

Notice

Hewlett-Packard to Agilent Technologies Transition

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. To reduce potential confusion, the only change to product numbers and names has been in the company name prefix: where a product name/number was HP XXXX the current name/number is now Agilent XXXX. For example, model number HP 8648 is now model number Agilent 8648.

Contacting Agilent Sales and Service Offices

The sales and service contact information in this manual may be out of date. The latest service and contact information for your location can be found on the Web at:

<http://www.agilent.com/find/assist>

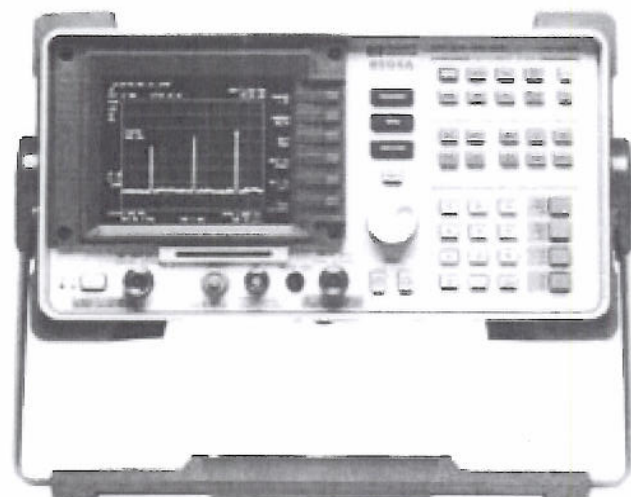
If you do not have access to the Internet, contact your field engineer. In any correspondence or telephone conversation, refer to your instrument by its model number and full serial number.



SIGNAL ANALYZERS

Spectrum Analyzers, Performance Portable

HP 8591A, 8593A, 8594A, 8595A



HP 8594A

HP 8594A and 8595A Spectrum Analyzers

These new models offer expanded frequency ranges with the same frequency accuracy and variety of options associated with the HP 8591A. The HP 8594A has a frequency range of 9 kHz to 2.9 GHz and an amplitude range of -112 to $+30$ dBm. The HP 8595A has a frequency range of 9 kHz to 6.5 GHz with an amplitude range of -114 to $+30$ dBm. (For general export, both analyzers offer option 1BH, which does not display spans wider than 2.3 GHz.) Both instruments have an optional 2.9 GHz built-in tracking generator. In addition, each comes standard with a memory-card reader that enables you to load HP's custom measurement personalities, your own programs, or measurement data into the spectrum analyzer using 32-Kbyte memory cards.

HP 8591A and 8593A Spectrum Analyzers

These portable spectrum analyzers offer frequency accuracy and a wide range of options for applications that demand higher performance. The HP 8591A has a frequency range of 9 kHz to 1.8 GHz and amplitude range of -115 to $+30$ dBm. The HP 8593A has a frequency range of 9 kHz to 22 GHz or 26.5 GHz with option 026, an internal preselector, and an amplitude range of -114 to $+30$ dBm. (For general export, the HP 8593A option 1BH does not tune above 18 GHz nor span greater than 2.3 GHz.) Both instruments have standard 7.5 ppm frequency accuracy that can be improved with an optional precision frequency reference to marker count accuracy of ± 230 Hz at 1 GHz or ± 2.3 kHz at 18 GHz.

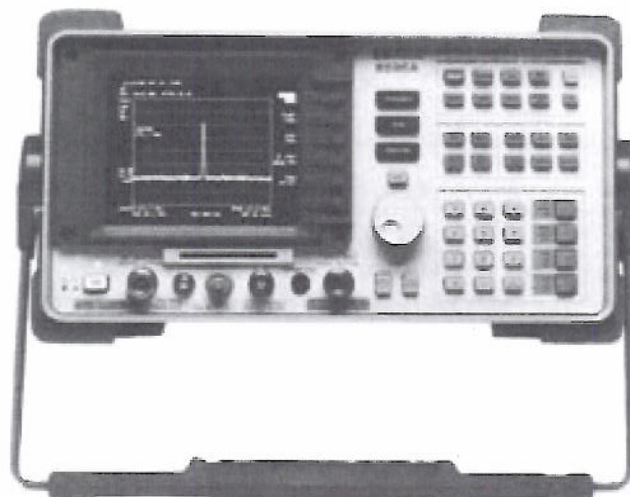
Standard Features

These performance analyzers share the same ease-of-use features found in the lower-cost HP 8590B and 8592B. (See page 174.) In addition, each performance portable comes with a built-in memory card reader that enables you to load HP's custom measurement personalities (see page 173) and measurement data into the spectrum analyzer using 32-Kbyte memory cards. A catalog function allows you to determine the exact content of information stored on your memory cards or within internal memory.

Option Flexibility

For easy installation of a growing variety of options, a cardcage for circuit cards has been designed in each performance portable spectrum analyzer. All card options are retrofittable, so the options you need are always available. Circuit-card options include:

- AM/FM demodulator speaker to let you view and hear the signal.
- TV sync trigger to let you select any line of the TV field for measurement.
- Fast time-domain sweep to allow zero-span sweep rates to 20 μ s.
- Quasi-peak detector for EMC measurements.



HP 8595A

HP 8591A Specifications

General

Temperature: 0° to $+55^{\circ}$ C operating; -40° to $+75^{\circ}$ C storage

EMI compatibility: CISPR Pub. 11 and FTZ 526/527/79

Audible noise: <37.5 dBA pressure and <5.0 Bels power (ISO DP7779)

Power requirements: 86 to 127 or 195 to 250 Vrms, 47 to 66 Hz, 100 to 126 Vrms, 400 Hz $\pm 10\%$

Power consumption: <300 VA; <100 watts

Frequency

Range: 9 kHz to 1.8 GHz (50 Ω); 1 MHz to 1.8 GHz (75 Ω , opt. 001)

Reference

Aging: $\pm 2 \times 10^{-6}$ /year

Stability: $\pm 0.5 \times 10^{-6}$

Precision frequency reference (option 004)

Aging: $\pm 1 \times 10^{-7}$ /year

Stability: $\pm 1 \times 10^{-8}$

Temperature stability: $\pm 1 \times 10^{-8}$

Frequency

Frequency readout accuracy (start, stop, center, frequency)

Span ≤ 10 MHz: \pm (freq readout \times freq ref error + 3% of span + 20% of RBW + 100 Hz)

Span ≥ 10 MHz: \pm (freq readout \times freq ref error + 3% of span + 20% of RBW)

Marker count accuracy (signal to noise ratio ≥ 25 dB, RBW/span ≥ 0.01)

Frequency span ≤ 10 MHz: \pm (marker freq \times freq ref error + counter res + 100 Hz)

Frequency span > 10 MHz: \pm (marker freq \times freq ref error + counter res + 1 kHz)

Counter resolution: selectable from 10 Hz to 100 kHz

Frequency span

Range: 0 Hz (zero span), 10 kHz to 1.8 GHz

Accuracy: $\pm 2\%$ of span, span ≤ 10 MHz; $\pm 3\%$ of span, span > 10 MHz

Sweep time

Range: 20 ms to 100 s, span = 0 Hz or > 10 kHz; 20 μ s to 100 s, span = 0 Hz (option 101)

Accuracy: $\pm 3\%$, 20 ms to 100 s; $\pm 2\%$, 20 μ s to < 20 ms (opt 101)

Sweep trigger: free run, single, line, video, external

Stability

Noise sidebands: ≤ 90 dBc/Hz at > 10 kHz offset from CW signal (1 kHz RBW, 30 Hz VBW, sample detector); ≤ 100 dBc/Hz at > 30 kHz offset from CW signal (1 kHz RBW, 30 Hz VBW, sample detector)

Residual FM: < 250 Hz p-p in 100 ms (1 kHz RBW, 1 kHz VBW)

System-related sidebands: < -65 dBc at > 30 kHz offset from CW

HP 8591A Specifications (continued)

Amplitude

Amplitude range: -115 to +30 dBm (50 ohm); -63 to +75 dBmV (75 ohm, opt 001)

Maximum safe input	50 ohm	75 ohm
Average cont power	+30 dBm (1 watt)	+75 dBmV (0.4 watts)
Peak pulse power	+30 dBm (1 watt)	+75 dBmV (0.4 watts)
Δ	75 Vac	100 Vac

Gain compression, >10 MHz: ≤ 0.5 dB, total power at input mixer = -10 dBm

Displayed average noise level: ≤ 115 to ≤ 113 dBm

Noise level

Spurious responses

Second harmonic distortion: 5 MHz to 1.8 GHz, < -70 dBc for -45 dBm tone at input mixer

Third-order intermodulation distortion: 5 MHz to 1.8 GHz, < -70 dBc for two -30 dBm tones at input mixer and > 50 kHz sep

Other input-related spurious: < -65 dBc for ≥ 30 kHz offset from CW signal

Residual responses (input terminated and 0 dB attenuation)

150 kHz to 1 MHz: < -90 dBm, 50 ohm

1 MHz to 1.8 GHz: < -90 dBm, 50 ohm; < -38 dBmV, 75 ohm

Display range

Log scale: 0 to -70 dB from ref lev is cal'd; 1 to 20 dB/div in 1 dB steps; 8 divisions displayed

Linear scale: 8 divisions

Scale units: dBm, dBmV, dBmicroV, volts, watts

Marker readout resolution: 0.05 dB, log scale; 0.07% of ref level, linear scale

Fast sweep times for zero span (opt 101): 20 μ s to 20 ms, 0.7% of ref level for linear scale

Reference level

Range: -115 to +30 dBm (50 ohm), -63 to +75 dBmV (75 ohm)

Resolution: 0.01 dB for log scale; 0.12% of ref level for linear scale

Accuracy, referred to -20 dBm ref level: 0 dBm to -59.9 dBm, ± 0.5 dB + input atten acc @ 50 MHz; -60 dBm to -115 dBm, ± 1.25 dB + input atten acc @ 50 MHz

Frequency response

Absolute: ± 1.5 dB, referred to 300 MHz CAL OUT

Relative flatness: ± 1.0 dB, referred to midpoint between highest and lowest response deviations

Calibrator output

Frequency: 100 MHz \pm (300 MHz \times freq ref error)

Amplitude: -20 dBm ± 0.4 dB (50 Ω), +28.75 dBmV ± 0.4 dB (75 Ω , opt 001)

Input attenuator

Range: 0 to 60 dB in 10 dB steps

Accuracy at 50 MHz, 10 dB atten: ± 0.5 dB, 0 to 50 dB, ± 0.75 dB, 60 dB

Resolution Bandwidth: 1 kHz to 3 MHz, $\pm 20\%$

Switching uncertainty, ref to 3 kHz bandwidth: 3 kHz to 3 MHz RBW, ± 0.4 dB; 1 kHz, ± 0.5 dB

Video bandwidth range: 30 Hz to 1 MHz

Log to linear switching: ± 0.25 dB at reference level

Display scale fidelity

Log incremental accuracy: ± 0.2 dB/2 dB, 0 to -70 dB from ref lev

Log maximum cumulative: ± 0.75 dB, 0 to -60 dB from ref level; ± 1.0 dB, 0 to -70 dB from ref level

Linear accuracy: $\pm 3\%$ of reference level

HP 8593A Specifications

Frequency

Frequency range: 9 kHz to 22 GHz; 9 kHz to 26.5 GHz (option 026)

Frequency reference

Aging: $\pm 2 \times 10^{-6}$ /year

Settability: $\pm 5 \times 10^{-7}$

Temperature stability: $\pm 5 \times 10^{-6}$

Precision frequency reference (Opt 004)

Aging: $\pm 1 \times 10^{-7}$ /year

Settability: $\pm 1 \times 10^{-8}$

Temperature stability: $\pm 1 \times 10^{-8}$

Frequency readout accuracy: \pm (frequency readout \times frequency reference error + 3% of span + 20% of RBW + 100 Hz sweep time) for spans ≤ 10 MHz; \pm (freq readout \times freq ref error + 3% of span + 20% of RBW) for spans > 10 MHz

Marker count accuracy (signal-to-noise ratio ≥ 25 dB, RBW/span ≥ 0.01): \pm (marker freq \times freq ref error + counter res + 100 Hz) spans ≤ 10 MHz; \pm (marker freq \times freq ref error + counter res + 1 kHz), spans > 10 MHz

Counter resolution: Selectable from 10 Hz to 100 kHz

Frequency span

Range: zero span, (10 \times N) kHz to 19.25 GHz, (10 \times N) kHz to 23.75 GHz (opt 026)

Accuracy: $\pm 2\%$ of span, span < 10 MHz; $\pm 3\%$ of span, span > 10 MHz

Sweep time

Range: 20 ms to 100 μ s, span = 0 Hz or > 10 kHz; 20 μ s to 100 s, span = 0 Hz (opt 101)

Accuracy: $\pm 3\%$, 20 ms to 100 s; $\pm 2\%$, 20 μ s to 20 ms

Sweep trigger: free run, single, line, video, external

Stability

Noise sidebands: ≤ -95 dBc/Hz + 20 log N at > 30 kHz offset from CW signal

Residual FM: $< (400 \times N)$ Hz peak-peak in 100 ms (1 kHz RBW, 1 kHz VBW)

System-related sidebands: $< -65 + 20$ log N at > 30 kHz offset from CW signal

Comb generator: 100 MHz fundamental freq; $\pm 0.007\%$ freq accuracy

Amplitude

Amplitude range: -114 to +30 dBm

Maximum safe input level: +30 dBm (1 watt, 7.1 Vrms), 0 Vdc

Gain compression: ≤ 0.5 dB (total power at input mixer = -10 dBm)

Displayed average noise level: ≤ 114 to < -92 dBm

Spurious responses

Second harmonic distortion: < -70 dBc for -40 dBm tone at input mixer, 10 MHz to 2.9 GHz; < -100 dBc for -10 dBm tone power at input mixer or below displayed av noise lev), > 2.75 GHz

Third-order intermodulation distortion > 10 MHz: < -70 dBc for two -30 dBm tones at input mixer and > 50 kHz separation

Other input-related spurious: < -70 dBc for applied freq ≤ 18 GHz; < -60 dBc for applied freq ≤ 22 GHz

Display range

Log scale: 0 to -70 dB from ref lev is calibrated; 1 to 20 dB/div in 1 dB steps; 8 divisions displayed

Linear scale: 8 divisions

Scale units: dBm, dBmB, dBmicroV, volts, watts

Reference level

Range: -114 to +30 dBm

Resolution: 0.01 dB for log scale; 0.12% of ref lev for linear

Accuracy (ref to -20 dBm ref level): \pm (0.05 dB + input atten acc @ 50 MHz), 0 dBm to -59.9 dBm; \pm (1.25 dB + input atten acc @ 50 MHz), -60 to -114 dBm

Frequency response (ref to 300 MHz CAL OUT, preselector peaked)

Absolute: ± 2.0 to ± 3.0 dB

Relative flatness: ± 1.5 to ± 2.0 dB

Calibrator output

Frequency: 300 MHz ± 30 kHz

Amplitude: -20 dBm ± 0.4 dB

Input attenuator

Range: 0 to 70 dB in 10 dB steps

Accuracy at 50 MHz, ref to 10 dB atten: ± 0.5 dB, 0 to 60 dB, ± 1.2 dB, 70 dB

Resolution bandwidth: 1 kHz to 3 MHz, $\pm 20\%$

Switching uncertainty: ± 0.4 dB, 3 kHz to 3 MHz RBW; ± 0.5 dB, 1 kHz

Video bandwidth range: 30 Hz to 1 MHz

Log to linear switching: ± 0.25 dB at reference level

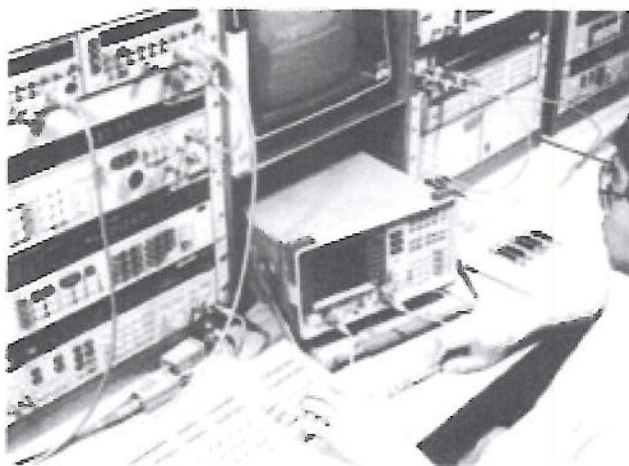
Display scale fidelity: ± 0.2 dB/2 dB, 0 to -70 dB from ref lev, incremental; ± 0.75 dB, 0 to -60 dB from ref lev and ± 1.0 dB, 0 to -70 dB from ref lev, maximum cumulative

Linear accuracy: $\pm 3\%$ of reference level

SIGNAL ANALYZERS

Spectrum Analyzers, Performance Portable and Accessory

HP 8591A, 8593A, 85901A



HP 8590 series RF spectrum analyzers have built-in tracking generator option

HP 8591A, 8593A Specifications

Option 010 and 011 built-in tracking generators

Specifications apply to both HP 8590B and 8591A.

Frequency range: 50 ohm 75 ohm
100 kHz to 1.8 GHz 1 MHz to 1.8 GHz

Tracking drift (10 kHz RBW, 30-minute warmup): 1.5 kHz/5 min, nominal

Output power level

Range:	50 ohm	75 ohm
HP 8591A	0 to -70 dBm	+42.8 to -27.2 dBmV
HP 8590B	0 to -15 dBm	+42.8 to -27.8 dBmV
Resolution	0.1 dB	0.1 dB

Absolute accuracy: ± 1.0 dB, HP 8591A; ± 1.5 dB, HP 8590B

Output vernier

Range: HP 8591A, 10 dB; HP 8590B, 15 dB

Accuracy: HP 8591A, ± 0.75 dB; HP 8590B, ± 1.0 dB

Output flatness: ± 1.75 dB, HP 8591A ref to 300 MHz and 10 dB attenuation; ± 1.75 dB 8590B

Output attenuator (HP 8591A only)

Range: 0 to 60 dB

Switching accuracy: ± 0.8 dB or 2.5% of atten setting, whichever greater for max of 1.5 dB (ref to 10 dB atten setting)

Repeatability: ± 0.2 dB, nominal

Dynamic range (difference bet max power out and 1-g. feed-through): > 106 dB, nominal, 50 ohm; > 100 dB, nominal, 75 ohm

Tracking generator feedthrough: < -106 dBm, 50 ohm;

< -52.2 dBm, 75 ohm

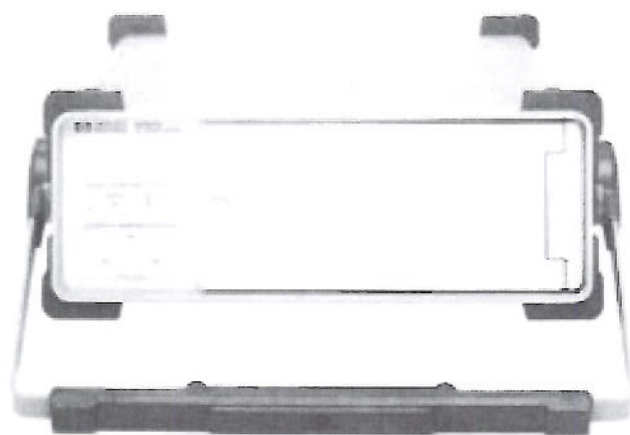
Output VSWR

0 dB attenuation: 2.5:1

10 dB attenuation (HP 8591A only): 1.6:1

Ordering information

	Price
HP 8591A spectrum analyzer (9 kHz to 1.8 GHz)	\$12,625
HP 8593A spectrum analyzer (9 kHz to 22 GHz)	\$24,805
HP 8594A spectrum analyzer (9 kHz to 2.9 GHz)	TBD
HP 8595A spectrum analyzer (9 kHz to 6.5 GHz)	TBD
Opt 001 75-ohm input (HP 8591A only)	50
Opt 004 precision frequency reference	+ \$2,050
Opt 010 50-ohm built-in tracking generator (HP 8591A only)	+ \$4,500
Opt 011 75-ohm built-in tracking generator (HP 8591A only)	+ \$4,500
Opt 021 HP-IB interface	+ \$600
Opt 023 RS-232 interface	+ \$600
Opt 026 26.5 GHz frequency range extension (HP 8593A only)	+ \$3,000
Opt 101 fast time-domain sweeps	+ \$1,000
Opt 101 general expert version (HP 8591A, 8594A, 8595A)	50
Opt 102 AM/FM demodulator and TV sync trigger	+ \$1,500
Opt 103 quasi-peak detector/AM-FM demodulator	\$1,910



HP 85901A

HP 85901A Portable ac Power Source

This small, easy-to-carry power source gives you ac power where and when you need it. Use it as a standalone battery or connect it to an external 12 Vdc source for even longer operation. As a standalone battery, the ac power source gives you over an hour of operation at 100 Watts continuous load. When the charge gets low, the power source shuts off automatically. It can be recharged in six hours or less. Over-voltage, short-circuit, and overload protection on the inverter output are built in. Also included are over-voltage protection on the inverter input and over-charge and over-discharge protection for the internal battery.

Specifications

Input inverter voltage: 10.8 to 14.5 Vdc

Charger voltage: 90 to 250 Vac auto selected

Frequency: 47 to 66 Hz

Power consumption: 122 VA maximum

Output

Voltage: 135 or 270 Vpeak $\pm 5\%$ rectangular waveform with 25% dead zone (115 or 230 Vrms $\pm 5\%$)

Frequency: 60 Hz $\pm 0.1\%$, crystal reference

Max power: 200 watts continuous

Connectors: two CEE22-V type, female

Temperature: 0° to 55° C, operating, -20° to 40° C storage with battery; -40° to 70° C storage without battery

EMI: conducted and radiated VDE 0871 level B

Battery

Type: sealed acid lead

Voltage: 12 Vdc, nominal

Capacity: 17 AMP-HR, nominal

Mechanical (nominal)

Size: 125 H x 337 W x 461 mm D

Weight: net, with battery, 14.2 kg (31.3 lb); without battery, 8.0 kg (17.7 lb); shipping, 16.3 kg (36.0 lb)

Ordering information

HP 85901A portable ac power source

Extra power cord adapter for HP instruments

HP 8120-5220

General-purpose power cord adapters

HP 8120-5210 European

HP 8120-5211 USA

HP 8120-5212 UK

☎ For same-day shipment, call HP DIRECT at 800-538-6787.

Price

\$1,120 ☎

\$17

\$55

\$55

\$55