES: from 10 ns/div to 0.1 s/div in 1, 2, 5 sequence; $\pm$3% accuracy with vernier in calibrated position. Mainframe magnifier extends fastest speed to 1 ns/div with $\pm$5% accuracy.

VERNIER: continuously variable between all ranges, extends slowest sweep to at least 0.25 s/div.

TRIGGERING

NORMAL

Internal: dc to $>$250 MHz with 1830A plug-in and signals producing 1.0 div or more vertical deflection.

External: dc to $>$250 MHz with signals of 20 mV peak-to-peak or more, increasing to 50 mV at 500 MHz. Input impedance 50 ohms. ÷ 10 trigger attenuator allows wider dynamic range of INT and EXT trigger input.

AUTOMATIC: bright baseline displayed in absence of trigger signal. Triggering is same as normal except low frequency limit is 5 Hz for internal and external triggering.

SINGLE SWEEP: selectable with front panel switch; reset pushbutton with armed indicator light. Rear panel input provides remote arming.

TRIGGER LEVEL AND SLOPE

Internal: any point on the vertical waveform displayed.

External: trigger level continuously variable from +0.1 V to —0.1 V on either slope of trigger signal; from +1.0 V to —1.0 V in ÷ 10 setting. Input impedance: 50 ohms, nominal.

Coupling: front panel selection of ac or dc. AC attenuates signals below approximately 5 kHz.

Variable Hold Off: time between sweeps continuously variable, exceeding one full sweep on all ranges.

PROBE POWER

Provides power for operating one HP active probe.

GENERAL

WEIGHT: net, 3 lb (1,4 kg); shipping, 6 lb (2,7 kg).
ENVIRONMENT: same as Model 183A/B.
PRICE: HP Model 1840A, $550.

SPECIFICATIONS, 1120A

BANDWIDTH

DC-COUPLED: dc to $>$500 MHz.
AC-COUPLED: $<$1.5 kHz to $>$500 MHz.

PULSE RESPONSE

Risetime, $<$0.75 ns; perturbations, $<\pm$5% measured with 1 GHz sampler.

GAIN

1:1, $\pm$5%.

DYNAMIC RANGE

$\pm$0.5 V with $\pm$5 V dc offset.

NOISE

Approximately 1.5 mV (measured tangentially with 1 GHz sampler); approximately 0.8 mV (measured tangentially) with Model 1830A.

DRIFT

Probe tip; $<\pm 100\ \mu V/^{\circ}C$; amplifier, $<\pm 200\ \mu V/^{\circ}C$.

INPUT IMPEDANCE

100 k ohms; shunt capacitance $<$3 pF at 100 MHz, with 10:1 divider shunt capacitance is $<$1 pF.

MAXIMUM INPUT

$\pm$100 V.

WEIGHT

Net, 2¼ lb (1,0 kg); shipping, 4¼ lb (1,9 kg).

POWER

Supplied by 1802A, 1830A, or 1840A plug-ins or Model 1122A probe power supply. +15 V $\pm$2%, 110 mA; —12.6 V $\pm$2%, 70 mA.

LENGTH

Over-all, 4 ft; with option 001, 6 ft.

ACCESSORIES FURNISHED

MODEL 10241A 10:1 divider: increases input impedance to approximately 1 megohm; shunt capacitance $<$1 pF at 100 MHz; increases dynamic range to $\pm$50 V, offset range to $\pm$350 V, maximum input to $\pm$350 V. Pulse response: perturbations within $\pm$5% measured with 1 GHz sampler.

MODEL 10243A 100:1 divider: increases input impedance to approximately 1 megohm; shunt capacitance $<$1 pF at 100 MHz; increases dynamic range to $\pm$50 V, offset range to 350 V, and maximum input to $\pm$350 V. Pulse response: perturbations within $\pm$5% measured with 1 GHz sampler.

MODEL 10242A BANDWIDTH LIMITER: reduces bandwidth to approximately 27 MHz shunted by approximately 6 pF and reduces gain $<$2%.

ALSO INCLUDED: a Model 10229A hook tip, 2.5-inch ground lead, spare probe tips, and a BNC probe adapter.

PRICE: Model 1120A, $350. Model 1120A option 001, add $25.

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