

# SIGNAL ANALYZERS

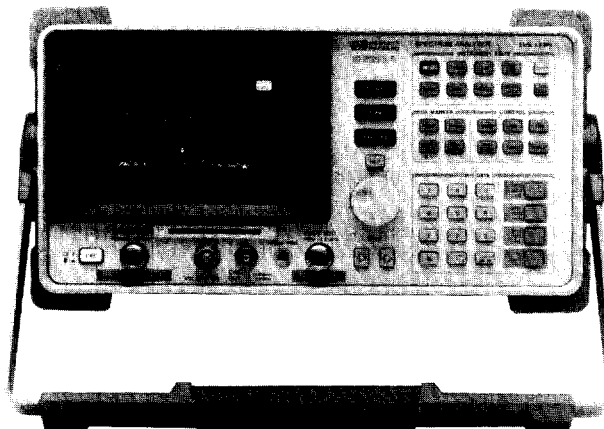
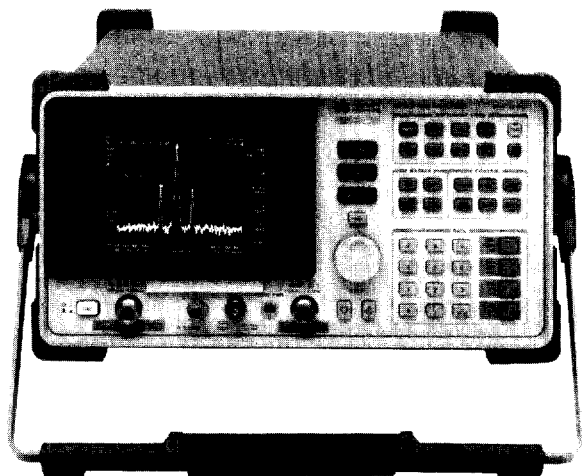
## Spectrum Analyzers, Low-cost RF Portable

### Models 8590B and 8591A

105

- Affordable new RF spectrum analyzers
- General-purpose or high performance capabilities

- 32-plus Kbytes of user memory
- Wide range of add-on features
- Custom measurement personalities



HP 8590B



HP 8591A

This very affordable model offers general-purpose measurement capabilities from 9 kHz to 1.8 GHz. Its wide amplitude range extends from  $-115$  dBm to  $+30$  dBm, and it has a 50- or optional 75-ohm input. Compact, weighing only 30 pounds, this analyzer goes anywhere. If ac power is not available, the analyzer can be run for approximately one and one half hours using the HP 85901A portable ac power source (see page 109). Display data can be sent to a printer or plotter.

#### More Standard Features at an Economical Price

The HP 8590B has more standard features than ever before offered in our lowest-priced RF spectrum analyzer. These features include 32 Kbytes of non-volatile program memory and the ability to incorporate custom programs or HP measurement personalities. You can store 50 traces without using program memory. A built-in clock/calendar stamps your trace data with the time and date. And, you can add titles to your stored traces through the front-panel keys, with a controller over the bus, or with an optional keyboard.

#### Add-on Features

As your measurement needs grow, a many options are available to increase the performance of the spectrum analyzer. HP-IB or RS-232 computer-interface options (including an external keyboard) automate the many functions of this instrument. A built-in, 1.8-GHz tracking-generator option turns the analyzer into a stimulus-response system for frequency-response and insertion-loss measurements. A memory-card reader can also be added, and optional measurement personalities customize the HP 8590B for cable-television and electromagnetic-interference (EMI) applications (see page 104).

#### Easy Signal Analysis

Operating this signal analyzer does not require an expert. With three clearly labeled keys—FREQUENCY, SPAN, and AMPLITUDE—and the data-entry knob or keypad, you can measure any signal. Built-in calibration routines guarantee the accuracy of your tests, and built-in service routines reduce down time and repair costs.

#### HP 8591A Frequency-accurate RF Spectrum Analyzer

For applications that require higher performance, the HP 8591A has frequency-counter resolution for frequency-synthesized accuracy from 9 kHz to 1.8 GHz. This model offers all of the portability and convenience features of the HP 8590B RF spectrum analyzer with even better specifications and more customizing features and options.

#### Greater Versatility for RF Measurements

Standard features of this high-performance analyzer include a built-in memory-card reader for use with 32-Kbyte memory cards. Fifty traces and states can be stored, and HP measurement personalities as well as your custom programs can be loaded in seconds. The built-in frequency counter, internal clock/calendar, and a dc-blocked input are also standard. Built-in calibration and service routines are included.

The many options can be added in any combination to customize the spectrum analyzer for the lowest cost. Optional features include fast time-domain sweep, AM/FM demodulator with speaker, TV trigger sync, precision frequency reference, and HP-IB or RS-232 interfaces. A built-in tracking generator is available for stimulus-response measurements, and HP measurement personalities for cable-television and EMI testing can be added (see page 104). Four internal slots allow certain options to be configured at any time.

# SIGNAL ANALYZERS

## Spectrum Analyzers, Low-cost RF Portable (Cont'd)

### Models 8590B and 8591A

#### General Specifications

##### Temperature range

**Operating:** 0° to +55° C

**Storage:** -40° to +75° C

**EMI compatibility:** CISPR pub 11 and FTZ 526/527/79

**Audible noise:** <37.5 dBA pressure, <5.0 Bels power (ISODP7779)

**Power requirements:** 86 to 127 or 195 to 250 Vrms, 47 to 66 Hz; 103 to 126 Vrms, 400 Hz  $\pm 10\%$ ; <300 VA power consumption

#### HP 8590B Specifications

##### Frequency

**Frequency range:** 9 kHz to 1.8 GHz; 1 MHz to 1.8 GHz (75 ohm)

**Frequency accuracy readout:**  $\pm(5 \text{ MHz} + 1\% \text{ of freq span})$

##### Frequency span

**Range:** 0 Hz (zero span), 50 kHz to 1.8 GHz

**Accuracy:**  $\pm 3\%$  of indicated span

##### Sweep time

**Range:** 20 ms to 100 s

**Accuracy:**  $\pm 3\%$  of indicated sweep time

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

##### Stability

**Drift:** <75 kHz/5 min after 2-hr warmup, 5 min after center freq set

**Noise sidebands:** <-95 dBc/Hz at >30 kHz offset from CW

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

##### Amplitude

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

**Maximum safe input:** +30 dBm (1 watt) and +25 Vdc for 50 ohm; +75 dBmV (0.4 watt) and 100 Vdc for 75 ohm

**Gain compression:**  $\leq 0.5 \text{ dB}$  for -10 dBm total power at input mixer

**Displayed average noise level:** -115 dBm at 1 GHz (50 ohm)

##### Spurious responses, 5 MHz to 1.8 GHz

**Second harmonic distortion:** <-70 dBc for -45 dBm tone at input mixer

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

**Other input-related spurious:** <-65 dBc for  $\geq 30 \text{ kHz}$  offset from CW

##### Display range

**Log scale:** calibrated 0 to -70 dB from reference level; 1 to 20 dB/division in 1 dB steps; 8 divisions displayed

**Linear scale:** 8 divisions

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

##### Reference level

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

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

**Accuracy, -20 dBm reference level:**  $\pm(0.5 \text{ dB} + \text{input atten acc @ } 50 \text{ MHz})$  for 0 to -59.9 dBm;  $\pm(1.25 \text{ dB} + \text{input atten acc @ } 50 \text{ MHz})$  for -60 to -115 dBm

**Absolute frequency response:**  $\pm 1.5 \text{ dB}$ , ref to 300 MHz CAL OUT

**Relative flatness:**  $\pm 1.0 \text{ dB}$

##### Calibrator output

**Frequency:** 300 MHz  $\pm 30 \text{ kHz}$

**Amplitude:** -20 dBm  $\pm 0.4 \text{ dB}$  (50 ohm); +28.75 dBmV  $\pm 0.4 \text{ dB}$  (75 ohm)

##### Input attenuator

**Range:** 0 to 60 dB, 10 dB steps

**Accuracy:**  $\pm 0.5 \text{ dB}$  at 50 MHz, ref 10 dB attenuation, 0 to 50 dB;  $\pm 0.75 \text{ dB}$  at 50 MHz, ref 10 dB attenuation, 60 dB

**Resolution BW switching:**  $\pm 0.4 \text{ dB}$ , 3 kHz to 3 MHz RBW;  $\pm 0.5 \text{ dB}$ , 1 kHz

**Log to linear switching:**  $\pm 0.25 \text{ dB}$  at reference level

**Log scale fidelity:**  $\pm 0.2 \text{ dB}/2 \text{ dB}$ , 0 to -70 dB from ref lev, incremental;  $\pm 0.75 \text{ dB}$ , 0 to -60 dB from ref lev, maximum cumulative

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

#### HP 8591A Specifications

##### Frequency

**Frequency range:** 9 kHz to 1.8 GHz; 1 MHz to 1.8 GHz (75 ohm)

##### Frequency reference

**Aging:**  $\pm 1 \times 10^{-7}/\text{day}$ ,  $\pm 2 \times 10^{-6}/\text{year}$

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

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

##### Precision frequency reference (Opt 004)

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

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

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

**Frequency readout accuracy:**  $\pm(\text{frequency} \times \text{frequency reference error} + 3\% \text{ of span} + 20\% \text{ of RBW} + 1.5 \text{ kHz})$

**Marker count accuracy (signal to noise ratio  $\geq 25 \text{ dB}$ , RBW/span  $\geq 0.01$ )**

**Frequency span  $\leq 10 \text{ MHz}$ :**  $\pm(\text{marker freq} \times \text{freq ref error} + \text{counter resolution} + 100 \text{ Hz})$

**Frequency span  $> 10 \text{ MHz}$ :**  $\pm(\text{marker freq} \times \text{freq ref error} + \text{counter resolution} + 1 \text{ kHz})$

**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  $\leq 10 \text{ MHz}$ ;  $\pm 3\%$  of span, span  $> 10 \text{ MHz}$

##### Sweep time

**Range:** 20 ms to 100 s, span = 0 Hz or  $> 10 \text{ kHz}$ ; 20 micros to 100 s, span = 0 Hz (option 101)

**Accuracy:**  $\pm 3\%$  of indicated sweep time;  $\pm 2\%$  for option 101

**Sweep trigger:** Free run, single, line, video, external

##### Stability

**Noise sidebands:**  $\leq -95 \text{ dBc}/\text{Hz}$  at  $> 30 \text{ kHz}$  offset from CW signal (1 kHz RBW, 30 Hz VBW, sample detector)

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

**System-related sidebands:** <-65 dBc at  $> 30 \text{ kHz}$  offset from CW signal

##### Amplitude

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

**Maximum safe input:** +30 dBm (1 watt), +25 Vdc for 50 ohm; +75 dBmV (0.4 watt), 100 Vdc for 75 ohm

**Gain compression:**  $\leq 0.5 \text{ dB}$  for -10 dBm total power at input mixer

**Displayed average noise level:** <-115 dBm, 400 kHz to 1.5 GHz; <-113 dBm, 1.5 GHz to 1.8 GHz (50 ohm)

##### Spurious responses, 5 MHz to 1.8 GHz

**Second harmonic distortion:** <-70 dBc for -45 dBm tone at input mixer

**Third-order intermodulation distortion:** <-70 dBc for two -30 dBm tones at input mixer and  $> 50 \text{ kHz}$  separation

**Other input-related spurious:** <-65 dBc for  $\geq 30 \text{ kHz}$  offset from CW

##### Display range

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

**Linear scale:** 8 divisions

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

##### 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

**Accuracy:**  $\pm(0.5 \text{ dB} + \text{input atten acc @ } 50 \text{ MHz})$ , 0 to -59.9 dBm;  $\pm(1.25 \text{ dB} + \text{input atten acc @ } 50 \text{ MHz})$ , -60 to -115 dBm

**Absolute frequency response:**  $\pm 1.5 \text{ dB}$  referred to 300 MHz CAL OUT

**Relative flatness:**  $\pm 1.0 \text{ dB}$

##### Calibrator output

**Frequency:** 300 MHz  $\pm(300 \text{ MHz} \times \text{freq ref error})$

**Amplitude:** -20 dBm  $\pm 0.4 \text{ dB}$  (50 ohm); +28.75 dBmV  $\pm 0.4 \text{ dB}$  (75 ohm)

##### Input attenuator

**Range:** 0 to 60 dB in 10 dB steps

**Accuracy at 50 MHz, 10 dB atten:**  $\pm 0.5 \text{ dB}$  for 0 to 50 dB;

$\pm 0.75 \text{ dB}$  for 60 dB

**Resolution BW switching:**  $\pm 0.4 \text{ dB}$ , 3 kHz to 3 MHz RBW;

$\pm 0.5 \text{ dB}$ , 1 kHz

**Log to linear switching:**  $\pm 0.25 \text{ dB}$  at reference level

**Log scale fidelity:**  $\pm 0.2 \text{ dB}/2 \text{ dB}$ , 0 to -70 dB from ref lev, incremental;  $\pm 0.75 \text{ dB}$ , 0 to -60 dB from ref lev and  $\pm 1.0 \text{ dB}$ , 0 to -70 dB from ref lev, maximum cumulative

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

#### Ordering Information

	Price
HP 8590B Portable RF Spectrum Analyzer	\$8,895
Opt 001 75-ohm Input Impedance	\$0
Opt 003 Card Reader	+\$600
Opt 010 Tracking Generator 50 Ohms	+3,200
Opt 011 Tracking Generator 75 Ohms	+\$3,200
Opt 021 HP-IB Interface	+\$600
Opt 023 RS-232 Interface	+\$600
Opt W30 Extended Repair Service. See page 725.	+\$225
HP 8591A Portable RF Spectrum Analyzer	\$12,000
Opt 001 75-ohm Input Impedance	\$0
Opt 004 Precision Frequency Reference	+\$2,000
Opt 010 Tracking Generator 50 Ohms	+\$3,600
Opt 011 Tracking Generator 75 Ohms	+\$3,600
Opt 021 HP-IB Interface	+\$600
Opt 023 RS-232 Interface	+\$600
Opt 101 Fast Time Domain Sweep	+\$1,000
Opt 102 AM/FM Demodulator & TV Synch Trigger	+\$1,500
Opt W30 Extended Repair Service. See page 725.	+\$300