Table 1-1. Specifications (Page 1 of 4)

OPERATING MODES

Voltage vs time (V vs T); channel 1 vs 2 (1 vs 2); monitor mode for logic state display with HP Model 1607A (X-Y-Z).

VERTICAL DISPLAY MODES (V vs T)

Channel 1; channel 2; channels 1 and 2 displayed on alternate sweeps (ALT); channels 1 and 2 displayed by switching between channels at approx 400 kHz rate with blanking during switching (CHOP); automatic selection of alternate for sweep speeds >1 ms/div and chop for sweep speeds ≤1 ms/div (AUTO-CHOP/ALT); channel 1 plus 2 algebraic addition (1+2); channel 1 and/or 2 may be inverted; and either main or delayed trigger signal.

VERTICAL AMPLIFIERS (2)

BANDWIDTH: 3 dB down from a 5 div reference signal (0 to +40° C).

DC-Coupled: dc to 100 MHz in 50Ω and 1 MΩ input modes.

AC-Coupled: <10 Hz to ≥100 MHz.

BANDWIDTH LIMIT: limits upper bandwidth to approx 20 MHz.

INPUT COUPLING: AC, DC, 50Ω (DC), Ground. Ground position disconnects input connector and grounds amplifier input.

INPUT RC

AC or DC: 1 MΩ ±2% shunted by approx 16 pF.

50 Ohm (DC): 50Ω ±3%.

MAXIMUM INPUT VOLTAGE

50 Ohm: 5V rms.

1 Megohm: ac or dc coupled, 250V (dc + peak ac) at ≤1 kHz.

DEFLECTION FACTOR

Range: 2 mV/div to 10 V/div.

Resolution: 3 digits.

Adjustment: coarse stepping is in a 100, 150, 200, 300 . . . 900 sequence; fine stepping is a change of 1 in the least significant digit.

Accuracy: ±3%.

VERTICAL POSITION

Range: baseline can be adjusted ±15 major div from center graticule line (possible 10 div off screen).

Resolution: 0.02 major division

Adjustment: coarse or fine slew rates.

Accuracy: ±(2% of reading +0.3 major div).

ΔV (CHANNEL 1 OR 2)

Range: ±15 times the deflection factor selected for that channel.

Resolution: 0.02 times the deflection factor for that channel.

Adjustment: coarse or fine slew rates.

Accuracy: ±4% (for a Δ ≤ 10 major divisions).

CHANNEL 1 + 2

Amplifier: bandwidth and deflection factors are unchanged.

Differential (Channel 1-2 or Channel 2-1): CMR is at least 20 dB from dc to 20 MHz with common mode signal amplitude equivalent to 10 div and one channel adjusted for optimum rejection.

TRIGGER VIEW

Display: internal or external trigger signal for either main or delayed sweep.

Deflection Factor: internal, approx deflection for selected channel; ext ÷ 10, 600 mV/div ±20%; ext × 1, 60 mV/div ±20%.

External Trigger Signal Delay: ≤4 ns with identically timed signals to a vertical channel and either main or delayed trigger inputs.

Trigger Point: approx center horizontal graticule line.

Momentary: trigger signal is displayed while main or delayed trigger level is adjusted

HORIZONTAL DISPLAY MODES (V vs T)

Main, Main Intensified, Delayed, and Dual. Dual simultaneously displays main intensified and delayed sweep for all displayed channels.

MAIN AND DELAYED TIME BASES

RANGE: 5 ns/div to 1 s/div.

RESOLUTION: 3 digits

ADJUSTMENT: coarse stepping is in a 100, 150, 200, 300, . . . 900 sequence; fine stepping is a change of 1 in the least significant digit.

ACCURACY:

Speed	Accuracy*
5 ns/div to 9.99 ns/div (center 8 div)	±3%
10 ns/div to 9.99 ms/div (first 10 div)	±3%
10 ms/div to 1 s/div (first 10 div)	±4%

*Within ±10° C of the temperature at which the instrument was calibrated. For temperatures beyond the ±10° C range and within 0 to +55° C, add 1%, from 0.5 s/div to 1 s/div add 2%.

SWEEP DELAY

Delay can be measured by either time or a number of events.

TIME DELAY

RANGE: 0 to 9.9999 s.

Resolution: displayed, 5 digits, HP-IB, 100 ps at any delay, possible 11 digits.

Table 1-1. Specifications (Page 2 of 4)

Accuracy:*

Delay or Time Interval

Sweep Speed	<200 μs	≥200 μs
5 ns/div to 9.99 ns/div	±(2 ns + 0.1% of reading)	±(0.05% of reading)
≥10 ns/div	±(2 ns + 0.1% of reading − 1% of dly'd s/div × 10 div)	±(0.05% of reading + 1% of dly'd s/div × 10 div)

*Within one hour of a Delay Self Calibration and in constant ambient temperature.

Delay Jitter: 0.002% of delay time; at 10 MHz ± 10 kHz, 0.01% of delay time.

Adjustment: Numerical, step size is related to current delay value: Normal, step size is related to sweep speed.

TIME INTERVAL (ΔT)

In Intensified, Dual, or Delayed Horizontal Display Modes a zero time reference can be set anywhere in the delay range and a time interval measurement can be made from that point.

Resolution, Adjustment, Accuracy: same as Time Delay.

FREQUENCY (1/ΔT)

Calculates and displays reciprocal of time interval measurement.

Resolution: same as ΔT. As frequency increases insignificant digits are truncated.

Adjustment, Accuracy: same as Time Delay.

DIGITAL DELAY

Range: 0 to $10^8 - 1$ events.

Resolution: 1 event.

Adjustment: coarse stepping is in a 1, 2, 3, . . . 9, 10, 20, 30, . . . 90, etc. sequence; fine stepping is a change of 1 in least significant digit.

Maximum Rep Rate: 15 MHz with a 50% duty cycle.

TRIGGERING (Main and Delayed Time Bases)

MAIN SWEEP

Triggered: specified level and slope is required to generate a sweep.

Auto-Triggered: baseline displayed in absence of a trigger signal; triggering is same as triggered above approx 10 Hz.

Single: sweep occurs once with same triggering as Triggered mode; reset key rearms sweep.

DELAYED SWEEP

Auto Sweep After Delay: delayed sweep starts at end of delay time.

Triggered Sweep After Delay: delayed sweep can be triggered after delay time.

Digital Delay: delayed sweep starts a specified number of events after start of main sweep.

SOURCES

Selectable from Channel 1, Channel 2, Enhancement Module, or External. Line frequency triggering is also available for main sweep only. Main and delayed trigger sources are independently selectable.

INTERNAL TRIGGER LEVEL

Range: ±20 major divisions from center horizontal graticule line.

Resolution: 0.02 major divisions; coarse or fine slew rates.

Accuracy: ±(3% of reading + 0.4 major div).

EXTERNAL TRIGGER LEVEL

Range: ÷1, ±1.2 V from ground reference; in ÷10, ±12 V from ground reference.

Resolution: ÷1, 2 mV; in ÷10, 20 mV; coarse or fine slew rates.

Accuracy: ±(3% of reading + 40 mV); in ÷10 mode, ±(3% of reading −400 mV).

LINE TRIGGER LEVEL

Range: ±20 relative units.

Resolution: steps of 0.02; fine or coarse slew rates.

SLOPE: triggers on positive or negative slope within specified trigger signal range.

SENSITIVITY

Internal: for deflection factors <10 mV/div, at least 1.4 div of vertical deflection from dc to 25 MHz increasing to 3 div at 100 MHz; for deflection factors ≥10 mV/div at least 0.7 div of vertical deflection from dc to 25 MHz increasing to 1.5 div at 100 MHz.

External: in external ÷10, at least 500 mV p-p from dc to 25 MHz increasing to 1.2 V p-p at 100 MHz; in external ÷1, at least 50 mV p-p from dc to 25 MHz increasing to 120 mV p-p at 100 MHz.

COUPLING (Internal and External)

AC: attenuates signals <10 Hz.

DC: direct coupled.

HF Rej: attenuates signals above approx 35 kHz.

LF Rej: attenuates signals below approx 35 kHz.

EXTERNAL TRIGGER INPUTS (Main and Delayed)

Input RC: AC or DC, 1 MΩ ±2% shunted by approx 15 pF; 50Ω (DC), 50Ω ±3%.

Maximum Input Voltage: 50Ω (DC), 5 V rms; 1 MΩ, ac or dc coupled, 250 V (dc + peak ac) at <1 kHz.

1 vs 2 OPERATION

BANDWIDTH

Y-Axis (Channel 1): same as channel 1 in V vs T.

X-Axis (Channel 2): dc to 4 MHz.

Phase Difference Between Channels: <3° dc to 100 kHz.

Deflection Factors: same as Vertical Amplifiers.

X·Y·Z OPERATION

Inputs are compatible with HP Model 1607A Logic State Analyzer or equivalent.

X AND Y INPUTS

Deflection Factors: 0.5 V/div ±20% for X; 0.4 V/div ±20% for Y.

Table 1-1. Specifications (Page 3 of 4)

Input Impedance: approx 5 kΩ.
Maximum Input Voltage: ±10 V.

Z-INPUT
Sensitivity: pulse ≥50 ns wide and 4 V amplitude blanks any intensity display.
Input Impedance: low power Schottky TTL gate
Bandwidth: approx 10 MHz.
Maximum Input Voltage: TTL level, 5 V.

CATHODE-RAY TUBE AND CONTROLS

TYPE: post accelerator, approx 22 kV accelerating potential, aluminized P31 phosphor.
GRATICULE: 10 × 10 div internal graticule; 0.2 subdivision markings on major horizontal and vertical axes; 10 × 12 cm display area.
TRACE INTENSITY: adjustable in relative steps of 1 from 0 to 99.
CHARACTER INTENSITY: adjustable in relative steps of 1 from 0 to 99.
FIND BEAM: returns trace to CRT screen regardless of setting of vertical, horizontal, or intensity controls.
GRATICULE ILLUMINATION: internal flood gun.
ALIGN: aligns baseline with horizontal graticule line.
ASTIG: controls roundness of beam.

OPERATING CHARACTERISTICS

AUTOSCOPE: seeks, scales, and displays input signals >20 mV and >50 Hz. Autoscope preselects V vs T operating mode, main sweep, assigns Control Knob to main sec/div, ac input coupling, character generator on, internal trigger source, positive slope, and trigger level to 0.5 div.
SELECTIVE AUTOSCOPE: seeks, scales, and displays selected channels in the same manner as autoscope except all setup functions below the variable function keys on the "VOLTAGE" and "TIME" panels are preserved.
PROBE RECOGNITION: deflection factor, ΔV, or external trigger level readout is automatically adjusted for division ratio of recommended 1:1 or 10:1 probes.
SAVE/RECALL REGISTERS: saves up to eight complete front panel setups in nonvolatile memory.
PRESET: sets front panel to V vs T, intensified sweep mode. 100 μs/div main sweep, 10 μs/div delayed sweep, channel 1 main trigger, channel 1 delayed trigger, 2 V/div on channels 1 and 2, and ac input coupling.
CRT DISPLAY READOUTS: displays selected trigger source and selected variable functions.
Trigger Source: time base, main or delayed for channels 1 and 2, external, and line.
Variable Functions: channels 1 and 2 volts/div and ΔV; main and delayed sweep speeds; time delay, normal, numerical, and digital; normal and numerical ΔT; and calculated frequency (reciprocal of ΔT) 1/ΔT.
LED DISPLAY READOUTS: all functions related to the Control Knob are displayed.

HORIZONTAL POSITION
Range: ±6 major div from center vertical graticule line.
Resolution: 0.02 major divisions.
Adjustment: coarse or fine slew rates.

DUAL SEPARATION
Range: delayed sweep waveform can be adjusted ±5 major vertical div from main sweep waveform.
Resolution: 0.02 major divisions.
Adjustment: coarse or fine slew rates.
PANEL INTENSITY: adjustable in relative steps of 1 from 0 to 99

GENERAL

BUS COMPATIBILITY: as defined in IEEE Std 488-1978 is: SH1, AH1, T5, TE0, L3, LE0, SR1, RL1, PP0, DC0, DT1, C0, and E2.
SELF CALIBRATION ROUTINES: two self calibration routines can be performed at any time without altering front panel setup.
Balance Self Cal: DC balances vertical pre-amplifier inputs to minimize trace shift during deflection factor range changes.
Delay Self Cal: calibrates delay time oscillator to within 0.005% of the internal crystal reference accuracy.
FRONT PANEL CAL 1980A/B: Channel 1 and 2 position, dual separation, main and delayed trigger level, and delay time are calibrated to specified accuracy using internally generated calibration signals. Channel 1 and 2 deflection factors, and main and delayed sweep speeds are calibrated to specified accuracies with externally supplied calibration signals. Deflection factors and sweep speeds are also supplied with internal calibration signals as a performance verification with approx ±6% accuracy.

SIGNAL OUTPUTS
Calibrator Outputs: rear panel BNC and front panel post: source impedance, approx 150Ω; probe calibration, 1 V p-p ±1%, approx 1.86 kHz square wave, rise time <5 μs; programmable cal signals, 20 mV p-p ±2%, 100 mV p-p ±1%, 200 mV p-p ±1%, 1 V p-p ±1%, and 10 V p-p ±1%.
15 Volt Reference: source impedance, approx 1 kΩ; level, 15 V ±30 mV.
Main Gate: source impedance, ECL gate output; signal, high ECL logic level following main gate.
Delayed Gate: source impedance, ECL gate output; signal, high ECL logic level following delayed gate.
POWER: 100, 120, 220, 240 Vac, +5 to −10%, 48 to 440 Hz, 300 VA max with expansion module and plug-in ROMs, standard, 200 VA max.

OPERATING ENVIRONMENT
Temperature: 0 to +55° C.
Humidity: to 95% relative at +40° C.
Altitude: to 4600 m (15 000 ft).
Vibration: vibrated in three planes for 15 min. each with 0.38 mm (0.015 in) excursion, 10 to 55 Hz.

Table 1-1. Specifications (Page 4 of 4)

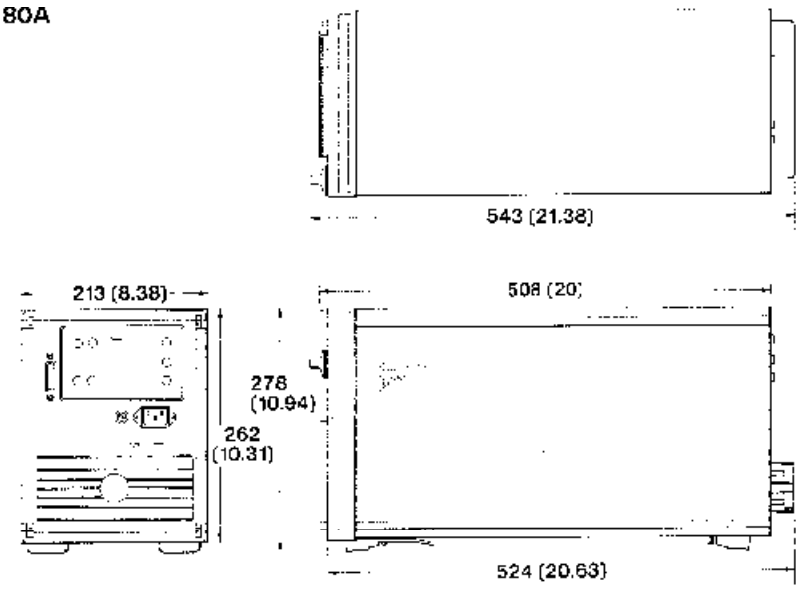
ACCESSORIES FURNISHED: one blue light filter HP P/N 01980-02701, one 2.3 m (7.5 ft) power cord, one Expansion Module Panel Cover HP P/N 01980-24106, two Operating/Programming Manuals, one Service Manual, one Binder with Divider tabs, two 10081A, 10:1, divider probes approx 2 m (6 ft) long.

WEIGHT: net, approx 18.2 kg (40 lb); shipping, approx 24.1 kg (53 lb).

DIMENSIONS:

in mm (in.):

1980A



1980B