The HP 16517/18A

Technical Specifications

4-GSa/s Timing and 1-GSa/s
Synchronous State for the
HP 16500A/B Logic Analysis System

SPECIFICATIONS

Specified for an input signal VH = -0.9V, VL = -1.7V, slew rate = 1V/ns,and threshold = -1.3V.

Minimum Input Voltage Swing	500 mV peak to peak
Threshold Accuracy	±2% of input signal ±50 mV
Minimum External Clock Period	1 ns.
Setup/Hold Per pod* Across pods	350 ps/350 ps 750 ps/750 ps 350 ps/350 ps, with manual deskew. Actual setup/hold adjustable with sample offset in all modes. * For the frequency range of 62.5 MHz to 20 MHz, a duty cycle of 40% to 60% is required

CHARACTERISTICS

Probes

Input DC Resistance	100 Kohms, + or - 2%
Input Impedance	DC thru 400 ns rise time 100 Kohms, typical 3.5 ns thru 350 ps 500 ohms, typical

HP 16517/18A Probe load equivalent circuit

500 Ω   0.2 pF   3 pF   100k Ω
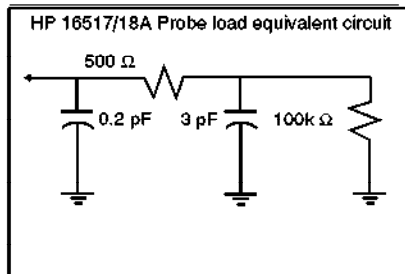
Input Capacitance	0.2 pF and then, through 500 ohms, 3 pF

Minimum Input Overdrive	250 mV or 30% of input (whichever is greater) above the pod threshold.
Threshold Range Increments	-5.0 V to +5.0 V in 10 mV increments.
Threshold Setting	Preset TTL, ECL, or User-defined on a per pod basis.
Input Dynamic Range	± 5V about the threshold.
Maximum Input Voltage	40 V peak-to-peak.

Synchronous State Analysis

Maximum External Clock Speed	1 GHz, requires a periodic clock.
Minimum State Speed	20 MSa/s, requires a periodic clock.
Minimum Detectable Pulse Width	900 ps
Channel Count	16 per card, up to 80 in one frame.
Channel-to-Channel Skew across up to 80 channels	Per pod:250 ps, typical Across pods:1 ns, typical 250 ps, with manual deskew
Memory Depth per Channel	65536 samples.
State Clocks	One external clock is available on the master board. No clocks are available on the expander board. Clock edge is selectable as positive or negative.
State Clock Duty Cycle Range	1 GHz thru 500 MHz: 45% - 55%, typical 500 MHz thru 250 MHz: 30% - 70%, typical 250 MHz thru 20 MHz: 20% - 80%, typical
Oversampling	2x, 4x, 8x, 16x, and 32x, with a maximum rate of 2 GSa/s.

Timing Analysis

Timing Modes	Conventional timing.
Timing Speed	15.3 KSa/s - 2 GSa/s full channel, 4 GSa/s half channel.
Sample Period	500/250 ps minimum (full/half channel mode), 65.536 us maximum.
Channel Count	16/8 per card (full/half channel mode) up to 80/40 in one frame.
Minimum Detectable Pulse Width	4 GSa/s 800 ps, typical 2 GSa/s or less 1.1 ns, typical
Memory Depth per Channel	65536 samples full channel mode, 131072 samples, half channel mode
Time Covered by Data	32.8 us at 2 GSa/s or 4 GSa/s up to 4.3 s at 15.3 KSa/s.
Time Interval Accuracy	+ or -(sample period + channel-to-channel skew + 0.005% of time interval reading).
Sample Period Accuracy	0.005% of sample period
Channel-to-Channel	250 ps across all channels, typical.
Maximum Delay After Triggering	(2 to the 20th)*(sample period) or 16.78 ms at or below 16 ns sample period. Note: When oversampling, use *oversampled period* for *sample period* above.

Trigger Characteristics

Pattern Recognizers	4. Each pattern recognizer is the AND combination of bit (0,1, or X) patterns.
Pattern Width	16/32/48/64/80 channels.
Minimum Pattern Recognizer Pulse Width	2.25 ns.

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Technical Specifications
Continued

Edge Recognizers*	2. Trigger on a rising, falling, or either edge on any channel. Edges are OR'd across all channels.
Edge Width*	16/32/48/64/80 channels.
Edge Counting Frequency*	444 MHz.
Edge Detection* Greater than Duration Less than Duration	up to 1 GHz. 0 nsec to 510 nsec range, accuracy is + or - 2.25 ns. 4 nsec to 510 nsec range, accuracy is + or - 2.25 nsec.
Qualifier	A user-specified term that can be any state, no state, any recognizer (patterns or edges), the timer, or the logical combination (AND, OR, XOR) of the recognizers and timers.
Branching	Each sequence level has two branching qualifiers. When satisfied, the analyzer will branch to the specified sequence level.
Maximum Occurrence Count	16,777,216.
Maximum Sequencer Speed	500 MHz.
State Sequence Levels	4 plus trace point.
Timing Sequence Levels	4 plus trace point.
Timer/Counter	There is one timer or counter per sequence level, which is restarted upon each entry into each level.
Timer/Counter Range	Timing mode: 0 s to 33 ms State mode: 500 MHz to 1 GHz, (user clock period)* (2 to the 23rd) below 500 MHz, (user clock period)*(2 to the 24th)
Timer Resolution timing mode state mode	2 ns above 500 MHz, 2 * user clock period below 500 MHz, user clock period
Timer Accuracy	0.005% of timer value.

*Timing mode only

Measurement and Display Functions

Arming	Can be armed by the Run key, the external SMB, or the Intermodul Bus (IMB).
Trace Mode	Single mode acquires data once per trace specification. Repetitive mode repeats single mode acquisitions until Stop is pressed or until pattern time interval or compare stop criteria are met.
Labels	Channels may be grouped together and given a 6-character name. Up to 126 labels in each analyzer may be assigned with up to 32 channels per label. Trigger terms may be given an 8-character name.
Activity Indicators	Provided in the Format menu for monitoring device-under-test activity while setting up the analyzer. The indicators only function when the analyzer is stopped.
Pod ID	A button provided on each pod which, when pressed, causes the display of its slot letter and pod number on the analyzer screen.
Markers	Two markers (X and O) are shown as dashed lines in the display.
Trigger	Displayed as a red vertical dashed line in the waveform display and as line 0 in the listing and compare displays.

Measurement Functions

Run	Starts acquisition of data in specified trace mode.
Stop	In single trace mode or the first run of a repetitive acquisition, Stop halts acquisition and displays the current acquisition data. For subsequent runs in repetitive mode, Stop halts acquisition of data and does not change current display.
Time Interval	The X and O markers measure the time interval between events.

Patterns	The X or O marker can be used to locate the nth occurrence of a specified pattern before or after trigger, or after the beginning of data. The O marker can also find the nth occurrence of a pattern before or after the X marker.
Statistics	X to O marker statistics are calculated for repetitive acquisitions. Patterns must be specified for both markers, and statistics are kept only when both patterns can be found in an acquisition. Statistics are minimum X to O time, maximum X to O time, average X to O time, and ratio of valid runs to total runs.
Compare Mode Functions	Performs a post-processing bit-by-bit comparison of the acquired state data and Compare Reference data.
Compare Reference	Created by copying an acquisition into the compare reference buffer. Allows editing of any bit in the Compare Reference to a 1, 0 or X.
Compare Reference Boundaries	Each channel (column) in the compare reference can be enabled or disabled via bit masks. Upper and lower ranges of states (rows) in the compare reference can be specified. Any data bits that do not fall within the enabled channels and the specified range are not compared.
Stop Measurement	Repetitive acquisitions may be halted when the comparison between the current acquisition and the Compare Image is equal or not equal.
Compare Mode Display	Reference Listing display shows the Compare Reference and bit masks; Difference Listing display highlights differences between the current acquisition and the Compare Reference.

Data Entry/Display

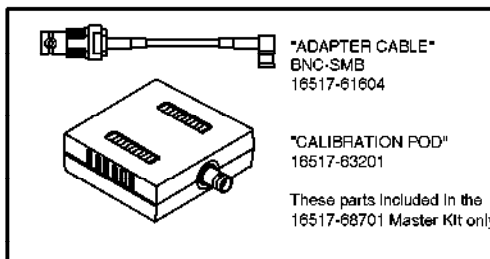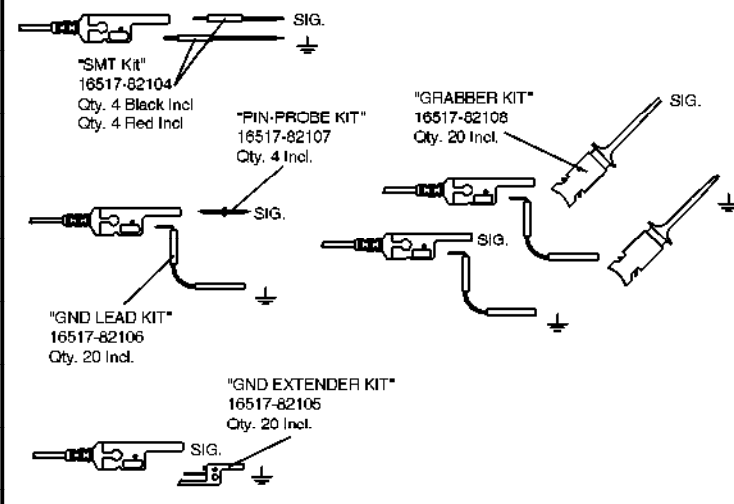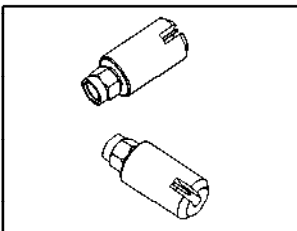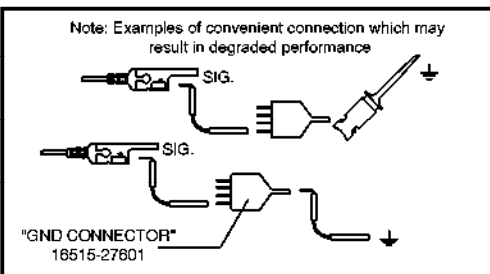|	
Display Modes	Listing, Waveform, Compare Reference Listing, Compare Difference Listing. Time-correlated oscilloscope traces can also be displayed in the waveform display mode when the intermodule bus is used.
Markers	Correlated to listing, and waveform displays. Available as pattern, time, or statistics.
Waveform Displays	Display acquisition in waveform format.
Sec/div	250 ps to 50 s.
Delay	-2,500 s to +2,500 s.
Accumulate	Waveform display is not erased between successive acquisitions.
Overlay Mode	Multiple channels can be displayed on one waveform display line. When waveform size is set to large, the value represented by the waveforms is displayed inside the waveforms in selected base.
Displayed Waveforms	24 lines maximum on one screen. Up to 96 lines may be specified and scrolled through.
Bases	Binary, Octal, Decimal, Hexadecimal, ASCII (data displays only), User-defined symbols, two's compliment.
Pattern Symbols	User can define a mnemonic for the specific bit pattern of a label. When label base is SYMBOL, mnemonic is displayed where the bit pattern occurs.
Range Symbols	User can define a mnemonic covering a range of values. When data display is SYMBOL, values within the specified range are displayed as mnemonic + offset from base of range.
Number of Symbols	1000 maximum.

Master Kit — Part Number 16517-68701
Expansion Kit — Part Number 16518-68701

Full Performance Configurations

"SMT Kit"
16517-82104
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"ADAPTER CABLE"
BNC-SMB
16517-61604

"CALIBRATION POD"
16517-63201

These parts Included In the
16517-68701 Master Kit only.

For supplemental or replacement parts, order the part numbers as shown

Note: Examples of convenient connection which may result in degraded performance

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"GND CONNECTOR"
16515-27601

SMA Probe Adapter
Part Number —
16517-27601

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Printed in U.S.A. 2\94
5091-7216 E