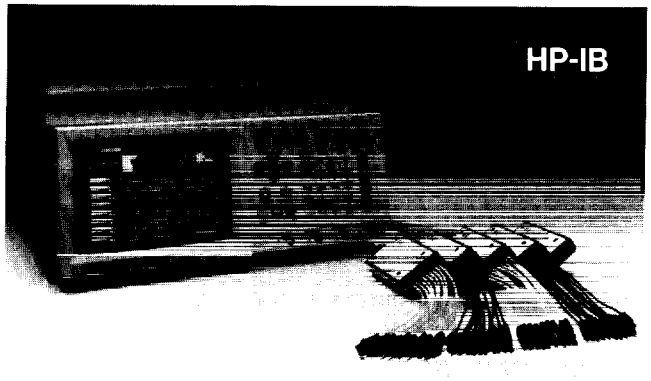
DATA GENERATORS & DATA ANALYZERS

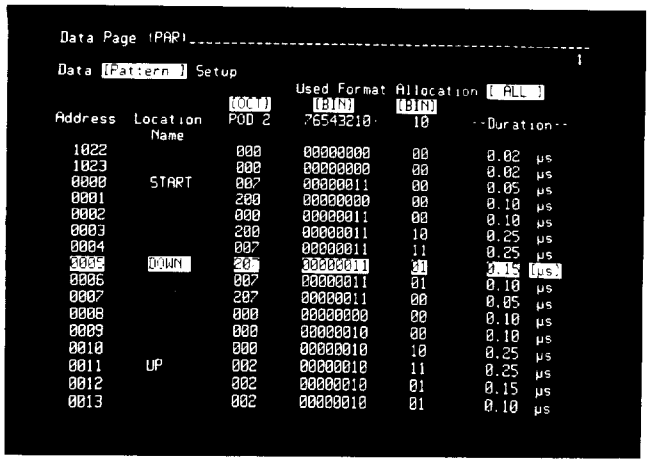
50 MHz Digital/Analog Signal Generator

Model 8175A

- 24 channels / 1 kbits ea / 50 Mbits/s ea
  2 channels / 8 kbits ea / 100 Mbits/s ea
- Individual pattern duration 20 ns to 9.99 s
- Virtual Memory Expansion
- Interaction with DUT
- Dual Arbitrary Waveform Generator (opt)

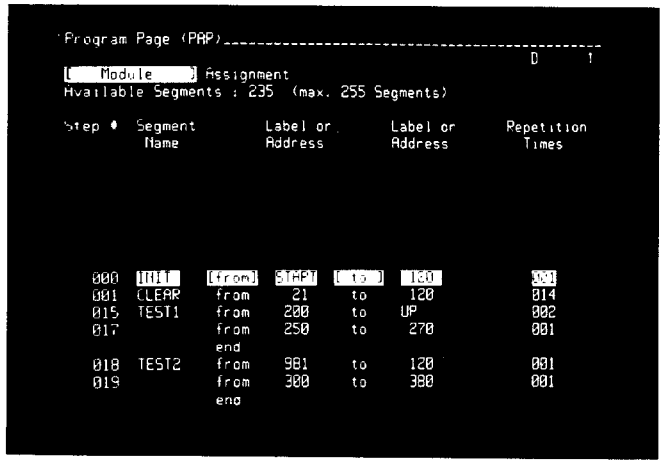


HP 8175A with output pods (15461A/15462A/15464A) and trigger pod (15463A)



Data Page: Pattern Set-Up

Data can be entered and displayed in various codings. Channels to be displayed can be selected. Comprehensive data editing support is provided. For instance, segments can be moved or copied to other memory addresses or data segments can be 'block modified'. Easy exchange of data between channels avoids having to rearrange probes at the test fixture. Also, fixed patterns such as up and down counters with selectable start and stop address are loaded with a few keystrokes. All codings from the pattern Set-Up page will be automatically converted into a timing diagram when switched to this page. Or, the data can be set-up from scratch or easily edited in terms of waveforms.



Program Page: Segment Assignment

This page gives an example of how pattern sequencing can be defined. Up to 255 segments of data memory can be defined by first and last addresses or labels in the 0000 to 1023 address range. During data execution the segments are real-time sequenced in the given order thus virtually expanding the memory depth far beyond the physical depth of 1024 data patterns.

HP 8175A Digital/Analog Signal Generator

The HP 8175A delivers high-speed parallel and serial data with programmable patterns, adequate for at-speed testing of most of present and future logic circuits. Individually Programmable Pattern Durations permit complex timing set-ups for simulation of extreme, asynchronous timings without wasting memory. Virtual Memory Expansion allows very long data sequences by branching to up to 255 user-definable memory segments. Interaction with a device under test provides for simulation of a wide range of data paths in digital systems. Output pods provide the appropriate levels for most logic families and flexible interface adapters ensure the specified signal quality at the probe tip, a precondition for reliable results.

A Fine Timing option (opt. 001) enhances the timing resolution provided with Programmable Pattern Durations in order to delay four channels with 100 ps.

Operational convenience is stressed through a large, menu driven CRT, a comprehensive data editor including waveform graphics and the capability to directly access (via HP-IB) a printer for documentation and a flexible disc drive for use as a test data library.

In Engineering Test, this versatile feature set provides early simulation of elements not yet available, speeding design cycles through reduced integration time at circuit, module and system level.

In Production Test and Incoming Inspection, automated at-speed testing at the module and system level results in early failure detection, thus reducing production cost and improving quality.

Combining the HP 8175A Digital Signal Generator with a HP 1630/31 family logic analyzer results in a complete Stimulus-Response measurement system. For more information on the HP 1630/31 family logic analyzers refer to the respective pages in this catalog.

Option 002 (Dual Arbitrary Waveform Generator)

With Option 002, the HP 8175A provides two arbitrary channels in addition to the full capabilities of the standard digital signal generator. Thus, some of the stimulation challenges -whether digital, analog or both together- can be met with a single unit (for further information about the analog capabilities, see page 420).

Specifications

Specifications apply for operating temperatures from 0°C to 55°C.

Parallel / Serial Data Generator

Number of channels: 24 parallel, 2 serial
Bits per channel: 1024 parallel, 8192 serial
Max. NRZ Bit rate per ch.: 50 Mbit/s parallel, 100 Mbit/s serial
Pattern Duration (with internal clock):

In *Parallel* mode the duration of each individual pattern is programmable. In *Serial* mode the duration of the data bits is programmable with successive bits always having the same duration. The duration is equal for all channels.

Range/Resolution: (10)*, 20 ns - 9.99 µs / 10 ns
10 µs - 999 µs / 1 µs
1 ms - 99.9 ms /100 µs
0.1 s - 9.99 s / 10 ms
* 10 ns in serial mode with fixed timing

Accuracy: ±0.05% of progr. duration ±2.5ns (asynchronous start)
±0.5% of progr. duration ±2.5ns (synchr. start, clock calibration)
±3.0% of progr. duration ±2.5ns (synchr. start, no clock cal.)

Jitter (max.): 0.1% of progr. value +150ps

Pattern Duration (with external clock): Period of ext. clock x m

m (Range)		/ Resolution:
(1)2**	to	999 / 1 period
1 000	to	99 900 / 100 periods
100 000	to	9 990 000 / 10 000 periods
10 000 000	to	999 000 000 / 1 000 000 periods

** Min. Pattern duration in parallel mode 20ns, in serial mode 10ns.

Clock

The clock has a programmable period. It is available on line 7 of the pod for the output flags. In serial mode an additional Clock is available providing a pulse at every bit.

Period (with internal clock):
Range / Resolution: 20ns - 9.99µs / 10ns; 2µs - 999µs / 1µs
Accuracy: ±0.05% of progr. value ±2.5µs (asynchronous start)
±0.5% of progr. value ±2.5µs (synchr. start, clock cal.)
±3% of progr. value ±2.5µs (synchr. start, no clock cal.)

Period (with external clock): Period of external clock x m
Range: m = 2,3,4 . . . 999, 1000, 1100, 1200, . . . 99 900
Skew (maximum time difference between the leading or trailing data bit edges of the same memory address with Fine Timing off)
across ECL pods: ≤6 ns: typical ≤3 ns
across TTL/CMOS pods: ≤7 ns; typical ≤3 ns

Option 001 Fine Timing (can be retrofitted in HP service office)

Parallel Data Generator
Channels: 0,1,2 and 3 of pod 0
Delay (Range/Resolution): 20 ns to 40 ns / 100 ps
Accuracy: ±5% of progr. value ±1 ns
Serial Data Generator
Channels: 0 and 2 of pod 0
Delay (Range/Resolution): 0 ns to 20 ns / 100 ps
Accuracy: ±5% of progr. value ±2 ns

External Input (BNC)

This connector can be used to start / stop datacycling with selectable transitions.
Impedance: 10 kΩ/ 50 pF
Threshold (Range/Resolution): −9.9V to +9.9 V/100 mV
Accuracy: ±5% of progr. value ±250 mV
Min. swing: 600 mV pp
Min. overdrive: 250 mV or 30% of input amplitude
Max. input voltage: ±20 V

External Clock (BNC)

Clock rate (Range): 8Hz to 100 MHz
All other specifications see External Input (BNC).

External Reference (BNC)

Input characteristics: LS TTL compatible

Ordering Information	Price
HP 8175A Digital/Analog Signal Generator	$11200
Note: HP 8175A must be ordered with at least one of the options #002, #003, #004, #005 or individual pods, as required.	
Options:	
Opt. 001 Fine Timing; 4 channels, 100 ps resolution	add $1325
Opt. 002 Dual Arbitrary Waveform Generator	add $3465
Opt. 003 Set of 4 ECL Pods Model HP 15461A and 1 Trigger Pod Model HP 15463A	add $4430
Opt. 004 Set of 4 TTL Pods Model HP 15464A and 1 Trigger Pod Model HP 15463A	add $3005
Opt. 005 Set of 4 TTL/CMOS Pods Model HP 15462A and 1 Trigger Pod Model HP 15463A	add $6670
Opt. 908 Rack Flange Kit (PN 5061-9678)	add $36 ☎
Opt. 910 Additional Operating/Programming/Service Manual	add $204
Opt. 916 Additional Operating/Programming Manual	add $36
Opt. W30 Two additional years of HP Service	$250
Pods:	
HP 15461A ECL Pod (fixed ECL levels, includes 1 ea HP 15429A)	$970
HP 15462A TTL/CMOS Pod (programmable High Level, incl. 1 ea HP 15429A)	$1530
HP 15463A Trigger Pod (includes lead set and 10 ea probe tip)	$560
HP 15464A TTL Pod (fixed TTL levels, includes 1 ea HP 15429A)	$610
Adaptors for HP 15461A, HP 15462A and HP 15464A:	
HP 15408A plug-on grabbers with ground leads 5 ea	$100
HP 15409A plug-on BNC adaptors, 5 ea	$100
HP 15410A plug-on SMB adaptors, 5 ea	$100
HP 15411A plug-on coax open-end adaptors, 5 ea	$65
HP 15415A plug-on miniprobe, usable with HP 10024A IC clip, 5 ea	$100
HP 15429A solder-in receptacles (standard accessory, 5x2 ea)	$51
Adaptors for HP 15463A:	
HP PN 15463-63201 lead set	$65
HP PN 10230-62101 probe tip, 1 ea (10 ea necessary per pod)	$3
Others:	
HP 15430A cable for synchronized master-slave operation of two ea HP 8175A	$76
HP 10062A Protective Cover (for front panel)	$75

☎ Fast-Ship product—see page 766

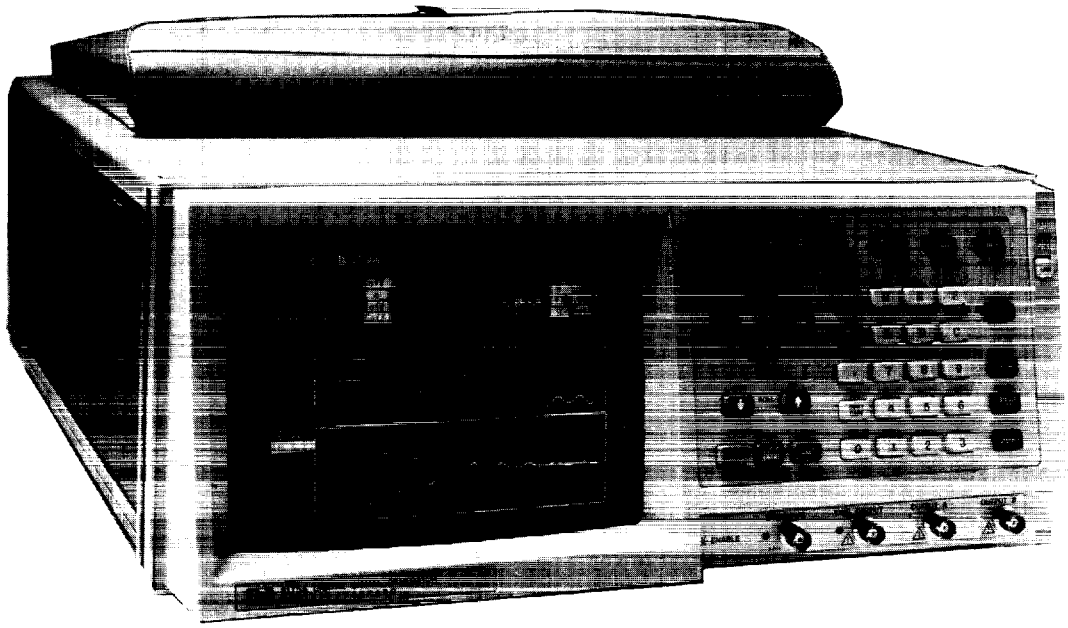
FREQUENCY, FUNCTION & WAVEFORM SYNTHESIZERS

Dual Arbitrary Waveform Generator

Model 8175A Option 002

- 2 analog channels / 1 kpoints ea / 50 MHz ea
- individual datapoint durations 20 ns to 9.99 s
- 10 bit amplitude resolution
- digital and analog signals simultaneously
- 4 waveform entry modes; calculator, graphical editing, abs. and rel. levels, various codings
- up to 32 Vp-p output voltage (into open), separately programmable offset (max ±16 V)

DESIGNED FOR HP-IB SYSTEMS



HP 8175A, Option 002; Data Page: Waveform Setup

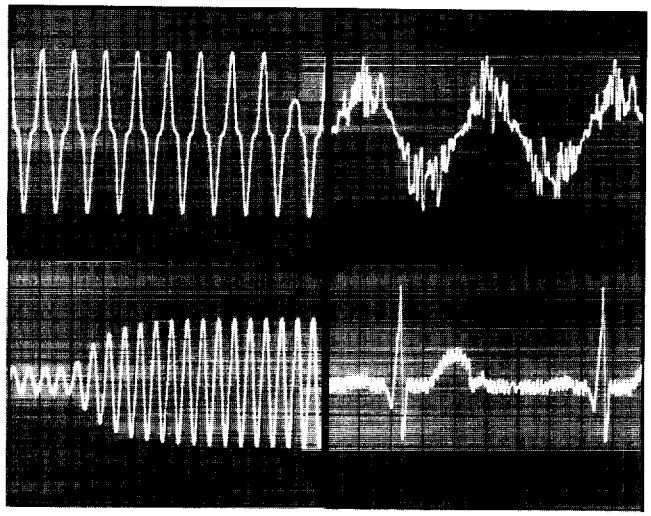
With the Option 002, the Dual Arbitrary Waveform Generator, the HP 8175A offers the new Arbitrary Waveform mode in addition to the existing Parallel and Serial modes. In the Arbitrary Waveform mode, you have: Dual arbitrary waveform channels, and simultaneous equivalent digital signals. This means you have the ideal source for difficult applications, for example:

- simulation of two dependent variables, like force and distance, at the same time.
- digital and analog stimulation of devices like programmable filters.
- stimulus and compare signals at the same time for DACs or ADCs.

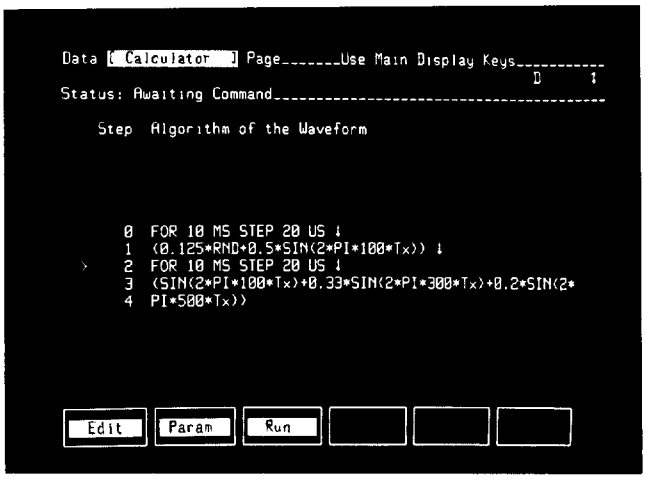
The arbitrary outputs are 50 Mpoints/s, synchronous, but independent in shape and amplitude (max 16 V p-p into 50 Ohm and max 32 V p-p into open), and the waveforms can be set up by means of: a) algorithms (a fundamental set of mathematical functions are available, including noise), b) interpolations (linear and spline), c) graphic or tabular entry of instantaneous level (or amplitude and offset), d) tabular entry of equivalent digital pattern. Additionally, any existing waveform can be modified. One way is simply by tabular or graphical editing. A more powerful alternative is the "Combine" feature. This allows you to combine an algorithm arithmetically with any desired part of the current waveform.

For further information about the digital capabilities of the HP 8175A see page 318.

Application Examples

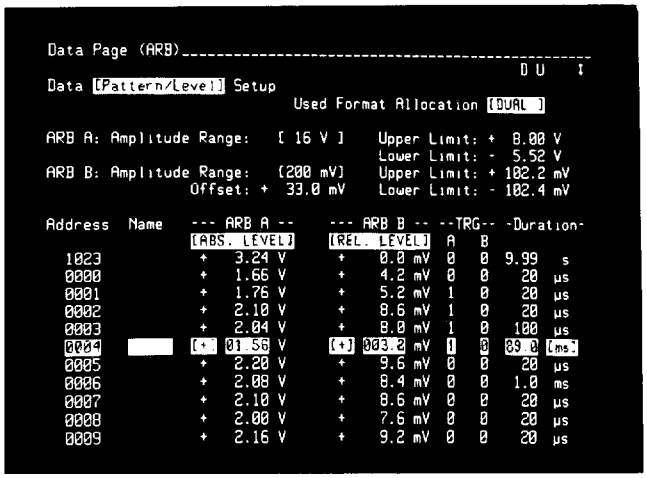


The comprehensive feature set, together with the outstanding memory management and interaction capability, mean that "real-life" simulation for the most exacting circuits is within your grasp.



Data Page: Calculator

The built in Calculator provides a comfortable method of setting up very complex, mathematically-definable waveforms by simply entering the formula. Softkeys support most of the fundamental mathematical functions. The Combine capability allows any previously generated function to be combined with the current calculated function. By this means, noise can be introduced into any desired parts of the waveform.



Data Page: Pattern/Level Set-Up

Data Points of a waveform can be entered and displayed in absolute or relative levels or in various codes. Comprehensive waveform editing support is provided. For instance, segments of data points can be moved or copied to other memory locations or waveform segments can easily be exchanged between the two analog channels. In this way it is easy to produce phase shifted signals. Graphical editing of the waveform, including interpolation between data points, is possible on this menu.

Specifications

apply for operating temperatures from 0° to 55°C.

Option 002 Dual Arbitrary Waveform Generator (can be retrofitted in HP service office)

Number of Analog Outputs: 2
Number of Bits: 10
Number of Data Points:
Horizontal: 1024 points
Vertical: 1000 points with additional 24 points override
800 points for 16 V p-p Output Voltage Range
640 points for 32 V p-p Output Voltage Range
Differential Non-Linearity: ≤1 LSB (monotonic)
Output Impedance: 50 Ohm ±5%

Output Levels

Load Impedance: 50 Ohm:
7 Output Voltage Ranges: 0.2 V to 16 V, Res. 0.2 mV to 20 mV
2 Offset Ranges: ±0.8 V and ±8 V (Output Volt. Range >1 V)
Load Impedance: ≥50 kOhm
7 Output Voltage Ranges: 0.5 V to 32 V, Res. 0.5 mV to 50 mV
2 Offset Ranges: ±1.6 V and ±16 V (Output Volt. R. >2V)

Accuracy (Output A and Output B)

Amplitude Accuracy: ±4% ±4 LSB
Offset Accuracy: ±1% of programmed value
±2% of (progr. High Level of p-p Output Volt. + progr. Low Level of p-p Output Volt.) (if High and Low Level are identical in magnitude, but opposite in sign, this error will be zero).

plus:
into 50 Ohm: ±10 mV for 0.2 V, 0.5 V and 1 V ranges
or: ±25 mV for 2 V and 5 V range
or: ±50 mV for 10 V and 16 V range
into ≥50 kOhm: ±20 mV for 0.5 V, 1 V and 2 V ranges
or: ±50 mV for 5 V and 10 V range
or: ±100 mV for 20 V and 32 V range

Timing (for Output A and B)

The maximum sample update rate is 50 MHz.
The Data Point Duration is 20 ns to 9.99 s.
Trigger Output Characteristics:
Number of Trigger Output Channels: 2
Trigger Output Impedance: 50 Ohm ±5%
Trigger Output Levels: ECL into 50 Ohm
TTL into 50 Ohm and ≥50 kOhm
Trigger Pulse Width: The trigger can be set for each individual data point to High Level or Low Level. The trigger width depends on the programmed Data Point Duration.

Ordering Information	Price
HP 8175A Digital/Analog Signal Generator	**$11200**
Note: HP 8175A must be ordered with at least option #002 or one of the digital options (refer to page 319).	
Opt. 002 Dual Arbitrary Waveform Generator	$3465
Opt. 908 Rack Flange Kit (P/N 5061-9678)	$36☎
Opt. 910 Additional Operating/ Programming/Service Manual	$204
Opt. 916 Additional Programming Manual	$36

☎ Fast-Ship product—see page 766