MODULE SPECIFICATIONS

This section lists only characteristics and measurement-related specifications (i.e., common specifications that apply to making measurements) for the following elements and mainframe:

- HP 70700A Digitizer

- HP 70001A Mainframe

- HP 70205A Graphics Display

- HP 70206A System Graphics Display

HP 70700A DIGITIZER

Specifications

Analog Input:

    Analog (3 dB) bandwidth:

        Input 1 . . . . >35 MHz

        Input 2 . . . . >35 MHz

    Damage Level:

        1 MΩ input impedance . . . . ±12V above 1 kHz, ±40 below 1kHz

        50Ω input impedance . . . . 5V rms

    Isolation between Inputs 1 and 2 . . . . >40 dBc at 10 MHz
                                                    (with input coupling set to dc 50Ω)

    Gain accuracy . . . . ±1%
    (after recalibration at operating temperature)

    Gain accuracy without recalibration . . . . ±1% + 0.03%/°C

    Offset Accuracy . . . . ±1%
    (after recalibration at operating temperature)

    Offset Accuracy without recalibration . . . . ±1% + 0.1%/°C

Digitizing Performance:

    Resolution . . . . 10 bits; 1 part in 1024

    Internal reference . . . . 20 MHz ±0.01%

Effective number of bits* . . . . >7.5 at 1 MHz (with ±1V sine wave)
$\geq$7.0 at 10 MHz (with ±1V sine wave)

Harmonic and spurious distortion . . . . >50 dBc at 1 MHz (with ±1V sine wave)
>45 dBc at 10 MHz (with ±1V sine wave)

Data Storage:

Memory size . . . . 262,144 10-bit samples

Record length . . . . 20 to 261,888 10-bit samples

General:

Temperature:
Operating . . . . 0 to 55°C
Storage . . . . –40 to +70°C

Humidity:
Operation . . . . 0 to 95% at +40°C

EMI:
Conducted and radiated interference is in compliance with CISPR publication 11 (1975) and
Messempfaenger-Postverfuegung 526/527/79 (Kennzeichnung Mit F-Nummer/Funkschutzzeichen).
Radiated interference is in compliance with MIL-STD 461B, Part 7, RE02.

Warm-up time . . . . 15 minutes, from cold start

Power and cooling requirements . . . . provided by the HP 70000 Series mainframe

Net weight *(characteristic only)* . . . . 2.2 kg (4.9 lbs)

Dimensions . . . . 1/8-width module

Supplemental Characteristics

Multi-channel configurability

Number of channels per HP 70700A module . . . . one
Maximum number of channels with display control . . . . four
Maximum number of channels with external controller . . . . eight**
Multi-channel sampling . . . . synchronous
Digitizer performance in multi-channel system . . . . same as for single channel

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* The effective number of bits specification is a measure of dynamic performance. Refer to HP Product
Note 5180A-2, "Dynamic Performance Testing of A to D Converters" for more information.

** More channels can be configured into a system if some external circuitry is provided. Consult factory.

Programmability

Fully programmable via HP-IB
Based on the proposed standard, "IEEE-488.2—Codes, Formats, Protocols and Common Commands".

Analog Input

Selection: Two analog inputs, one active at any time.

Connectors:

	Input 1	Input 2
Front Panel	BNC (f)	(none)
Rear Panel	SMB (f)	SMB (f)

Input coupling and impedance: Selectable via softkeys (manual operation) or under program control (remote operation), as follows:

	Capacitance	
Coupling/Resistance	Input 1	Input 2
AC, 1 MΩ	60 pF	45 pF
DC, 1 MΩ	60 pF	45 pF
DC, 50 Ω	60 pF	45 pF

Input ranges (full scale) . . . . ±0.3V, ±1V, ±3V, ±10V.

Maximum sensitivity . . . . 0.5 mV/LSB on the ±0.3V range

Input offset voltage . . . . ±100% of attenuator range in 1% steps

Probe selection . . . . 1×, 10×, or 50×

Timebase

External reference input: 10 to 20 MHz; TTL level; positive and negative widths must each be greater than 24 ns.

Available sampling rates: R/N, where R is the reference frequency and N is an integer between 1 and 2^{23}, inclusive.

Dual Timebase: second timebase is switched in after $8N$ samples, where N is between 1 and 32,768, inclusive.

Random-Event Capture: Each time a trigger is received, a record of data (consisting of a predetermined number of pre- and post-trigger samples) is recorded in a different segment of memory. No re-arm time is required between triggers. The relative times of the triggers are recorded with a precision of one sample period. Either the absolute or the relative times of the triggers may be examined with or without reading the data. The total number of records of data that can be captured depends on the size of the records and the mode of operation, and is typically several hundred. The maximum allowable time between triggers is 22 minutes at a sampling rate of 20 megasamples/second and using the smallest possible record size (worst-case conditions).

Equivalent Time Sampling: A detailed record of a periodic waveform is constructed from sparse samples collected over many periods. For Equivalent Time Sampling to function, the periodic waveform must be jitter-free, the pulse width must be greater than one sample period, and the fundamental frequency must not be an integer-submultiple of the reference frequency.

Data Storage and Transfer

Waveform registers: Four 512-point waveform registers are available for storage, display, and trace math.

Maximum data transfer rate: 60 kbyte/s (depends on receiving instrument)

Triggering

Source: Channel 1, external, line and none (free running)

Trigger timing uncertainty (without interpolation): 50 ns

Internal triggering modes: Trigger when waveform passes through a level (positive, negative, or either slope); trigger when waveform goes above a level, below a level, or outside a range.

External triggering modes: TTL level (positive, negative, or either edge)

Triggering Parameters:

Holdoff: The amount of time the module will wait before re-arming the trigger, adjustable between 0 and 10,000 seconds in 10 ms steps.

Hysteresis: Adjustable in 1% steps (available in level/slope triggering only)

External trigger input: TTL level; impedance is equivalent to one 74AS TTL load.

Pre- and post-trigger data: A "trace" or record of samples may be aligned anywhere in the interval $[K - 2^{18}, K + 2^{20}]$, where K is the index of the sample corresponding to the trigger.

Display features (requires HP 70000 Series display)

Screen modes: full/split

Background: Grid, frame or axes

Trace display modes: Dot mode (each sample point is represented by a dot); line mode (adjacent sample point dots are connected by line segments).

Interpolation: The sampling density is increased by digital processing. Zeroes are inserted between samples, and the resulting unsampled waveform is then digitally lowpass-filtered. The available lowpass filters are: Gaussian (gradual rolloff), and brickwall (sharp cutoff).

Detection sampling modes: A subsampled waveform is obtained by dividing the time axis into uniform intervals, and retaining from each the maximum or minimum value of the original sampled waveform. The available modes are conventional sampling (sample detection), positive peak detection, negative peak detection, and alternate peak detection.

Frequency mode: An FFT (fast Fourier transform) is computed of the trace currently being displayed. The magnitude (in dB) of the transform is displayed as a function of frequency. The available FFT sizes are 32, 64, 128, ..., 1024 points. Nevertheless, the number of points displayed in frequency domain is not restricted to be a power of two; intermediate sizes are obtained through sample rate conversion in the frequency domain. The available windows are Hanning, flat-top, and uniform.

Other display features: Time and voltage markers; trace averaging.

Automatic measurement and analysis

Auto-scale: Adjusts sampling rate and input attenuation levels to match the characteristics of the input signal.

Automatic pulse parameter measurements: Rise time, fall time, duration of positive or negative portion of pulse, duty cycle, period, fundamental frequency, pre-shoot, over-shoot, peak-to-peak voltage, RMS voltage.

Waveform math functions: Point-by-point trace addition, subtraction, multiplication, and computation of additive inverse. Operands may be selected from the channels and trace memories.

HP 70001A MAINFRAME

General

Temperature:
operation . . . . 0°C to +55°C
storage . . . . −40°C to +75°C
Humidity:
operation . . . . 0 to 95% relative humidity at +40°C
EMI:
Conducted and radiated interference is in compliance with CISPR publication 11 (1975) and Messempfaenger-Postverfuegung 526/527/79 (Kennzeichnung Mit F-Nummer/Funkschutzzeichen). Radiated interference is in compliance with MIL-STD 461B, Part 7, RE02.
Line Voltage . . . . 100, 120, 220, and 240 Vac (+5%, −10%)
Line Frequency:
standard . . . . 47—66 Hz
Option 400 . . . . 356—444 Hz
Power consumption . . . . 650 VA maximum
Warm-up time:
One hour warm-up from cold start . . . . 0°C to 55°C
Weight (characteristic only) . . . . 14.5 kg (31.9 lb)