250 MHz PLUG-IN
OSCILLOSCOPE

- 250 MHz Real-Time Bandwidth
- Plug-In Versatility & Compatibility
- 6cm by 10cm Internal Graticule
- 10 mV/div Deflection Factor
- 1ns/div Sweep Speed
- 4cm/ns Writing Speed
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 purpose 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). Riset ime (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-going pulse and sets the control 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).

#### SWEET 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:** 50 Hz to 400 Hz, approx 115 watts at normal line with 1830A and 1840A plug-ins. Max mainframe power 155 watts.

**DIMENSIONS**

- **Cabinet:** 7½" wide, 11½” high, 23¾” deep behind panel (200 x 289 x 594 mm).
- **Rack:** 19” wide, 5½” high, 21½” deep behind panel (483 x 133 x 543 mm); 23½” deep over-all.

**OPTIONS:** CRT phosphor (specify by option number); P31 standard, P2, option 002; P7, option 007; P1, 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); Channels A and B displayed by switching (time shared) between channels, chapel 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: <1.5 ns. 10% to 90% with 6 div input step, 50 ohm-source.

DEFOCTION FACTOR

Ranges: from 0.01 V/div to 1 V/div (7 positions) in 1, 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

Maximum Input: 743 volts rms or ±500 div peak, whichever is less.

DC Drift: short term drift/min and long term drift/hr <0.5 div after 1/2 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, 3 lb (1.4 kg); shipping, 6 lb (2.7 kg).

ENVIRONMENT: same as Model 183A/B.


SPECIFICATIONS, 1120A

BANDWIDTH

DC-COUPLED: dc to >500 MHz.

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

PULSE RESPONSE

Risetime, <0.75 ns; perturbations, <±5% measured with 1 GHz sampler.

GAIN

1:1, ±5%.

DYNAMIC RANGE

±0.5 V with ±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: <±100 µV/°C; amplifier, <±200 µV/°C.

INPUT IMPEDANCE

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

MAXIMUM INPUT

±100 V.

WEIGHT

Net, 2½ lb (1.0 kg); shipping, 4½ lb (1.9 kg).

POWER

Supplied by 1802A, 1830A, or 1840A plug-ins or Model 1122A probe power supply. +15 V ±2%, 110 mA; —12.6 V ±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 ±50 V, offset range to ±350 V, maximum input to ±350 V. Pulse response: perturbations within ±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 ±50 V, offset range to 350 V, and maximum input to ±350 V. Pulse response: perturbations within ±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.