



General information about Hewlett-Packard's portable oscilloscopes begins on page 156.

### Specifications, 1700B, 1701B, 1706B, 1707B

#### Vertical amplifiers

**Modes of operation:** channel A; channel B; channels A and B displayed alternately on successive sweeps (ALT); channels A and B displayed by switching between channels at approx 400 kHz rate with blanking during switching (Chop); channel A + channel B (algebraic addition).

#### Each channel (2)

**Bandwidth:** (Direct or with Model 10006B probe, 3 dB down from 50 kHz, 6 div reference signal from a terminated 50 ohm source.) dc-coupled, dc to 35 MHz in 1700B, 1701B; dc to 75 MHz in 1706B, 1707B; ac-coupled, lower limit is approx 10 Hz.

**Risetime:** <10 ns in 1700B, 1701B; <4.7 ns in 1706B, 1707B. Direct or with Model 10006B probe, 10% to 90% points with 6 div input step from a terminated 50 ohm source.

#### Deflection factor

**Ranges:** from 10 mV/div to 5 V/div (9 ranges) in 1,2,5 sequence.  $\pm 3\%$  accuracy with vernier in calibrated position.

**Vernier:** continuously variable between all ranges, extends maximum deflection factor to at least 12.5 V/div.

**Polarity:** NORM or INV, selectable on channel B.

**Signal delay:** input signals are delayed sufficiently to view leading edge of input signals without advanced external trigger.

#### Input RC

**1700B, 1701B:** 1 megohm  $\pm 1\%$ , shunted by approx 27 pF.

**1706B, 1707B:** 1 megohm  $\pm 1\%$ , shunted by approx 24 pF.

**Input coupling:** AC, DC, or Ground selectable. Ground position disconnects signal input and grounds amplifier input.

#### Maximum input

**AC-coupled:**  $\pm 600$  V (dc peak ac); rms ac <350 V, 5V/div to 20 mV/div; <150 V at 10 mV/div (10 kHz or less).

**DC-coupled:** <350 V (rms) 5 V/div to 20 mV/div; <150 V at 10 mV/div (10 kHz or less).

#### A + B operation

**Amplifier:** bandwidth and deflection factors are unchanged; channel B may be inverted for A-B operation.

**Common mode (A-B):** frequency, dc to 1 MHz; rejection ratio, at least 40 dB on 10 mV/div, at least 20 dB on all other ranges with verniers set for optimum rejection. Common mode signal amplitude equivalent to 30 div.

#### Trigger source

(applies for all five modes of operation)

**Norm:** on displayed signal.

**A only:** on signal from Channel A.

#### Time base

#### Sweep

**Ranges:** from 0.1  $\mu$ s/div to 2 s/div (23 ranges) in 1,2,5 sequence.  $\pm 3\%$  accuracy with vernier in calibrated position.

**Vernier:** continuously variable between all ranges, extends slowest sweep to at least 5 s/div. Vernier uncalibrated light indicates when vernier is not in Cal position.

**Magnifier:** expands all sweeps by a factor of 10 and extends fastest sweep to 10 ns/div. Accuracy  $\pm 5\%$  (including 3% accuracy of time base.)

#### Sweep mode

**Normal:** sweep is triggered by internal or external signal.

**Automatic:** bright baseline displayed in absence of input signal. Triggering is same as normal above 40 Hz.

**Single:** in Normal mode, sweep occurs once with same triggering as normal; reset pushbutton arms sweep and lights indicator; in Auto mode, sweep occurs once each time Reset pushbutton is pressed.

#### Triggering

##### Internal

**1700B, 1701B:** dc to 35 MHz on signals causing 0.5 div or more vertical deflection increasing to 1.5 div at 75 MHz in all display modes except chop; dc to 400 kHz in chop mode. Triggering on line frequency is also selectable.

**1706B and 1707B:** dc to 35 MHz on signals causing 0.5 div or more vertical deflection increasing to 1 div at 75 MHz in

# PORTABLE, 35 AND 75 MHz

## Delayed, non-delayed sweeps

### Models 1700B, 1701B, 1706B, 1707B



# OSCILLOSCOPES

all display modes except chop; dc to 400 kHz in chop mode. Triggering on line frequency is also selectable.

**External:** dc to 35 MHz on signals 50 mV p-p or more, increasing to 100 mV p-p at 75 MHz.

**External input RC:** approx 1 megohm shunted by approx 27 pF.

**Level and slope:** internal, at any point on the vertical waveform displayed; external, continuously variable from  $\pm 1.2$  V to  $-1.2$  V on either slope of the trigger signal. Maximum input,  $\pm 100$  V. In Models 1700B and 1706B,  $\pm 10$  extends external trigger input range to  $+12$  V to  $-12$  V.

**Coupling:** AC, DC, LF REJ, or HF REJ.

**AC:** attenuates signals below approx 20 Hz.

**LF-REJ:** attenuates signals below approx 15 kHz.

**HF-REJ:** attenuates signals above approx 30 kHz.

**Trigger holdoff:** time between sweeps continuously variable.

#### Delayed time base (Models 1701B and 1707B)

**Trace intensification:** intensifies that part of main time base to be expanded to full screen in delayed time base mode. Rotating time base switch from OFF position activates intensified mode.

#### Sweep

**Ranges:** 0.1  $\mu$ s/div to 0.2 s/div (20 ranges) in 1,2,5 sequence.  $\pm 3\%$  with vernier in calibrated position.

**Vernier:** continuously variable between all ranges, extends slowest sweep to 0.5 s/div.

**Magnifier:** expands all sweeps by a factor of 10 and extends fastest sweep to 10 ns/div. Accuracy is  $\pm 5\%$  (including 3% accuracy of time base).

#### Sweep Mode

**Trigger:** delayed sweep is armed at end of delay period.

**Auto:** delayed sweep is automatically triggered at end of delay period.

#### Triggering

**Internal:** same as main time base.

**External:** same as main time base. Input RC is approx 1 megohm shunted by approx 27 pF.

**Level and slope:** internal, at any point on the vertical waveform displayed; external, continuously variable from  $\pm 1.2$  V to  $-1.2$  V on either slope of the trigger signal.

**Coupling:** selectable, AC or DC. AC attenuates signals below approx 20 Hz.

#### Delay (Before start of delayed sweep.)

**Time:** continuously variable from 0.1  $\mu$ s to 2 s.

**Time Jitter:**  $< 0.005\%$  (1 part in 20,000) of maximum delay in each sweep.

**Calibrated delay accuracy:**  $\pm 1\%$ ; linearity,  $\pm 0.2\%$ .

**Mixed Sweep (Models 1701B and 1707B):** combines main and delayed sweeps into one display. Sweep is started by the main time base and is completed by the faster delayed time base.

#### Cathode-ray tube and controls

**Type:** post-accelerator.  $\approx 22$  kV accelerating potential, aluminized P31 phosphor.

**Graticule:** 6 x 10 div internal graticule; 0.2 subdivisions on major horizontal and vertical major axes. 1 div = 1 cm. Front panel adjustments for trace alignment and astigmatism.

**Beam finder:** returns trace to CRT screen regardless of setting of horizontal, vertical, or intensity controls.

**Intensity modulation:**  $> \pm 4$  V, dc to 1 MHz blanks trace of any intensity. Input R, 1000 ohms  $\pm 10\%$ . Max input,  $\pm 10$  V (dc - peak ac).

#### General

**Calibrator:** 1 kHz,  $\pm 10\%$ ; 1 V p-p,  $\pm 1\%$ .

#### Power requirements

**AC line:** 115 or 230 V  $\pm 20\%$ , 48 to 440 Hz; 1700B, 1701B, 30 VA max; 1706B, 1707B, 50 VA max.

**DC line:** 11.5 to 36 V; 1700B, 1701B, 18 watts max; 1706B, 1707B, 25 watts max.

#### Battery (optional)

**Operating time:** up to 6 hours in 1700B or 1701B; up to 4.5 hours in 1706B or 1707B.

**Recharge time:** 14 hours maximum, with power switch off, if not operated after power indicator flashes.

**Low battery indicator:** power light flashes to indicate that batteries are discharged and further operation may damage battery.

**Recharging:** batteries are recharging whenever power mode switch is set to AC with power applied. With power switch off, full charge is applied. With power switch on, trickle charge is applied.

#### Weight

**Without panel cover:** net, 24 lb (11 kg); shipping, 35 lb (15,9 kg).

**With panel cover and accessories:** net, 27 lb (12.3 kg); shipping, 38 lb (17,2 kg).

**With panel covers, accessories, and battery pack:** net, 35 lb (16 kg); shipping, 46 lb (20,9 kg).

**Dimensions:** 12-13/16" wide, 7 3/4" high, 20 7/8" long with handle, 15 5/8" without handle (325,4 x 198 x 530, 400 mm).

**Operating environment:** temperature 0°C to +55°C; humidity, to 95% relative humidity to 40°C, altitude, to 15,000 ft; vibration, vibrated in three planes for 15 min, each with 0.010 inch excursion, 10 to 55 Hz.

**Accessories furnished:** one Model 10115A blue light filter; one Model 10101B front panel storage cover; two Model 10006B, 10:1 divider probes, 6 ft (1,8 m) long; one 7.5 ft (2,3 m) power cord with right angle plug (HP P/N 8120-1521); and one Operating and Service manual.

#### Price

Model 1700B 35 MHz Oscilloscope	\$1475
Model 1701B 35 MHz Delayed Sweep Oscilloscope	\$1550
Model 1706B 75 MHz Oscilloscope	\$1500
Model 1707B 75 MHz Delayed Sweep Oscilloscope	\$1575

#### Options

012: Model 10103B battery pack installed	add \$ 215
020 (1707B): adds external horizontal input and channel A output	add \$ 50

#### 1707B Option 020 specifications

#### External horizontal input

**Bandwidth:** dc to 1 MHz when driven directly from a terminated 50 ohm source.

**Coupling:** dc

**Deflection factor (with beam positioned at left edge of CRT):** X1, 1 V/div; X10, 0.1 V/div.

**Vernier:** 10:1 vernier extends deflection factor to at least 10 V/div (X1) or 1 V/div (X10).

**Dynamic range:** beam may be positioned at left edge of CRT with 0 V to  $-5$  V input.

**Maximum input:**  $\pm 100$  V.

**Input RC:** 1 megohm shunted by approx 10 pF.

#### Channel A output

**Amplitude:** one division of displayed signal in channel A produces approx 100 mV output.

**Cascaded deflection factor:** 1 mV/div with both vertical channels set to 10 mV/div.

**Cascaded bandwidth:** dc to 3 MHz. Use supplied HP Model 10121A 8-inch (20 cm) BNC cable.

**Coupling:** dc.

**Vertical output dc level:** approx 0 V.

**Vertical output resistance:** approx 0 V.