Table 1-1. Specifications

VERTICAL DISPLAY MODES

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 1 MHz rate with blanking during switching (CHOP); channel A plus channel B (algebraic addition).

VERTICAL AMPLIFIERS (2)

BANDWIDTH (≤3 dB down from a 6 div reference signal.)

DC-Coupled: dc to 275 MHz in both 50 ohm and high impedance input modes.

AC-Coupled: approx 10 Hz to 275 MHz.

BANDWIDTH LIMIT: limits upper bandwidth to approx 20 MHz.

RISE TIME: <1.3 ns (calculated by T_r = 0.35/Bandwidth in MHz).

DEFLECTION FACTOR

Ranges: 10 mV/div to 5 V/div (9 calibrated positions) in 1, 2, 5 sequence. ±2% attenuator accuracy.

Vernier: continuously variable between all ranges; extends maximum deflection factor to at least 12.5 V/div. Front panel light indicates when vernier is not in CAL position.

POLARITY: channel B may be inverted, front panel pushbutton.

SIGNAL DELAY: input signals are delayed sufficiently to view leading edge of input pulse without external trigger.

INPUT COUPLING: selectable, AC or DC, 50 ohms (dc), or ground. Ground position disconnects input connector and grounds amplifier input.

INPUT RC (SELECTABLE)

AC and DC: 1 megohm ±2% shunted by approx 11 pF.

50 Ohm: 50 ohms ±2%; VSWR, ≤1.3:1 on 10, 20, and 50 mV ranges and ≤1.15:1 on all other ranges.

MAXIMUM INPUT

AC and DC: ±250 V (dc + peak ac) at 1 kHz or less.

50 Ohm: 5 V rms or ±250 V peak whichever is less.

A + B OPERATION

Amplifier: bandwidth and deflection factors are unchanged. Channel B may be inverted for A—B operation.

Differential (A—B) Common Mode: CMRR is at least 40 dB from dc to 5 MHz decreasing to 26 dB at 50 MHz. Common mode signal amplitude equivalent to 12 cm with one vernier adjusted for optimum rejection.

TRIGGER SOURCE

Selectable from channel A, channel B, or Composite.

CHANNEL A: all display modes triggered by channel A signal.

CHANNEL B: all display modes triggered by channel B signal.

COMPOSITE: all display modes triggered by displayed signal.

CHANNEL A INPUT - DC VOLTS

DISPLAY: light emitting diodes (LED).

NUMBER OF DIGITS: 3-1/2.

DISPLAY UNITS: 0 exponent indicates volts; —3 exponent indicates millivolts.

X1 RANGE: 95 mV to 47 V full scale vertical deflection (10 mV/div to 5 V/div).

X10 RANGE: 0.95 V to 470 V full scale vertical deflection (100 mV/div to 50 V/div with X10 probe).

ACCURACY: ±0.5% reading ±0.5% full scale (full scale = 10 cm), 20°C to 30°C.

STABILITY: temperature coefficient, =±0.02%/°C.

INPUT IMPEDANCE: X1 range, 1 megohm shunted by approx 11 pF; X10 range (with X10 probe) 10 megohms shunted by approx 10 pF.

SAMPLE RATE: approx 2/s.

RESPONSE TIME: <1 s.

REFERENCE SET: meter may be zeroed permitting dc voltage measurements with respect to any voltage within selected range. Drift may be eliminated by the REF SET control.

OVERRANGE: flashing display indicates overrange condition.

Table 1-1. Specifications (Cont'd)

CHANNEL A POSITION - VOLTS

(Channel A vernier in CAL detent.) With the following exceptions, specifications are the same as Channel A Input - DC Volts.

MEASUREMENT: dc substitution method using channel A position control to determine voltage of any point on displayed waveform using any graticule line as reference.

BANDWIDTH: dc to 275 MHz (<3 dB down from a 6 div reference signal).

DYNAMIC RANGE: ±6 cm from ground referenced to center screen.

REFERENCE SET: meter may be zeroed, permits instantaneous voltage measurements with respect to any voltage within selected range.

ACCURACY: ±1% reading ±0.5% of full scale (10X the volts/div range) measured at dc.

CHANNEL A POSITION — %

(Channel A vernier out of CAL detent.)

MEASUREMENT: dc substitution method using channel A position control to determine percent of any waveform point with respect to user defined 0 and 100% points.

RANGE: 0 to ±140% (calibrated with vernier so that 100% equals 5 div).

ACCURACY: ±1%.

ZERO REFERENCE: meter may be zeroed to permit percent measurements with respect to any waveform point.

VERTICAL OUTPUT

AMPLITUDE: one division of vertical deflection produces approx 100 mV output (dc to 50 MHz).

CASCADED DEFLECTION FACTOR: 1 mV/div with both vertical channels set to 10 mV/div.

CASCADED BANDWIDTH: dc to 5 MHz with bandwidth limit engaged.

SOURCE RESISTANCE: approx 100 ohms.

SOURCE SELECTION: trigger source set to channel A selects channel A output; trigger source set to channel B selects channel B output.

HORIZONTAL DISPLAY MODES

Main, main intensified, mixed, delayed, mag X10, and X-Y.

MAIN TIME BASE

SWEEP

Ranges: 10 ns/div to 0.5 s/div (24 ranges) in 1, 2, 5 sequence.

Accuracy

Main Sweep Time/Div	Accuracy (0°C to 55°C)	
	X1	X10
10 ns to 50 ns	±3%	±5%
100 ns to 20 ms	±2%	±3%
50 ms to 0.5 s	±3%	±3%

Vernier: continuously variable between all ranges, extends slowest sweep to at least 1.25 s/div. Vernier uncalibrated light indicates when vernier is not in CAL position.

Magnifier: expands all sweeps by a factor of 10, extends fastest sweep to 1 ns/div.

SWEEP MODE

Normal: sweep is triggered by internal or external signal.

Automatic: bright baseline displayed in absence of input signal from 10 ns/div to 20 ms/div. Triggering is same as normal above 40 Hz. Normal triggering is generally required for sweep speeds from 50 ms/div to 0.5 s/div.

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.

MAIN TIME BASE TRIGGERING

INTERNAL: dc to 50 MHz on signals causing 0.5 division or more vertical deflection, increasing to 1 division of vertical deflection at 300 MHz in all display modes. Triggering on line frequency is also selectable.

EXTERNAL: dc to 100 MHz on signals of 50 mV p-p or more increasing to 100 mV p-p at 300 MHz.

EXTERNAL INPUT RC: approx 1 megohm shunted by approx 15 pF.

TRIGGER LEVEL AND SLOPE

Internal: at any point on the vertical waveform displayed.

External: continuously variable from +1.0 V to —1.0 V on either slope of the trigger signal, +10 V to —10 V in divide by 10 mode (÷10).

Maximum Input: ±250 V (dc + peak ac) at 1 kHz or less.

COUPLING: AC, DC, LF REJ, or HF REJ.

AC: attenuates signals below approx 10 Hz.

LF Reject: attenuates signals below approx 7 kHz.

HF Reject: attenuates signals above approx 7 kHz.

TRIGGER HOLDOFF: time between sweeps continuously variable, exceeding one full sweep from 10 ns/div to 50 ms/div.

MAIN INTENSIFIED

Intensifies that part of main time base to be expanded to full screen in delayed time base mode. Time interval controls adjust position of intensified portion of sweep. Rear panel intensity ratio control sets relative intensity of brightened segment.

DELAYED TIME BASE

SWEEP

Ranges: 10 ns/div to 20 ms/div (20 ranges) in 1, 2, 5 sequence.

Accuracy (0 to 55°C): same as main time base.

Magnifier (0 to 55°C): same as main time base.

DELAYED TIME BASE TRIGGERING

INTERNAL: same as main time base except there is no Line Frequency triggering.

Table 1-1. Specifications (Cont'd)

STARTS AFTER DELAY: delayed sweep automatically starts at end of delay period.
TRIGGER: with delayed trigger level control out of detent (Starts After Delay) delayed sweep is triggerable at end of delay period.
EXTERNAL: dc to 100 MHz on signals of 50 mV p-p or more, increasing to 100 mV p-p at 300 MHz.
Maximum Input: ±250 V (dc + peak ac) at 1 kHz or less.
EXTERNAL INPUT RC: approx 1 megohm shunted by approx 15 pF.

TRIGGER LEVEL AND SLOPE
Internal: at any point on the vertical waveform displayed when in triggered mode.
External: continuously variable from +1.0 V to —1.0 V on either slope of the trigger signal, +10 V to — 10 V in divide by 10 mode (÷10).
COUPLING: AC, DC, LF REJ, or HF REJ.
AC: attenuates signals below approx 10 Hz.
LF Reject: attenuates signals below approx 7 kHz.
HF Reject: attenuates signals above approx 7 kHz.

TIME INTERVAL
Delay Time: first marker may be positioned anywhere from 0.5 to 10X of the main TIME/DIV setting of 20 ns to 0.5 s (minimum delay is 50 ns).
Delay Jitter: refer to Time Interval Measurements, Stability.

TIME INTERVAL MEASUREMENTS.
Function: measures time interval between two events on channel A (channel A display); between two events on channel B (channel B display); or between two events starting from an event on channel A and ending with an event on channel B (Alternate display).
Display Units: 0(s); —3(ms); —6(μs); or —9(ns).
Resolution: intervals <1 cm, >0.01% of full scale; intervals >1 cm, >0.1% of full scale; maximum display resolution, 20 ps.
Stability (0°C to +55°C): short term, <0.01%. Temperature, ±0.03%/°C deviation from calibration temperature range.

Accuracy

Main Time Base Setting	Accuracy (+20°C to +30°C)
100 ns/div to 20 ms/div	±0.5% of measurement ±0.02% of full scale for measurements <1 cm. For measurements >1 cm, ±0.5% of measurement ±0.05% of full scale.
50 ns/div*	±0.5% of measurement ±0.06% of full scale.
20 ns/div*	±0.5% of measurement ±0.15% of full scale.
50 ms/div to 0.5 s/div	±3%.

*Starting after 60 ns of sweep.

RECIPROCAL OF TIME INTERVAL MEASUREMENTS (1/TIME)
Function: calculates and displays the reciprocal of the measured time interval.
Display Units: 0 (Hz); 3 (kHz); 6 (MHz).
Accuracy: same as Time Interval Measurements.
Resolution: same as Time Interval Measurements.
Stability: same as Time Interval Measurements.

MIXED TIME BASE

Dual time base in which the main time base drives the first portion of sweep and the delayed time base completes the sweep at the faster delayed sweep. Also operates in single sweep mode.

X-Y OPERATION

BANDWIDTH
Y-axis (channel A): same as channel A.
X-axis (channel B): dc to >3 MHz.
DEFLECTION FACTOR: 10 mV/div to 5 V/div (9 calibrated positions) in 1, 2, 5 sequence.
PHASE DIFFERENCE BETWEEN CHANNELS: <3°, dc to 1 MHz.

Table 1-2. General Information

CATHODE-RAY TUBE AND CONTROLS

TYPE: post accelerator, approx 20.5 kV accelerating potential, aluminized P31 phosphor.

GRATICULE: 8 x 10 div internal graticule. 0.2 subdivision markings on major horizontal and vertical axes. 1 div = 1 cm. Rear panel adjustment aligns trace with graticule. Internal flood gun graticule illumination.

BEAM FINDER: returns trace to CRT screen regardless of setting of horizontal, vertical, or intensity controls.

INTENSITY MODULATION: +8 V. ≥50 ns width pulse blanks trace of any intensity, useable to 20 MHz for normal intensity. Input R, 1 kΩ ±10%. Maximum input +10 V (dc + peak ac).

AUTO-FOCUS: automatically maintains beam focus with variations of intensity.

INTENSITY LIMIT: automatically limits beam current to reduce possible CRT damage. Circuit response time ensures full writing speed for viewing low duty cycle, fast rise time pulses.

REAR PANEL CONTROLS: astigmatism, pattern, main/delayed intensity ratio, and trace align.

GENERAL

REAR PANEL OUTPUTS: main and delayed gates, —0.7 V to +1.3 V capable of supplying approx 3 mA.

CALIBRATOR: 1 kHz ±15% square wave; 3 V p-p ±1%; rise time, <0.1 μs.

POWER: 100, 120, 220, 240, —10% +5%; 48 to 440 Hz; 110 VA max.

WEIGHT: net, 13.2 kg (29 lb); shipping, 18.1 kg (40 lb).

OPERATING ENVIRONMENT: temperature, 0°C to 55°C; humidity, up to 95% relative humidity at 40°C; altitude, to 4600 m (15 000 ft); vibration, vibrated in three planes for 15 minutes each with 0.254 mm (0.010 in.) excursion, 10 to 55 Hz.

DIMENSIONS: see outline drawing.

ACCESSORIES FURNISHED: Two Model 10017A Voltage Divider Probes, one Model 10115A blue light filter; one front panel cover; one 2.3 m (7.5 ft) power cord; one vinyl accessory storage pouch; one Operating and Service Manual.

NOTES
1. Dimensions are for general information only. If dimensions are required for building special enclosures, contact your HP Field Engineer.
2. Dimensions are in millimeters and (inches).