Get Big Picture Displays, Plug-In Versatility, 100% Solid State Circuitry, Superior Performance, In a New 30-Pound Package For Field, Laboratory and Production Applications
New Step-Ahead Design Gives Big Scope Features In a Rugged, Lightweight Instrument

You get more total performance, more usability in the new hp 180A Oscilloscope—more than any other scope on the market! You get this greater measurement capability in a 30-pound package that goes anywhere—field, laboratory or production line. Designed from the user's viewpoint in, this new high-frequency scope is packed with new ideas and innovations to give you big picture CRT, plug-in versatility, step-ahead electrical performance, minimum weight and rugged design.

With hp's all-new CRT, you get a big picture 8 x 10 cm display in a compact 17-inch tube length to allow portability. Display area is 30% larger than on existing high-frequency scopes—and 100% larger than some portable scopes. This means that you make accurate measurements, easier!

The vertical amplifier drives the CRT vertical deflection plates directly, requiring only 3 v/cm. This allows extended bandwidth capabilities, and means the vertical amplifier is lightweight, requires low power. Solid-state amplifiers with FET input stages provide stable gain and low drift for accurate measurements. Vertical attenuation, which sets vertical deflection factor, is ahead of the amplifier. This prevents trace jumps as you change ranges; bandwidth is maintained on all ranges even when verniers are used.

For easy viewing of the leading edge of a fast pulse, a new lightweight 160 nsec, 140 MHz etched circuit delay line was developed. Wide bandwidth together with good impedance characteristics insure clean display of input signal.

A new type of horizontal amplifier has wide bandwidth with X10 magnification to provide linear 5 nsec/cm sweeps, giving you greater resolution of high frequency signals and fast pulses.

Circuitry in the new 180A is 100% solid state. Only premium quality components were used throughout. This means you have lower power requirements, lighter weight and increased reliability. This results in the utilization of convection cooling—no fans.

Circuit boards in the scope are arranged to provide easy access to all circuitry. Snap-off covers give quick access. The control panel has been "human-engineered"—control knobs and switches are "convenience-grouped" and plainly marked to make them easier to see, easier to operate. Control panel and nomenclature are selective dye anodized for permanence.

Ask your nearest hp field representative for a demonstration of the 180A Oscilloscope, and he will show how you can see more, do more with this new big picture, 30-pound scope!
More Performance Than Any Other Scope—And in a 30-Pound Package!

**Large Area 8 x 10 cm CRT**
- New design breakthrough offers a shorter, high-frequency CRT with picture area from 30% to 100% greater than any other high-frequency scope. Accurate measurements are easier to read and view.
- Deflection plates require only 3 v/cm drive—allows extended bandwidth capabilities.
- 12 kv accelerating potential produces bright, easy-to-see traces, even at 5 nsec/cm sweeps.
- Snap-off bezel for easy installation of new hp contrast filters or special graticules.
- Beam finder for rapid location of trace.
- Internal graticule calibrated in centimeters eliminates parallax error; flood guns allow background illumination for optimum contrast of graticule and trace.

**Plug-In Versatility**
- **Now 180A1 dual channel vertical amplifier**
  - dc to 50 MHz bandwidth (all ranges). 7 nsec rise time.
  - 5 mv/cm to 20 v/cm range.
  - A = B, and A - B operation.
  - Internal trigger on Channel B in ALT and CHOP modes for time correlation of traces.
- **Now 182A1 time base and delay generator**
  - triggering to 90 MHz.
  - sweeps from 1 sec/cm to 10 nsec/cm.
  - easy-to-use delayed sweep.
  - mixed sweep for slow/fast sweep display.
  - bright line automatic triggering.
- **Now 1820A time base**
  - triggering to 90 MHz.
  - sweeps from 2 sec/cm to 5 nsec/cm.
  - variable holdoff locks-in complex waveforms.
  - bright line automatic triggering.
- More plug-ins to come—for extended capabilities.

**Step-Ahead Electrical Performance**
- Solid triggering capability to 90 MHz, as shown above.
- New horizontal amplifier permits linear 5 nsec/cm sweep speed.
- Maximum stability with 100% solid state circuitry.
- Premium components—capacitors, potentiometers and metal film resistors.
- FET input amplifiers for exceptionally low drift, quick 15-second warm-up.
- Operates on 115 or 230 volts, 50-1000 Hz, only 95 watts—convection cooled.
- New hp CRT design permits 3 v/cm drive; therefore, vertical amplifier is smaller, lower power. Amplifier drives CRT vertical deflection plates directly. These features provide extended bandwidth capability.
- DC coupled 2 axis input.
- New etched circuit delay line for clean pulse response—minimum weight and size.

**Rugged Design for Use Anywhere**
- Aircraft-type frame construction for maximum ruggedness with minimum weight.
- Easy-to-get-at circuits—covers snap off.
- Conveniently-grouped controls are easier to see, easier to operate.
- Operates with confidence at -28°C to 65°C, 95% relative humidity to 40°C, 15,000 feet.
- Withstands shock and vibration—built for portable use.
- Scope with plug-ins weighs only 30 pounds.
- 8" x 10" cabinet, or 5½" x 19" rack mount models.

1116A Testmobile, $95.00
117A Camera, $475.00
10176A Flexible Viewing Hood, $7.00
10166A Panel Cover, $25.00
10167A Carrying Cover, $20.00
10004A 3½-foot 10:1 Divider Probe, $35.00
10115A BNC Male to BNC Male Adapter, $5.00
10360A Camera Adapter for hp 106A/B Camera, $15.00
10361A Camera Adapter for Tektronix C12 Camera, $15.00
10362A Camera Adapter for Tektronix C27 Camera, $15.00

Get the BIG picture! Write or call for your demonstration, today! Hewlett-Packard, Palo Alto, California 94304, Tel. (415) 326-7000, Europe: 54 Route des Acacias, Geneva. Price: hp Model 1804 Oscilloscope, $625.00; hp Model 1804R (rack) Oscilloscope, $800.00; hp Model 1801A Dual Channel Vertical Amplifier, $650.00; hp Model 1820A Time Base, $475.00; hp Model 1821A Time Base and Delay Generator, $800.00, f.o.b. factory.
180A Oscilloscope

External Input:
- Bandwidth: DC coupled, dc to 5 MHz; AC coupled, 5 Hz to 5 MHz.
- Sensitivity: 1 v/cm, X1; 0.2 v/cm, X5; 0.1 v/cm, X10; X10; vernier provides continuous adjustment between ranges. Dynamic range = 5 v.
- Input RC: 1 megohm shunted by approximately 50 pf.
- Sweep Magnifier: X1, X5, X10; magnified sweep accuracy = 5%.

Calibrator:
- Type: Approx. 1 kHz square wave, 3 μsec rise time.
- Voltage: 2 outputs, 250 mv and 10 v p-p, ≈ 1%.

Cathode-ray Tubes and Controls:
- Type: Electrophotometric tube, 12 v accelerating potential; illuminated phosphor (IP2, P7, and P11 available at no extra charge. Specify by phosphor number).
- Writing Rate: Using HP 127A Cameras with 11.8 mm and Polaroid 3000 speed film; P3 phosphor, approximately 700 cm/sec.
- Graticule: 8 x 10 cm parallax-free internal graticule marked in cm squares. 2mm subdivisions on major axes. Front panel recessed TRACE ALIGN aligns trace with graticule; internal Y-aligns X-trace with X-trace.
- SCALE control illuminates CRT phosphor for viewing with light or dark photographs.

Beam Finder:
- Pressing Beam Finder control brings trace on CRT screen regardless of setting of horizontal, vertical, or intensity controls.

Intensity Modulation:
- Intensity: Approx. ± 4 v, dc to 15 MHz, will blank trace of irregular intensity. Input R, 5.1 kohms.

Active Components:
- All solid state (except CRT).

Environment:
- Oscilloscope: Scope with plug-ins operates within spaces specified below the following ranges. Temperature: -28 to +65°C. Humidity: to 95% relative humidity at 40°C. Altitude: to 15,000 ft. Vibration: Vibration is in these planes for 15 min, each with 0.1° exception from 10 to 55 Hz.
- Power: 115 or 230 v, 50-60 Hz, 95 watts at normal line, connection cooled.

Specifications:
- Weight: (without plug-ins) Model 180A, Net, 22 lbs, (9.9 kg). Shipping, 33 lbs (15.3 kg). Model 180AR (rack); Net, 25 lbs (11.3 kg). Shipping, 33 lbs (14.9 kg).
- Outputs: Four emitter follower outputs for main and delayed gates, main and delayed sweeps. Maximum current available, 3 ma. Outputs drive impedances down to 1 KΩ without distortion.
- Accessories furnished: Two Model 1262A 10-1 voltage divider probes, mesh contrast filter, detachable power cord, rack mounting hardware (rack only).

1801A Dual Channel Amplifier

Modes of Operation:
- Chan A alone: Chan B alone.
- Chan A and B displayed on alternate sweeps: Chan A and B displayed by switching at approximately a 400 kH/sec rate, with blanking during switching: Chan A plus Chan B (alternative addition).

Each Channel:
- Deflection Factor (sensitivity): 0.005 v/cm to 20 v/cm; vernier extends minimum sensitivity to 50 v/cm, a sensitivity-calibration adjustment for each channel is provided on the front panel.
- Attenuator Accuracy: ≈ 3%.
- Bandwidth (Direct or with probes, 3 db down from 1 v/kHz at reference signal): DC coupled, dc to 50 MHz; AC coupled, 5 Hz to 50 MHz.
- Rise Time (Direct or with probes): Less than 7 nanoseconds with 8 cm input step.
- Input RC: 1 megohm shunted by approximately 25 pf.
- Maximum Input Signal: AC coupled, 500 volts peak; DC coupled, 150 v at 5 ma/cm increasing to 350 v at 20 v/cm.
- Polarity Presentation: ± + or - U, selectable.
- A - B Input:
- Amplifier: Bandwidth and sensitivity remain unchanged. Either Channel A or B may be inverted to give A -- B operation.
- Differential Input (A -- B): Common mode rejection at least 40 db or 5 mv/v, 20 db on other ranges for frequencies up to 1 MHz. Common mode signal should not exceed an amplitude equivalent to 50 cm.
- Triggering:
- Mode: Chan A or Chan B alone, or Chan A plus Chan B, on the signal displayed: Chan A and Chan B displayed by sweep displays (ui mode) or by sweep displays (ui mode) on Chan B alone; Chan A and B displayed on alternate sweeps, on the signal displayed on each channel or Chan B, alone.
- Frequency: Provides sufficient signal to the time base for triggering over the range of dc to 50 MHz with 0.5 cm p-p signal or more displayed on the CRT.
- General:
- Weight: Net, 4 lbs (1.8 kg). Shipping, 5 lbs (2.3 kg).
- Price: Model 1801A, 1850.00.

1820A Time Base

Sweep Range: 24 ranges, 0,06 μsec/cm to 2 sec/cm in 1,2,5 sequence; accuracy, ±3%; vernier provides continuous adjustment between ranges and extends slowest sweep to at least 125 ms/sec.

Triggering:
- Internal: See vertical amplifier plug-in.
- External: dc to 50 MHz from signals 0.5 μv/p-p or more increasing to 1 v at 50 MHz.
- Automatic: Bright base line displayed in absence of input signal. Internal, from 40 Hz, see vertical amplifier specification. External, from 40 Hz on signals 0.5 μv/p-p or more to greater than 50 MHz increasing to 1 v at 50 MHz.
- Trigger point and slope: Controls allow selection of level and positive or negative slope; trigger level on external sync signal adjustable over range of ±5 v, ±50 v in ±10 position.
- Coupling: AC, DC, ACF: AC attenuates signals below approx, 20 Hz; ACF attenuates signals below approx, 15 kHz.

Delay sweep: 50 μsec to 1000 μsec.

1821A Time Base and Delay Generator

Main Sweep:
- Range: 22 ranges, 0.1 μsec/cm to 1 sec/cm in 1,2,5, sequence; accuracy: ±3%; vernier provides continuous adjustment between ranges and extends slowest sweep to at least 2.5 sec/cm. Horizontal magnifier expands fastest sweep to 10 msec/cm.

Triggering:
- Internal: See vertical amplifier plug-in.
- External: dc to 50 MHz from signals 0.5 μv/p-p or more increasing to 1 v at 90 MHz.

Automatic: Bright base line displayed in absence of input signal. Internal, from 40 Hz, see vertical amplifier specification. External, from 40 Hz on signals 0.5 μv/p-p or more to greater than 50 MHz increasing to 1 v at 50 MHz.

Trigger point and slope: Controls allow selection of level and positive or negative slope; trigger level on external sync signal adjustable over range of ±5 v, ±50 v in ±10 position.

Coupling: AC, DC, ACF: AC attenuates signals below approx, 20 Hz; ACF attenuates signals below approx, 15 kHz.

Delay sweep: 50 μsec to 1000 μsec.

Price: Model 1821A, 1800.00.

Variable Holdoff: Permits variation of time between sweeps to allow triggering on asymmetrical pulse trains.

Weight: Net, 2¾ lbs, (1.3 kg). Shipping, 5¼ lbs, (2.4 kg).

Price: Model 1820A, 1475.00.