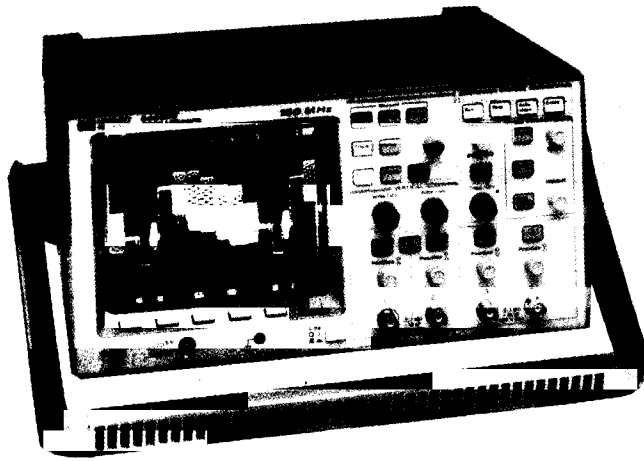


Oscilloscopes

General Purpose and Troubleshooting

HP 54600B
HP 54602B
HP 54603B
HP 54645A

- 60 MHz to 150 MHz Bandwidths
- Fast update rates
- Analog look and feel
- 1 Meg of memory (HP 54645A)



HP 54602B, 150 MHz Oscilloscope

The HP 54602B is a powerful general-purpose scope, with four channels, and 1 mv/div sensitivity.

Key Features

- 4 channels (2 + 2), two 150 MHz full feature and two 250 MHz limited attenuation channels
- 1 mV/div to 5 V/div sensitivity
- 4K memory
- Responsive front-panel controls
- High screen-update rate, 1.5 million points/second

HP 54600B, 100 MHz Oscilloscope

The HP 54600B is ideal for production test, field service and education—anywhere you need a solid, dependable, general-purpose scope at a low price.

Key Features

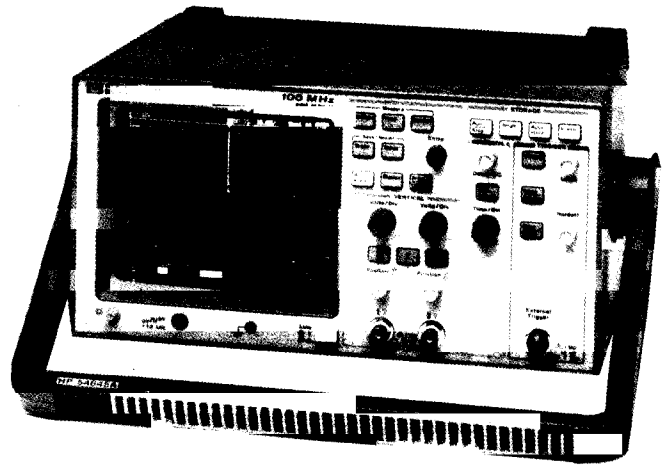
- 100 MHz bandwidth
- 2 channels
- 4K memory
- 2 ns to 5 s/division timebase

HP 54603B, 60 MHz Oscilloscope

Even with tight budget restrictions, the HP 54603B delivers the features and performance of an HP oscilloscope. For colleges and universities, this scope is a great way to introduce students to the world of professional test equipment.

Key Features

- 60 MHz bandwidth
- 2 channels
- 4K memory
- 5 ns to 5 s/division timebase
- 7-inch raster CRT



HP 54645A, 100 MHz MegaZoom Oscilloscope

The HP 54645A is no ordinary 100 MHz oscilloscope. It may look and operate like the rest of the HP 54600 series but there is one big difference—it is running with a megabyte of memory.

Key Features

- 100 MHz bandwidth
- 200 MSa/s sample rate, on both channels
- 1 megabyte of memory, on both channels
- Fast screen-update rate, 3 million points/second
- 1 mv to 5 V/division vertical sensitivity
- 2 ns to 50 s/division timebase

HP 54645A MegaZoom Oscilloscope

The HP 54645A oscilloscope brings the advantages of deep memory with none of the disadvantages usually associated with this class of oscilloscopes. The HP 54645A is a dual channel 100 MHz oscilloscope with 200 MSa and a full 1 MB of memory behind each of its channels. Through the application of MegaZoom technology, this deep-memory oscilloscope has a high speed/low dead time display and a highly-responsive front panel. Unlike all other deep memory scopes which force the user to choose between fast response and deep memory, MegaZoom technology gives you a scope that is always fast and deep. Pan-and-zoom operation is as simple as turning the time/division knob. No special menus or controls are required to take full advantage of the HP 54645A's deep memory.

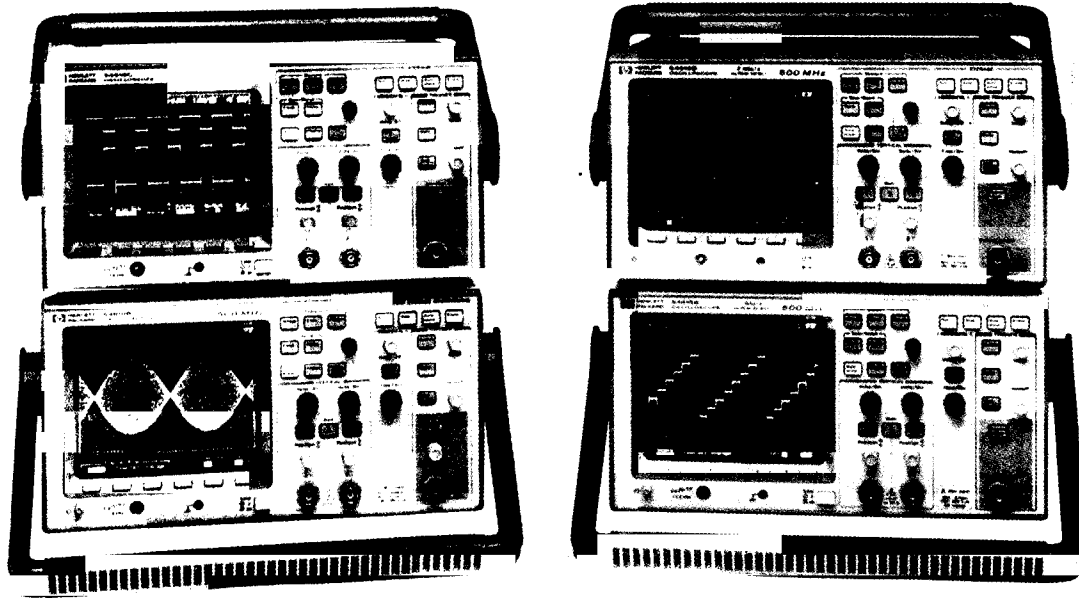
A powerful glitch trigger extends the power of MegaZoom technology in solving your toughest troubleshooting problems. Simply set up the desired pulse width that represents a worse case situation and after the scope finds it, pan and zoom through the deep waveform record to find out exactly what was going on in your circuit that caused the problem.

Multiple-Processor Architecture

HP uses a multiple-processor architecture in the HP 54600 series of oscilloscopes. This is one of the ways in which HP delivers ease of use, with a responsive high update-rate oscilloscope. The parallel processing utilized in the HP 54600 series allows acquisition and display systems of the oscilloscope to function independent of the human interface and measurement systems. This makes for a general-purpose troubleshooting scope that is responsive to changes in your waveform, as well as responding to changes initiated from the front panel.

- 500 MHz bandwidth
- Up to 2 GSa/s sample rates
- Fast update rates
- 500 MHz bandwidth
- Up to 2 GSa/s sample rates

HP 54610B
HP 54615B
HP 54616B
HP 54616C



The 500 MHz Members of the 54600 Series

There are four choices for 500 MHz general-purpose troubleshooting scopes. These scopes are designed with troubleshooting and debug in mind. Simple, responsive, direct-access controls coupled with a responsive display make debugging easy.

HP 54610B Oscilloscope

The HP 54610B is the lowest cost 500 MHz scope on the market today. It provides a high-quality 500 MHz scope for troubleshooting repetitive signals.

Key Features

- 500 MHz bandwidth
- Low cost
- 4K memory
- High display-update rate, 1.5 million points/second
- 1 M Ω /50 Ω selectable inputs

HP 54615B Oscilloscope

The HP 54615B is a 500 MHz scope with a 1 GSa/s sample rate. The 1 GSa/s sample rate allows the single-shot capture of phenomena up to 250 MHz.

Key Features

- 500 MHz bandwidth
- 250 MHz single shot
- 1 GSa/s sample rate, on both channels
- 1 ns peak detect, on all sweep speeds
- 5K memory
- Built-in power for HP active probes
- Fast screen-update rate, 0.5 million points/second
- 1 M Ω /50 Ω selectable inputs

HP 54616B/C Oscilloscope

The HP 54616B (monochrome) and the HP 54616C (color) offer the highest sample rate available in the HP 54600 series. At 2 GSa/s, these scopes can capture signals up to 500 MHz, single shot or repetitive. With features like 1 ns peak detect, 5K of memory, responsive display and 1 Meg or 50 ohm inputs, this scope will meet your troubleshooting needs today and in the future.

Key Features

- 500 MHz bandwidth
- 500 MHz single shot
- 2 GSa/s sample rate, on both channels
- 1 ns peak detect, on all sweep speeds
- Color (HP 54616C)
- 5K memory
- Built-in power for HP active probes
- Fast screen-update rate, 0.5 million points/second
- 1 M Ω /50 Ω selectable inputs

1 ns Peak Detect

When activated, the peak detect of the HP 54615B and HP 54616B/C runs the samplers at no less than 1 GSa/s at all sweep speeds. HP's implementation of peak detect does not effect the bandwidth of the scope and is operational at all sweep speeds.

Powerful, Efficient and Compact

When you think about powerful 500 MHz digital scopes, the first thing that might come to mind is large and complicated. The HP 54600 family has four models that are neither, making them ideal troubleshooting and debugging oscilloscopes. These scopes are compact (can fit under a plane seat) and weigh under 15 pounds. They also retain some of the attributes that were valued in analog scopes. Knobs that allow direct access control of vertical and horizontal scaling and positioning are just one of the many features that make these scopes easy to use. High update rate and a real-time vector display respond instantly to changes in your waveform. This powerful combination will help you get answers fast.

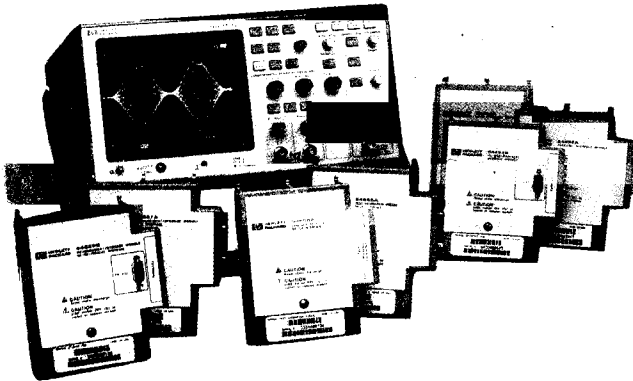
Oscilloscopes

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General Purpose and Troubleshooting

HP 54600 Series

- Hard-copy output to printer or plotter
- Remote instrument control
- Enhanced automatic measurements
- Extended trace storage, math operations, and FFT
- Unattended signal monitoring



3

A Full Family of Add-On Interface and Enhancement Modules



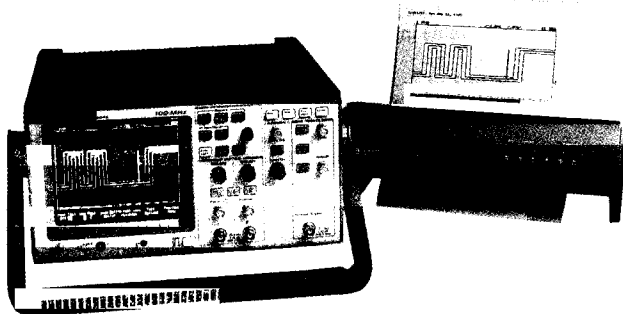
The HP 54600 series scopes use a complete range of optional interface modules for hard-copy output, remote programmability, and custom test functionality. These modules plug into the back of most HP 54600 series scopes, adding advanced capability to your general-purpose, trouble-shooting scope. You can create a measurement solution for your specific test needs. No other scope in its class can offer these capabilities—and the price is right.

HP 54650A HP-IB Interface Module

This module provides full remote control and hard-copy output to HP-IB printers and plotters. Programming is in accordance with IEEE-488.2. With the addition of this module, the oscilloscope's two trace memories become non-volatile.

HP 54652B RS-232/Parallel Interface Module

This module provides computer interface via RS-232 and printing via parallel in one module. The RS-232 interface also can be configured for printing when not being used for remote programming. With the addition of this module, the oscilloscope's two trace memories become non-volatile.



Hard copy output to HP's most popular printers

HP 54657A HP-IB and 54659B RS-232 and Parallel Measurement/Storage Modules

The HP 54657A and 54659B measurement/storage modules bring enhanced measurement and storage power to your HP 54600 scope. Added features include:

- FFT
- Up to 100 non-volatile trace memories
- New automatic measurements with user-defined levels
- New channel-to-channel delay and phase measurements
- Real-time clock for time- and date-tagging of hard copy and stored traces
- Unattended pass/fail signal monitoring

Automatic Measurements and Waveform Math

The measurement/storage module adds measurement capabilities such as:

- Amplitude, pulse overshoot and preshoot, delay, and phase angle
- 10%/90%, 20%/80%, and user-defined voltage thresholds for rise-time and fall-time measurements
- New measurement formats of percentage and phase angle
- Waveform multiplication, differentiation, and integration

Additional Trace Storage

The modules add three high-speed, non-volatile trace storage locations and 64K of trace memory to the HP 54600 scope. The modules use a data compression technique for trace memory storage, allowing you to save up to 96 additional waveforms, depending on trace complexity.

Unattended Signal Monitoring

The measurement/storage module simplifies circuit analysis and debugging by comparing your live signal to a test template you create. If the scope detects a failure, it can perform one of three tasks:

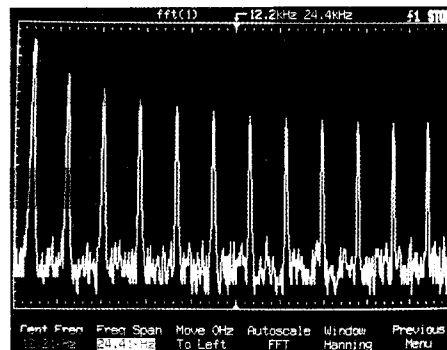
- Store the failing trace to memory, along with the time and date of the failure
- Print the trace (with time and date) on a printer
- Note the failure and maintain pass/fail statistics while continuing the test

Built-in mask generation and editing software make creating your test template simple. Once your mask and test are created, you can leave them in the module's non-volatile memory or store it to a PC with HP BenchLink software. This capability lets you easily run tests to characterize your circuits, whether for a short time or many days. You can even use the measurement/storage module in conjunction with a PC for enhanced throughput and to take advantage of the automatic measurements.

FFT—A New Measurement Dimension

The measurement/storage module now has the ability to give you frequency information for your input waveforms. Fast Fourier Transform (FFT) capability allows you to find and identify unusual waveform frequency components. FFT also allows you to check the fidelity of your signal or compare it to other similar-looking waveforms. The FFT autoscale function simplifies frequency domain set-up.

The measurement/storage module's FFT capability includes frequency and amplitude cursors (with both dBm and dBv scaling), which let you make quick, accurate measurements. Choose between Hanning, flat-top, exponential, and rectangular windows. You can even view the frequency components of a single shot event.



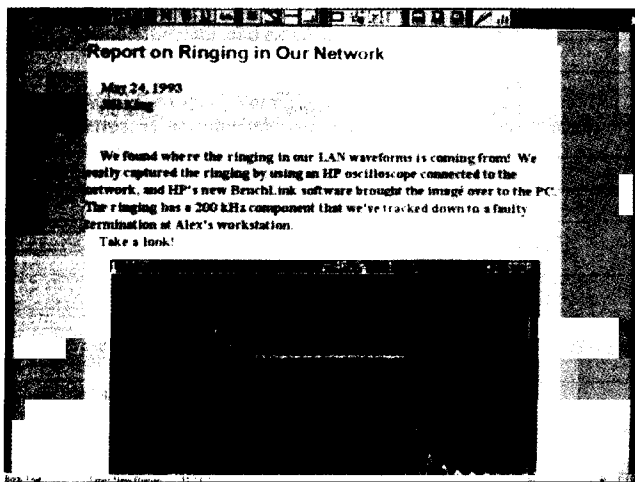
HP 54600 Series Software and Accessories

HP 34810B BenchLink Scope Windows Software (Option 106) Offers Connectivity

The HP BenchLink Scope provides a simple communications link between your PC and the HP 54600 and 54500 families of oscilloscopes. HP BenchLink Scope is a member of the HP BenchLink family of PC/basic instrument connectivity solutions, and takes full advantage of the Windows interface to easily transfer screen images, waveform data, front-panel setups, and even custom test information via HP-IB or RS-232 interfaces.

HP BenchLink Scope makes it easy to move important information from scope to PC. You'll be able to transfer:

- Screen images—you can transfer a bitmap picture of the scope screen to your PC for viewing, annotation, storage or printing. HP BenchLink Scope provides convenient annotation tools, and Windows makes it easy to cut and paste your annotated image into other applications. You can also save your image in PCX and TIF formats. You'll find documenting lab results to be fast and simple.
- Waveform data—HP BenchLink Scope transfers the actual waveforms on screen to your PC for further review and analysis. You can simultaneously capture scope and logic waveforms, and, once captured, use waveform markers in HP BenchLink Scope to review your data. HP 54645A/D users can also use pan and zoom to effectively review 1 MB spreadsheets and analysis programs, and you can save waveform data in a variety of formats.
- Instrument setups—the full front-panel setup of your scope can be saved in the PC for later use. You can store setups for several different tests or configure multiple scopes with the setup created on a master scope.



HP BenchLink/Scope makes PC connections easy

HP 54654A Operator's Training Kit (Option 103 to HP 54600 Series Instruments)

The operator's training kit consists of a training signal board and lab workbook. The signal board provides 12 signals that show various operating modes and features of an HP 54600 series oscilloscope. Nineteen logic analyzer test points are also provided to demonstrate the features of the HP 54600 series logic analyzers or mixed signal oscilloscope. After completing the labs, the user can operate the instrument and make measurements with no extra training. This kit is ideal for the educational environment and can also be an excellent tool for training new employees. The operator's training kit comes with signal board, manual, and 9 V battery, all contained in an attractive case.

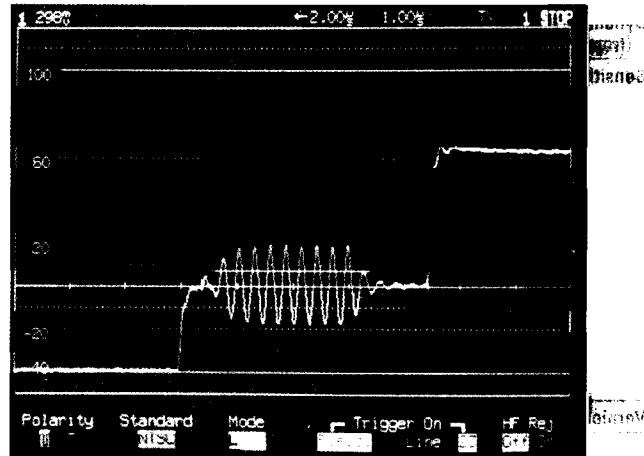
Two-Year Warranty Extension (Option W50)

Option W50 for HP 54600 series scopes extends the normal three-year warranty for an additional two years, giving you five years of worry-free operation.

Enhanced Performance for Video Applications (Option 005 to Select HP 54600 Series Scopes)

With the addition of Option 005, enhanced TV/video triggering, to the HP 54602B, HP 54610B, HP 54615B, HP 54616B/C or HP 54645A oscilloscopes, you will be able to trigger on any specified line of video in either NTSC, PAL, PAL-M, SECAM or generic video formats. With this additional triggering, you will be able to easily view signals that are often very dim or invisible on most analog scopes. Once you have the signal of interest displayed, you can measure it with digital precision.

With Option 005, a full bandwidth signal output is added to the scope's rear panel. Now you can bring additional measuring instruments to the signal at the scope's probe tip.



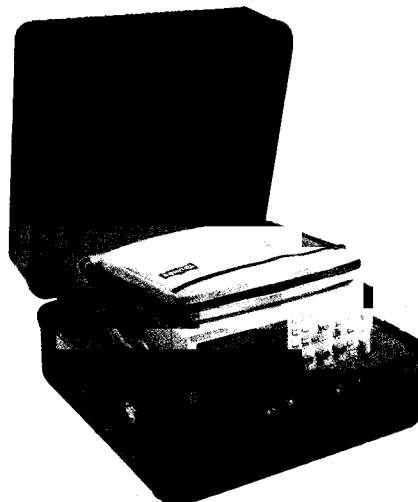
Live NTSC broadcast video

HP 10098A Pouch and Front Panel Cover (Option 101 to HP 54600 Series Scopes)

The pouch provides probe and accessory storage on top of the scope and is easily removable for rackmounting. The front panel cover provides sturdy protection of the front panel display and knobs when transporting the scope.

HP 1185A Carrying Case (Option 104 to HP 54600 Series Scopes)

The HP 1185A carrying case makes transporting and shipping your HP 54600 series oscilloscope safe and simple. A scope, optional module, and other accessories fit neatly inside the padded shell of hard plastic, and the case is lockable for shipment.



Oscilloscopes

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General Purpose and Troubleshooting

HP 54600 Series

Product Specific Performance Characteristics

Vertical system	HP 54603B	HP 54600B	HP 54602B	HP 54610B	HP 54615B/ HP 54616B/C	HP 54645A
Bandwidth (BW) Ch. 1 and 2	dc to 60 MHz	dc to 100 MHz	dc to 150 MHz 100 MHz @ 1, 2, & 5 mV/div	dc to 500 MHz ⁷	dc to 500 MHz ⁷	dc to 100 MHz 75 MHz @ 1, 2 and 5 mV/div
Ch. 3 and 4	N/A	N/A	dc to 250 MHz	N/A	N/A	N/A
Rise time (calculated) Ch. 1 and 2	5.8 ns	3.5 ns	2.3 ns	700 ps	700 ps	3.5 ns
Ch. 3 and 4	N/A	N/A	1.4 ns	N/A	N/A	N/A
Input R & C	1 MΩ, ≈ 13 pf	1 MΩ, ≈ 13 pf ⁸	1 MΩ, ≈ 13 pf	1 MΩ, ≈ 9 pf	1 MΩ, ≈ 9 pf	1 MΩ, ≈ 13 pf
Dynamic range (from center screen)	± 8 divisions	± 8 divisions	± 8 divisions	± 12 divisions	± 12 divisions	± 8 divisions
Sensitivity (per division) Ch. 1 and 2	2 mV to 5 V	2 mV to 5 V	1 mV to 5 V	2 mV to 5 V	2 mV to 5 V	1 mV to 5 V
Ch. 3 and 4	N/A	N/A	0.1 V and 0.5 V	N/A	N/A	N/A
Accuracy	± 2%	± 1.5%	± 1.5%	± 2%	± 2%	± 1.5%
Vernier accuracy	± 3.5%	± 3%	± 3%	± 2%	± 2%	± 3%
Maximum input dc + peak ac	400 V	400 V	400 V	250 V or 5 V RMS in 50 Ω mode	250 V or 5 V RMS in 50 Ω mode	400 V
Selectable BW limit Ch. 1 and 2	20 MHz	20 MHz	20 MHz	30 MHz	30 MHz	20 MHz
Horizontal system						
Accuracy	± 0.01%	± 0.01%	± 0.01%	± 0.01%	± 0.005%	± 0.01%
Vernier accuracy	± 0.05%	± 0.05%	± 0.05%	± 0.05%	NA	± 0.05%
Resolution	100 ps	100 ps	100 ps	25 ps	20 ps	40 ps
Delay jitter	10 ppm	10 ppm	10 ppm	10 ppm	1 ppm	10 ppm
Sweep speed	5 s/div to 5 ns/div	5 s/div to 2 ns/div	5 s/div to 2 ns/div	5 s/div to 1 ns/div	5 s/div to 1 ns/div	50 s/div to 2 ns/div
Acquisition system						
Max. sample rate	20 MSa/s	20 MSa/s	20 MSa/s	20 MSa/s	1 GSa/s ¹⁰ /2 GSa/s	200 MSa/s ¹⁰
Single shot BW	2 MHz	2 MHz	2 MHz	2 MHz	250 MHz/500 MHz ¹⁰	50 MHz ¹⁰
Peak detect (single chan.)	50 ns	50 ns	50 ns	50 ns	1 ns ¹⁰	5 ns ¹⁰
Record length (pts. vectors off/on)	4,000/2,000	4,000/2,000	4,000/2,000	4,000/2,000	5,000/2,000	1 Meg
Max. update rate vectors off	1.5 M pts/s	1.5 M pts/s	1.5 M pts/s	1.5 M pts/s	0.5 M pts/s	3 M pts/s
Trigger system						
Sensitivity Ch. 1 and 2	dc to 25 MHz, 0.35 div or 3.5 mV dc to 60 MHz, 1 div or 10 mV	dc to 25 MHz, 0.35 div or 3.5 mV dc to 100 MHz, 1 div or 10 mV	dc to 25 MHz, ⁹ 0.35 div or 3.5 mV dc to 150 MHz, 1 div or 10 mV	dc to 25 MHz, 0.35 div or 3.5 mV dc to 500 MHz, 1 div or 10 mV	dc to 100 MHz, 0.5 div or 3.5 mV dc to 500 MHz, 1 div or 7 mV	dc to 25 MHz 0.35 div or 3.5 mV dc to 100 MHz, 1 div or 10 mV
Sensitivity Ch. 3 and 4	N/A	N/A	dc to 250 MHz 1 div or 10 mV	N/A	N/A	N/A
External trigger range	± 18 V	± 18 V	N/A	± 18 V	± 2 V	± 18 V
External trigger sensitivity	dc to 25 MHz, 50 mV dc to 60 MHz, 100 mV	dc to 25 MHz, 50 mV dc to 100 MHz, 100 mV	N/A	dc to 100 MHz, 75 mV dc to 500 MHz, 150 mV	dc to 100 MHz, 75 mV dc to 500 MHz, 150 mV	dc to 25 MHz, 50 mV dc to 100 MHz 100 mV
External trigger input R&C	1 MΩ, ≈ 13pf	1 MΩ, ≈ 13pf	N/A	1 MΩ, ≈ 12pf or 50 Ω	1 MΩ, ≈ 12pf or 50 Ω	1 MΩ, ≈ 13pf
External trigger input maximum input	400 V (dc + peak ac)	400 V (dc + peak ac)	N/A	250 V (dc + peak ac) or 5 V rms in 50 Ω	250 V (dc + peak ac) or 5 V rms in 50 Ω	400 V (dc + peak ac)

¹ Temperature is ± 10° C from calibration.

² Use full scale of 80 mV for 2 mV/div and 5 mV/div ranges on HP 54600B, HP 54615B, HP 54616B/C and HP 54603B. Use full scale of 40 mV for 2 mV/div range on HP 54610B. Use full scale of 56 mV for 2 mV/div range on HP 54615B, HP 54616B/C. Use full scale of 16 mV for 1 mV/div or HP 54602B.

³ Use full scale of 50 ns for 2 ns/div.

⁴ Tested to Hewlett-Packard environmental specification section 758 for Class B-1 products.

⁵ Characteristic for the HP 54602B only.

⁶ Characteristic for HP 54610B and HP 54615B, HP 54616B/C only.

⁷ Upper BW reduces by 2 MHz per degree C above +35° C.

⁸ Characteristic for HP 54603B only.

⁹ 1, 2, 5 mV/div dc to 25 MHz, 1 div or 2 mV.

¹⁰ Simultaneous on both channels.

Product Specific Performance Characteristics**Vertical System—All Models**

Math Functions: Channel 1 \pm Channel 2
Cursor Accuracy¹/Single Cursor: Vertical accuracy \pm 1.2% of full scale \pm 0.5% of position value
Dual Cursor: Vertical accuracy \pm 0.4% of full scale
Inversion: Channel 1 and Channel 2
CMRR: -20 dB at 50 MHz

Vertical System (HP 54610B, 54615B, 54616B/C)

50 Ω Protection: Protects 50 Ω load from excessive voltage
Probe Sense: Automatic readout of 1X, 0X, 20X, and 100X probes

Horizontal System—All Models

Cursor Accuracy (t and 1/t)²: \pm 0.01% \pm 0.2% of full scale \pm 200 ps
Pre-Trigger Delay (negative time): 10 div
Post-Trigger Delay (trigger to start of sweep): At least 2560 div or 50 ms. Not to exceed 100 s.
Time Skew (HP 54610B, HP 54615B, 54616B/C): Each channel adjustable over a range of \pm 25 ns to remove effects of cabling

Delayed Sweep

Main Sweep 5 s/div to 10 ms/div: Delayed sweep; up to 200 x main
5 ms/div and Faster: Up to 2 ns/div/1 ns/div³/5 ns/div³

Trigger System**Sources**

HP 54602B: Channels 1, 2, 3, 4, or line
HP 54600B, 54603B, 54610B, 54615B, 54616B/C 54645A:
 Channels 1, 2, line, and external

Coupling: ac, dc, LF reject, HF reject, and noise reject.
 LF and HF: -3 db at 50 kHz.

Modes: Auto, Auto-level, Normal, Single, and TV
TV Triggering: TV line and field. Requires 0.5 div of composite sync for stable display (Channels 1 and 2).
Holdoff: Adjustable from 200 ns to 13 s from 300 ns (HP 54615B, 54616B/C)

External Trigger (HP 54600B, HP 54603B, HP 54610B, HP 54615B, HP 54616B/C, HP 54645B)

Coupling: dc, HF reject and noise reject

External Trigger (HP 54610B only)

Coupling: ac and dc
Trigger View: External trigger is viewable
Bandwidth: \geq 350 MHz

X-Y Operation—All Models

Z-Blanking: TTL high-blanks trace (Not available on HP 54615B, HP 54616B/C)
Bandwidth: X and Y same as vertical system
Phase Difference: \pm 3° at 100 kHz, \pm 3° at 10 MHz (HP 54615B, HP 54616B/C), \pm 1.8° at 1 MHz (HP 54645A)

Display System—All Models Except HP 54616C

Display: 7-inch raster CRT
Resolution: 255 vertical x 500 horizontal points
Controls: Front-panel intensity control
Graticule: 8 x 10 grid or frame
Auto-Store: Saves previous sweeps in half-bright display and the most recent sweep in full-bright display

Acquisition System—All Models

Resolution: 8 bits
Simultaneous Channels: Channels 1 and 2 or Channels 3 and 4 (HP 54602B)
Average: Number of averages selectable from 8, 64, 256

Advanced Functions—All Models

Automatic Measurements: Continuously updated
Voltage: V avg, V rms, V p-p, V top, V base, V min, and V max
Time: Frequency, period, + width, - width, duty cycle, rise time, and fall time
Cursors: Manually or automatically placed
Setup Functions Autoscale: Sets the vertical and horizontal deflection and the trigger level
Save/Recall: 15 front-panel setups; 10 front-panel setups (HP 54645A)
Trace Memory: 2 volatile pixel memories
TV Functions/Line Counting: Delay time calibrated in NTSC and PAL line numbers
All-Field Trigger (both fields selected): Oscilloscope triggers on the vertical sync pulse in both fields, allowing use with fields, allowing use with noninterlaced video

General**Power Requirements**

Line Voltage Range: 100 Vac to 240 Vac
Line Voltage Selection: Automatic

Line Frequency: 45 Hz to 440 Hz

Max. Power Consumption: 220 VA, 300 VA (HP 54615B, HP 54616B/C)

Environmental Characteristics: Meets the requirements of MIL-T-28800D for Type III, Class 3, Style D equipment as described later in this table

Ambient Temperature

Operating: -10° C to + 55° C

Nonoperating: -51° C to + 71° C

Humidity⁴

Operating: 95% RH at 40° C for 24 hrs.

Nonoperating: 90% RH at 65° C for 24 hrs.

Altitude

Operating: To 4,500 m (15,000 ft)

Nonoperating: To 15,000 m (50,000 ft)

EMI (Commercial) (MIL-T-28800D): Meets FTZ 1046 Class B. Meets requirements in accordance with paragraph 3.8.3 EMI Type III and MIL-STD-461C as modified by Table XII.

CE01: Part 2 narrow band requirements up to 15 kHz

CE03: Part 4

CS01: Part 2

CS02: Part 2

CS06: Part 5 limited to 300 V

RE01: Parts 5 and 6 measured @ 12-inch, 15 dB relaxation to 20 kHz excepted from 20 kHz to 50 kHz

RE02: Part 2 (limited to 1 GHz) full limits of Class A1C and A1F with Option 002 installed. Without Option 002 installed, 10 dB relaxation, 14 kHz to 1 GHz.

RS02: Part 2, Part I and Part 2, Part II, excepted

RS03: Part 2, limited to 1 V/meter from 14 kHz to 1 GHz (with Option 001 installed); slight trace shift from 80 MHz to 200 MHz.

Vibration: Operating 15 min. along each of the 3 major axes; 0.025-inch peak-to-peak displacement, 10 Hz to 55 Hz in 1-min. cycles. Held for 10 min. at 55 Hz (4 g at 55 Hz).

Shock: Operating 30 g, 1/2 sine, 11-ms duration, 3 shocks/axis along major axis. Total of 18 shocks.

Size (excluding handle): 322 mm W x 172 mm H x 317 mm D (12.7 in x 6.8 in x 6.8 in x 12.5 in)

Weight: 6.2 kg (14 lbs)

Safety: CSA certification, IEC-348, UL-1244 listed

HP 54600 Series

Product Specific Performance Characteristics

HP 54650A HP-IB Interface Module

Provides full remote control and hard copy to HP-IB printers and plotters. Programming is in accordance with IEEE-488.2. With the addition of this module, the scope's two pixel memories become non-volatile. An operating and programming manual and a programming examples disk are supplied.

Specifications: The interface capabilities of the HP 54600 series oscilloscope with this module installed are as defined by IEEE-488.1 as SH1, AH1, T5, L4, SR1, RL1, PP1, DC1, DT1, C0 and E2.

Printer/Plotter Supported: HP ThinkJet, HP QuietJet, HP PaintJet, and HP Laser-Jet; HP-GL compatible plotters.

HP 54652B RS-232/Parallel Interface Module

Provides full remote control via RS-232 and printing via parallel in one module. The RS-232 can also be configured for printing when not being used for remote control.

Specifications

Connector Type: 9 pin (m) DTE Port, works with HP 34398A RS-232 cable

Protocols: Xon/Xoff, hardware

Data Bits: 8

Parity: None

Baud Rates: 1200, 2400, 9600, or 19200

Printer/Plotter Support: HP ThinkJet, HP QuietJet, HP PaintJet, and HP Laser-Jet; HP-GL compatible plotters

Connector Type: 25 pin (F) connector, works with HP C2950A parallel printer cable

Supported Printers: Epson FX-80 or HP PCL compatible printers

HP 54657A and 54659B Measurement/Storage Modules

With the the addition of either the HP 54657A module with HP-IB interface or the HP 54659B module with RS-232 and parallel interface, the HP 54600 series oscilloscope will provide all of the following features:

19 Automatic Measurements consisting of:

Voltage: Vamp, Vavg, Vrms, Vpp, Vpre, Vovr, Vtop, Vbase, Vmin, and Vmax

Time: Delay, Duty Cycle, Frequency, Period, Phase Angle, Rise Time, Fall Time, + width, and -width

Thresholds: User selectable among 10%/90%, 20%/80%, or absolute voltage levels

Cursor Readout: Voltage or percentage

Modes: Time or phase angle

HP 54600-Series Scope Interface and Enhancement Modules

Ordering Information Product	Description	Price	HP-IB	RS-232	FFT and Advance Parallel	Windows MC-S	Software
1. HP 54650A	HP-IB Interface Module	\$295	•				
HP 54652B	RE-232 and Parallel Interface Module	\$295		•	•		
2. HP 54657A	HP-IB Measurement/Storage Module	\$495	•			•	
HP 54659B	RS-232 Measurement/Storage Module	\$495		•	•	•	
3. HP E2657A	Measurement/Connectivity Kit for HP-IB	\$695	•			•	•
HP E2659A	Measurement/Connectivity Kit for RS-232	\$695		•	•	•	•

(Note that the HP 54620A/C logic analyzers can use any of these modules, but they use the modules for I/O only.) HP 34810B BenchLink Scope software for Windows is available separately. See page 97.

1. Basic Connectivity

If all you need is a PC interface, add HP-IB with the HP 54650A or both RS-232 and parallel connections with the HP 54652B.

2. Connectivity and Advanced Measurements

For high-performance tools usually found only in much more expensive scopes—including the FFT to view signals in the frequency domain—add the HP 54657A (HP-IB) or HP 54659B (RS-232 and parallel) measurement/storage module.

Waveform Math Functions

Function 1: Addition, subtraction, and multiplication

Function 2: Differentiation, integration, and FFT

FFT

Windows: Exponential, flat top, Hanning and rectangular

Samples: 1024 points

Storage

Trace Memory: Up to 100 nonvolatile memories

Memories 1-3: High speed storage without compression

Memories 4-100: Storage with compression. Storage time is approximately 7 seconds. Number of traces that can be stored is a function of complexity, with the minimum being 4 highly complex traces and the maximum being 96.

Memory Labeling: An onscreen text editor is provided for creating labels up to 20 characters. Each label contains the date and time it was saved.

Real-Time Clock: 24-hour format with battery back-up. Can be set from front panel.

Unattended Waveform Monitoring

Testing Method: Comparison to waveform mask

Number of Masks: 2

Mask Generation and Operation: Automask, controlled from the front panel, generates mask from displayed wave-form with selectable tolerance. Mask editor function allows pixel-by-pixel editing and line drawing. Smoothing function performs a running average of 3 pixels.

Action on Failure:

Save failed trace to memory with date and time of the failure

Print failed trace with date and time of the failure

Count the failure and maintain pass/fail statistics while continuing the test

Hard Copy and Programmability Interface: HP 54657A: HP-IB

(for HP-IB specifications, see HP 54650A)

HP 54658A: RS-232 (for RS-232 specifications, see HP 54652B)

This module also provides many other features to make your work easier, including unattended signal monitoring and failure detection, measurements of channel-to-channel delay and phase, user-definable voltage levels for timing measurements, and extended math functions and cursor readouts.

3. Complete Connectivity, Including Software

Get the complete package, including HP BenchLink Scope software for documenting and analyzing measurement results (see page 97 for more information on HP BenchLink).

Ordering Information

HP 54600B Two-Channel 100-MHz Oscilloscope Includes two 1.5 m 10X probes (HP 10071A), operating and service guide, and line cord	\$2,550
HP 54602B Four-Channel 150-MHz Oscilloscope Includes two 1.5 m 10X probes (HP 10071A), operating and service guide, and line cord	\$3,050
HP 54603B Two-Channel 60-MHz Oscilloscope Includes two 1.5 m 10X probes (HP 10071A), operating and service guide, and line cord	\$1,995
HP 54610B Two-Channel 500-MHz Oscilloscope Includes two 1.5 m 10X probes (HP 10073A), operating and service guide, and line cord	\$4,495
HP 54615B Two-Channel 500 MHz Oscilloscope Includes two 1.5 m 10X probes (HP 10073A), operating and service guide, and line cord	\$5,695
HP 54616B Two-Channel 500 MHz Oscilloscope Includes two 1.5 m 10X probes (HP 10073A), operating and service guide, and line cord	\$6,695
HP 54616C Two-Channel 500 MHz Color Oscilloscope Includes two 1.5 m 10X probes (HP 10073A), operating and service guide, and line cord	\$7,695
HP 54645A Two-Channel 100 MHz MegaZoom Oscilloscope Includes two 1.5 m 10X probes (HP 10074A), operating and service guide, and line cord	\$3,495

Accessories

HP 54650A HP-IB Interface Module	\$295
HP 54652A Parallel Interface Module	\$286
HP 54652B RS-232 and Parallel Interface Module	\$295
HP 54654A Operator's Training Kit	\$208
HP 54655A Test Automation Module with HP-IB Interface (compatible with the HP 54600B, HP 54603B, HP 54602B and HP 54610B only)	\$780
HP 54656A Test Automation Module with RS-232 Interface (compatible with the HP 54600B, HP 54603B, HP 54602B and HP 54610B only)	\$831
HP 54657A Measurement/Storage Module with HP-IB Interface	\$495
HP 54658A Measurement/Storage Module with RS-232 Interface (not recommended for 54600B series)	\$780
HP 54659B Measurement/Storage Module with RS-232 and Parallel	\$495
HP 1146A Oscilloscope AC/DC Current Probe	\$407
HP 1137A 1000:1 High Voltage Divider Probe	\$215
HP 10070A 1.5 m 1X Probe	\$59
HP 10071A 1.5 m 10X 150 MHz Probe	\$79
HP 10072A SMT Probe Tip Kit for HP 10070A family of probes	\$67
HP 10073A 1.5 m 10X 500 MHz Probe	\$156
HP 10074A 1.5 m 10X 150 MHz Probe with Probe Sense	\$84
HP 10075A 0.5 mm SMT Probe Accessory Kit for the HP 10070A family of probes	\$152
HP 34397A DC to AC Inverter	\$163
HP 85901A AC Power Source	\$1,340

Options

Opt 001 Display EMI Shield (HP 54600-68703) Provides extra shielding for the CRT. For MIL standards or harsh magnetic environments (see page 99 for more details).	+\$105
Opt 002 Display Filter Provides additional reduction in radiated emissions. For MIL standards or measurement environments sensitive to radiated emissions (see page 99 for more details).	+\$362
Opt 005 Enhanced Video Trigger (not available on HP 54600B or HP 54603B) Adds the ability to trigger on a specified line of NTSC, PAL, PAL-M, SECAM, or general format video. IRE graticule, IRE cursor readout, video autoscale, and rear-panel outputs for trigger and channel input are added with this option.	+\$520
Opt 101 Accessory Pouch and Front-Panel Cover (HP 10098A)	+\$52
Opt 102 Two Additional 10071A Probes (54602B only)	+\$158

Price

Opt 103 Operator's Training Kit (HP 54654A) Consists of a training signal board and lab workbook. After completing these labs, an operator will be able to make measurements and operate the oscilloscope without any additional training.	+\$208
Opt 104 Carrying Case (HP 1185) Designed to protect the oscilloscope for shipment or for checking as airline baggage	+\$218
Opt 106 BenchLink Software (HP 34810B) Windows software that interfaces the scope (with either HP-IB or RS-232 module installed) to a PC for storage, analysis, or easy integration of waveform data into desktop publishing software	+\$300
Opt 090 Delete Probes for HP 54600B, 54602B, 54603B	-\$114
Opt 090 Delete Probes for HP 54610B, HP 54615B, HP 54616B/C	-\$306
Opt 090 Delete Probes for HP 54645A	-\$130
Opt 1CM Rackmount Kit (HP 5062-7345) 7-inch EIA standard rack	+\$265
Opt W50 Additional Two-Year Warranty (for a total of five years)	
HP 54600B	+\$60
HP 54602B	+\$85
HP 54603B	+\$50
HP 54610B	+\$125
HP 54615B	+\$140
HP 54616B	+\$165
HP 54616C	+\$190
HP 54645B	+\$100

For the Educators

These oscilloscopes are ideally suited for classroom use. Contact your local Hewlett-Packard sales office for details on specific education discount programs.

HP 54600 Interfacing and Hard Copy Output Information Compatibility Chart

The following table describes the devices supported by the HP 54600 series oscilloscopes:

	HP-IB modules	RS-232 modules	Parallel modules
Hewlett-Packard Printers (LaserJet, DeskJet)	N/A	N/A	Yes
Epson Printers (FX-80 or Compatible)	N/A	Yes	Yes
Computers	Yes	Yes	Yes
HP-PCL Printers	Yes	Yes	Yes
HP-GL Plotters	Yes	Yes	N/A

HP-IB Cables for HP 59650A and HP 59657A

HP 10833A 1 m Cable	\$90
HP 10833B 2 m Cable	\$100
HP 10833C 4 m Cable	\$110
HP 10833D 0.5 m Cable	\$90

RS-232 Cables for HP 54652B and HP 54659B

For connection to printers and plotters:	
HP 34398A 2.5 m, 9 Pin (f) to 9 Pin (f)	\$20
HP 34399A Adapter Kit	\$26

For connection to PCs:	
HP 34398A 2.5 m, 9 Pin (f) to 9 Pin (f) Plus 9 Pin (m) to 25 Pin (f) Adapter	\$20

RS-232 Cables for HP 54656A and HP 54658A	
For connection to printers and plotters:	
HP 13242G 5 m, 25 Pin (m) to 25 Pin (m)	\$49

For connection to IBM PC/XT computers:	
HP C2913A 1.5 m, 25 Pin (m) to 25 Pin (f)	\$18

For connection to PCs:	
HP 24542G 3 m, 25 Pin (m) to 9 Pin (f)	\$45

Parallel Cable	
HP C2950A 2 m, Parallel Printer Cable	\$14

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