

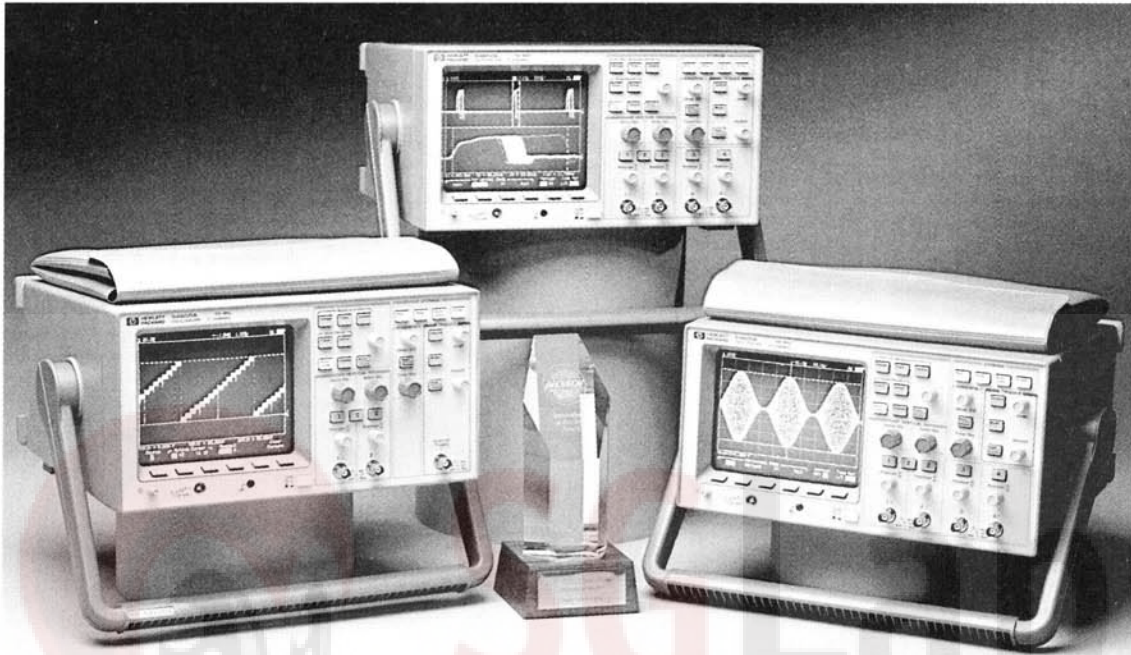
# OSCILLOSCOPES

## General Purpose and Troubleshooting

### HP 54600 Series

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- Up to 500 MHz bandwidth
- Analog look and feel
- Automatic and cursor-based measurements of frequency, time, and voltage
- Waveform storage
- Plug-in modules for hard copy, remote programming, and enhanced testing
- 3-year warranty with optional 2-year extension



#### HP 54600 Family of Oscilloscopes

The HP 54600 family of oscilloscopes offers you the comfortable feel of analog scopes and the measurement power of digital scopes, all at a price you can afford. This family of oscilloscopes gives you the ability to view waveforms you can't see with your analog scope, and they provide the familiar controls and interactive displays you've grown accustomed to. To solve your most difficult test problems, the scope provides powerful digital features, such as pre-trigger viewing, waveform storage, and measurement automation.

This combination of analog feel and digital power enhances your troubleshooting ability. You can expect bright, crisp displays of your most demanding signals at all sweep speeds and delayed sweep magnifications. Storage for glitch and transient analysis is as simple as pressing a button. Pre-trigger viewing lets you view events that an analog scope would miss.

This new class of oscilloscopes, made possible through HP's advanced integrated circuit technology, presents this power in a small, lightweight package and at a price that fits your budget. These oscilloscopes capture your repetitive signals at up to 10 GSa/sec (single shot phenomena at up to 20 MSa/sec) giving you a clear and accurate display of your most troublesome signals. The display update rate of over one million points per second provides a display with unprecedented interactivity. For example, AM-modulated waveforms and other rapidly changing signals are shown onscreen with the detail and fidelity you expect.

#### Four Models: One Is Right for You

The new 500 MHz HP 54610A has two channels and a viewable external trigger and is your best oscilloscope for working with high-speed logic circuits and applications where high bandwidth signals must be measured. The four-channel 150 MHz HP 54602A is a very good choice for labs where mixed signal electronic circuits are being developed. This scope offers 150 MHz bandwidth on channels 1 and 2, and 250 MHz bandwidth on channels 3 and 4. This additional bandwidth on channels 3 and 4 provides for high-frequency triggering and viewing fast digital signals with rise times down to 1.4 ns.

When your budget is tight, the 100 MHz products offer performance that is without compromise while still meeting your budget. The four-channel HP 54601A fits well into labs where complex digital circuits are being designed and tested. The two-channel HP 54600A is HP's most economical oscilloscope and is ideally suited for production, field service, and education.

#### A Full Family of Benchtop Automation Products

The HP 54600 Series oscilloscopes are only part of a comprehensive line of test products. You'll find the answer to your general-purpose test and troubleshooting needs among the solutions offered in the family of test solution products. Optional plug-on modules add remote programming (HP-IB and RS-232 versions) and hard-copy output; for more complete measurement solutions, try:

- HP 54655A and 54656A Test Automation Modules. Design your test boundaries and create a test sequence—at your bench!
- HP 54657A and 54658A Measurement/Storage Modules. Add measurements, mask testing, and up to 100 waveform memory locations with this module.
- HP 54653A ScopeLink software. This easy-to-use package lets you use your PC to view waveforms, store scope and module setups, and much more.
- HP 34810A BenchLink software. This software takes full advantage of Windows to easily connect your scope to your PC. BenchLink offers all of the performance of ScopeLink in a Windows environment.

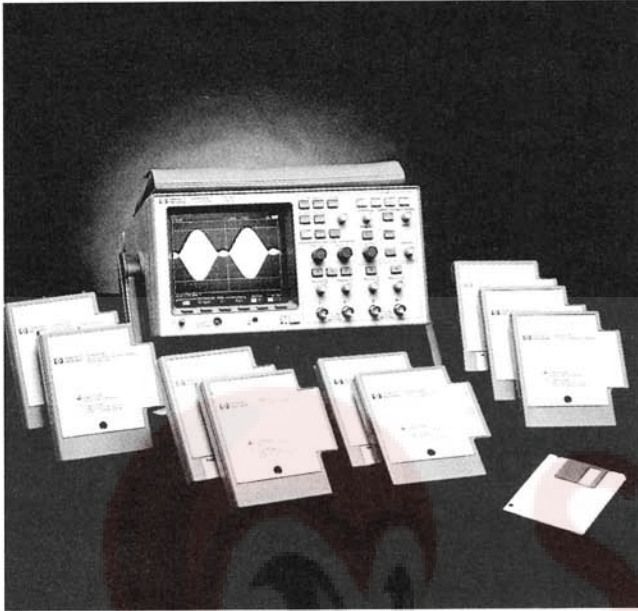
For more information on any of these products in the HP 54600 family, see the modules and accessories sections on the following pages.

# OSCILLOSCOPES

## General Purpose and Troubleshooting

### HP 54600 Series Test and Interface Modules

- Hard-copy output to printer or plotter
- Remote instrument control
- Enhanced automatic measurements
- Extended waveform storage and math operations
- Custom test-sequence creation and operation



#### HP 54600 Series Oscilloscopes

The HP 54600 Series scopes use a complete range of optional interface modules for hard-copy output, remote programmability, and, perhaps most importantly, custom test functionality. These modules plug onto the back of any HP 54600 Series scope and turn a great manual scope into a benchtop automation tool. You can create a true measurement solution for your specific test and measurement needs. No other scope in its class can offer these capabilities—and the price is right!

#### HP 54650A HP-IB Interface Module

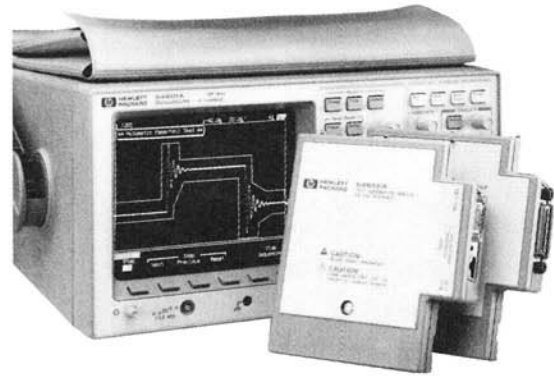
This module provides full remote control and hard-copy output to HP-IB printers and plotters. Programming is in accordance with IEEE 488.2. An operating and programming manual and disk with programming examples are included.

#### HP 54651A RS-232 Interface Module

This module provides full remote control and hard-copy output to RS-232 printers and plotters. The module supports printers that are Epson FX-80 or HP-PCL compatible. An operating and programming manual and disk with programming examples are included.

#### HP 54652A Parallel Interface Module

This module provides the lowest-cost hard-copy solution in the HP 54600 family. Printers supported include those that are Epson FX-80 or HP-PCL compatible. An operating note is included.



#### HP 54655A and 54656A Test Automation Modules

The HP 54655A (HP-IB) and 54656A (RS-232) Test Automation Modules provide you with an automated test station that can sit on your bench. The Test Automation Modules add built-in pass/fail testing with conditional branching and operator prompts to any oscilloscope in the HP 54600 family. With these modules, an unskilled operator can perform exacting measurements by simply following the instructions listed on the scope's display. All of these abilities add up to a powerful benchtop test solution—and it can all be created without a computer!

#### Mask Template Testing

The Test Automation Module's test abilities are based on waveform mask templates, waveform envelopes that define a test area. The module lets you build up to 40 masks and up to 100 test-sequence steps that you define to create your custom test. Each step consists of a scope configuration, test mask, custom branching instructions, and custom labels and messages. The combination of sequencing and branching based on test results allows you to re-create your test flowchart with the scope and module combination. You end up with a reliable and repeatable path to automated testing, and you create that test in the comfortable environment of your test bench.

#### Mask Template Generation and Editing

The Test Automation Modules can automatically generate your test masks. Two methods make mask generation simple:

- Automask with tolerance limit. This method uses your known good waveform and applies a user-defined voltage tolerance to the waveform, generating a mask with the tolerance built-in.
- Automask with Autostore. You can use Autostore, the HP 54600 family's infinite persistence mode, to create an envelope from your waveform. Automask then creates the mask template from the Autostore data.

The built-in mask editor lets you refine your Automask template, or you can use the editor to create your own precision mask.

Once the test sequence has been defined, it remains safely stored in the module's nonvolatile RAM. You can use HP ScopeLink software to copy sequences to other scopes, for constructing multiple-test stations, or for storage of multiple sequences.

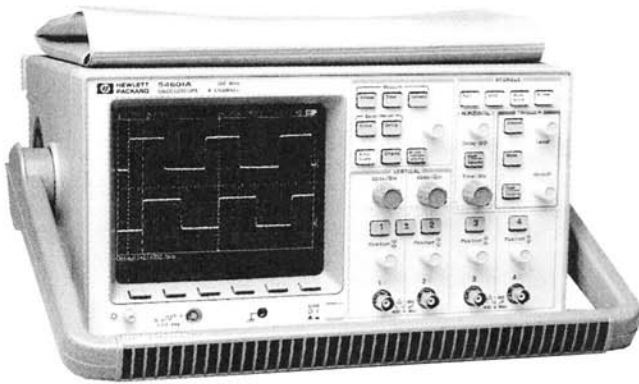
#### Two Interface Versions

The HP 54655A Test Automation Module provides an HP-IB interface, and is well suited for applications involving controllers. The module performs many tasks previously left to the computer, speeding throughput and improving productivity.

The HP 54656A RS-232 version of the Test Automation Module provides you with additional features for external I/O. External switches can be connected to the module to allow remote switching through a test sequence. In addition, the HP 54656A has five user-definable output lines that can be uniquely configured for each step. Use these lines to drive buzzers, indicator lights, or even switches in your test fixture.

Even with all this test power, each module gives you the full functionality and programmability of the standard HP-IB and RS-232 interface modules.

The HP 54655A and 54656A are both supplied with an operating and programming manual, user's guide, and a disk with programming examples. In addition, the HP 54656A RS-232 version includes a 9- to 25-pin adapter cable and an RJ-45 connector with 10 ft (about 3 m) of cable for use with the I/O lines.



### HP 54657A HP-IB and 54658A RS-232 Measurement/Storage Modules

The HP 54657A and 54658A Measurement/Storage Modules bring enhanced measurement and storage power to your HP 54600 scope. You can even create and monitor a mask-based test by using the modules' new mask template test capabilities. A list of the added features includes:

- Up to 100 nonvolatile 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

### New Automatic Measurements and Waveform Math

The Measurement/Storage Module adds such new measurement capabilities 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

Now you can make your measurement in the format you desire. No more manual calculations!

### More Trace Storage

The module adds 3 nonvolatile trace storage locations and 64 K of trace memory to the HP 54600 scope. The module uses a data compression technique for storage in that 64 K, allowing storage for up to 96 additional waveforms.

### 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

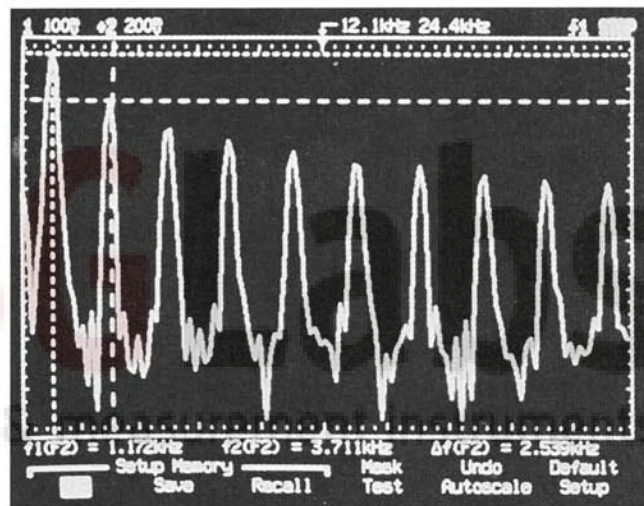
Built-in mask generation and editing software make creating your test template simple. Once your mask and test are created, you can leave it in the module's nonvolatile memory or store it to a PC with HP ScopeLink or HP BenchLink software. This new capability lets you easily run tests to characterize your circuits, whether for a short time or overnight. You can even use the Measurement/Storage Module in conjunction with a PC for enhanced throughput and to take advantage of the new 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 now 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 Measurement/Storage Module's FFT capability includes frequency and amplitude cursors (with both dBm and dBv scaling), which let you make quick, accurate measurements. You can choose between Hanning, flattop, exponential, and rectangular windows, and you can select the number of points to include in the FFT calculation.

The HP 54657A and the HP 54658A include an operating and programming manual and a disk with programming examples.



New FFT trace with cursor readout.

### Software Products for Easy Connection to Your PC

Hewlett Packard provides two software packages that allow quick and easy connection of your oscilloscope to a PC. BenchLink is a Windows application and ScopeLink runs in simpler DOS PCs that do not have enough power to run Windows.

### HP 34810A BenchLink (Opt 106 to HP 54600 Series Oscilloscopes)

BenchLink takes full advantage of Windows to quickly and easily connect your HP 54600 Series oscilloscope to your PC. With BenchLink you will be able to quickly and easily transfer scope screen images, waveform data, front panel setups, and even custom test information via either HP-IB or RS-232 interfaces.

Both BenchLink and ScopeLink perform the same tasks, however BenchLink also supports the HP 54540 Series oscilloscopes. BenchLink does not support logic analyzers. For a complete description of BenchLink features please refer to the description of ScopeLink.