

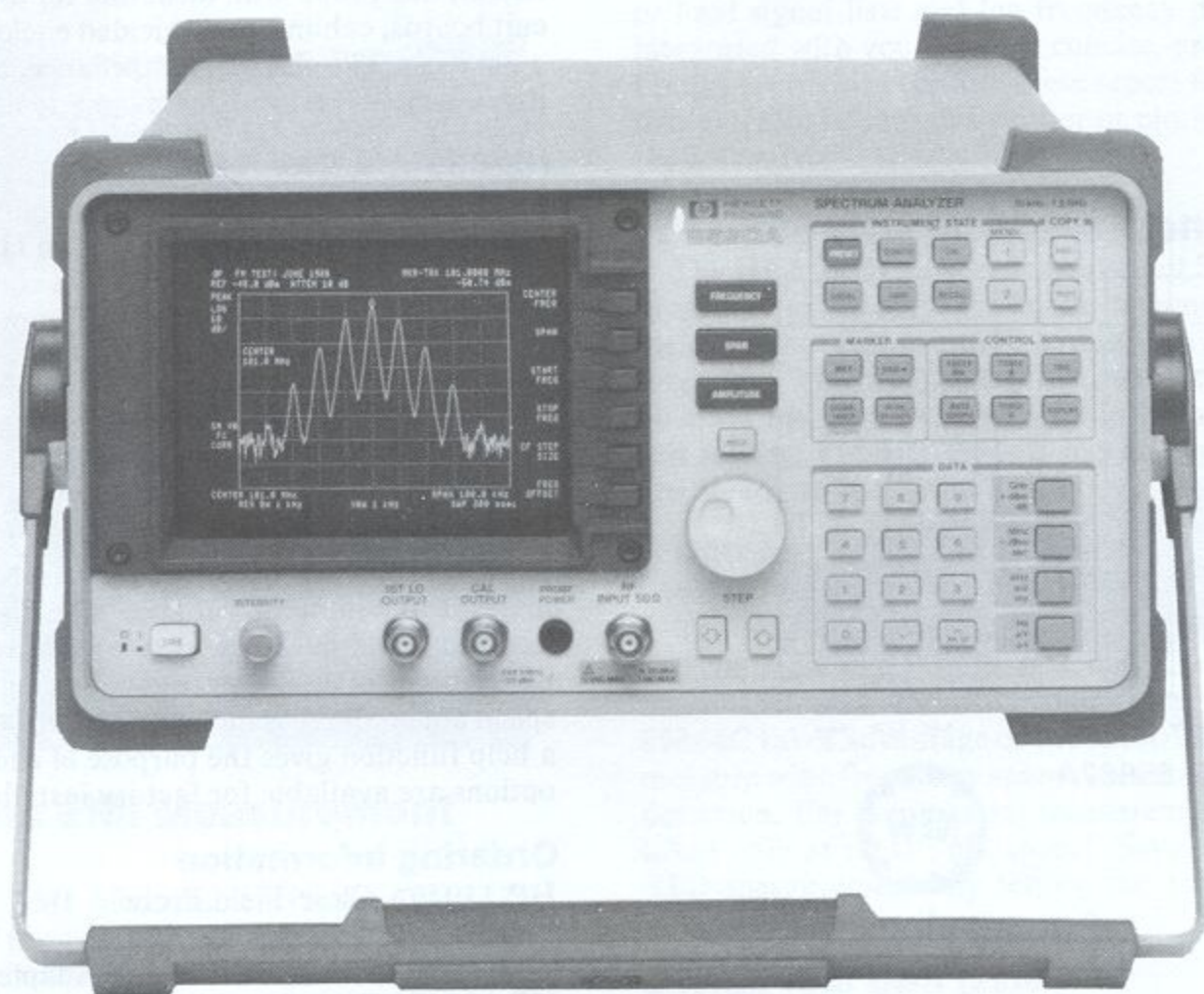
# SIGNAL ANALYZERS

## Spectrum Analyzer

Model 8590A

- Powerful features at a new, low cost
- Lightweight and portable

- Programmable via HP-IB, HP-IL, or RS232C
- Direct printer and plotter output



HP 8590A



### HP 8590A Portable RF Spectrum Analyzer

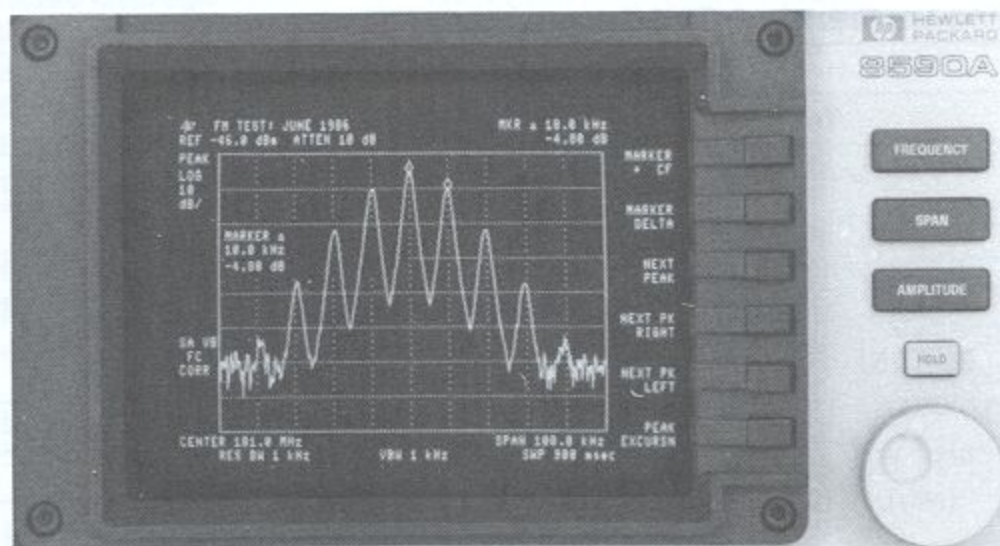
This compact, portable RF spectrum analyzer offers many features of a high-performance model for a low, affordable price. With a wide frequency range (10 kHz to 1.5 GHz), large amplitude range (-115 dBm to +30 dBm), and 50- or optional 75-ohm input, the new HP 8590A has the versatility to make most RF signal measurements. Lightweight and sturdy, the analyzer goes where you need it—from the bench into the field. Over 100 functions are programmable from an optional computer interface, and many accessories are available to expand basic spectrum analyzer capabilities. Whatever the application, from automatic testing on the production line to servicing equipment in the field, the HP 8590A fits the job.

#### Digital Display

The raster-scan display of this spectrum analyzer gives a flicker-free and parallax-free graticule. Display menus simplify operation and reduce the number of front-panel controls. Easy-to-read control settings surround the graticule, and a 50-character label can be added to the top of the screen. Expanded display size and remote viewing of the screen are possible using the HP 82913A video monitor.

#### Simple Operation

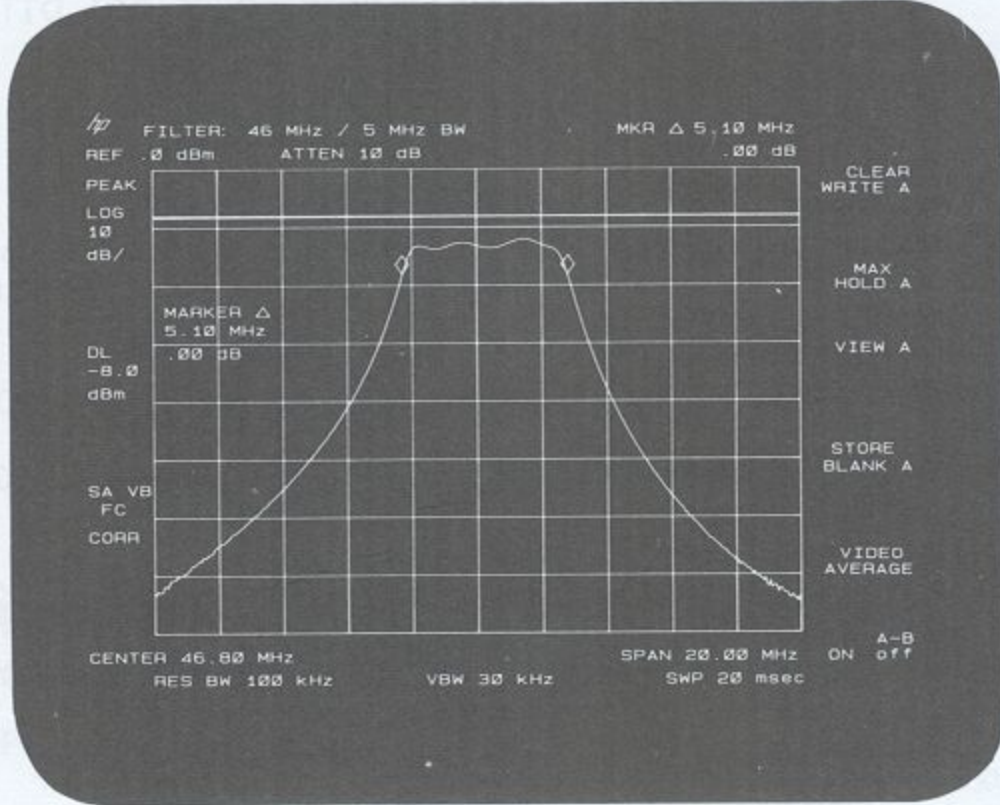
Special training is not required to run the HP 8590A. Use the three main control keys and the data entry knob or keypad to measure any signal. Center the signal with FREQUENCY; resolve the signal with SPAN; move the signal up and down with AMPLITUDE. The analyzer automatically adjusts internal parameters such as resolution bandwidth, sweptime, IF gain, and input attenuation. Commonly used functions are built into dedicated keys. These include markers for reading out amplitude and frequency values, and PLOT and PRINT keys for recording test results easily on ordinary typing paper. Display-menu softkeys access nearly 100 additional time-saving functions.



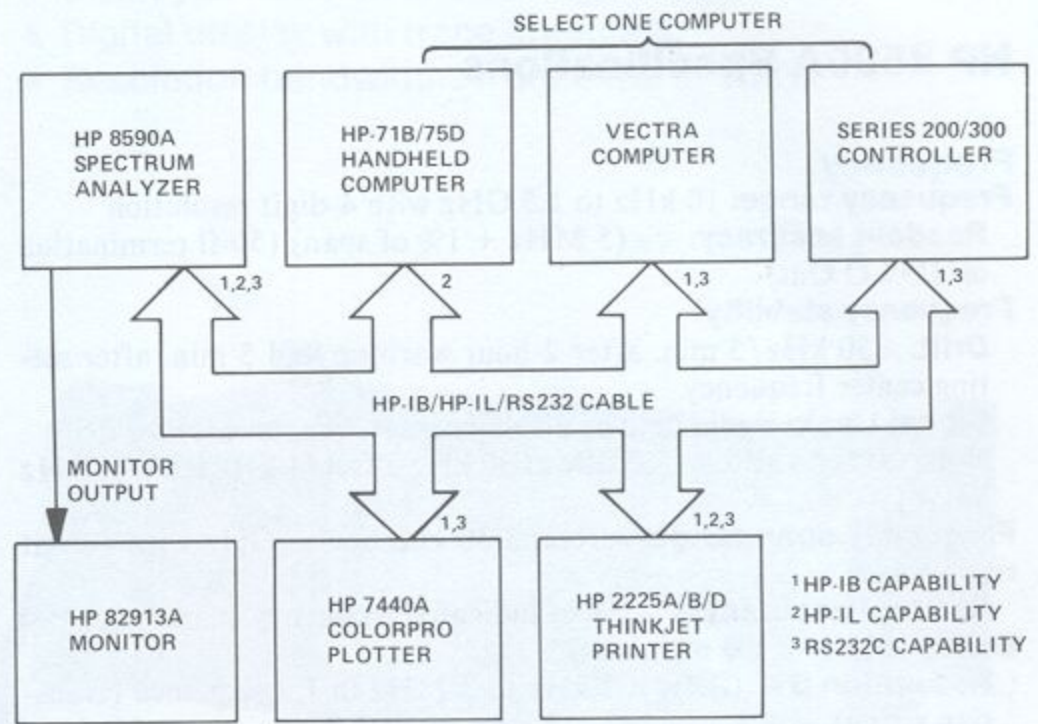
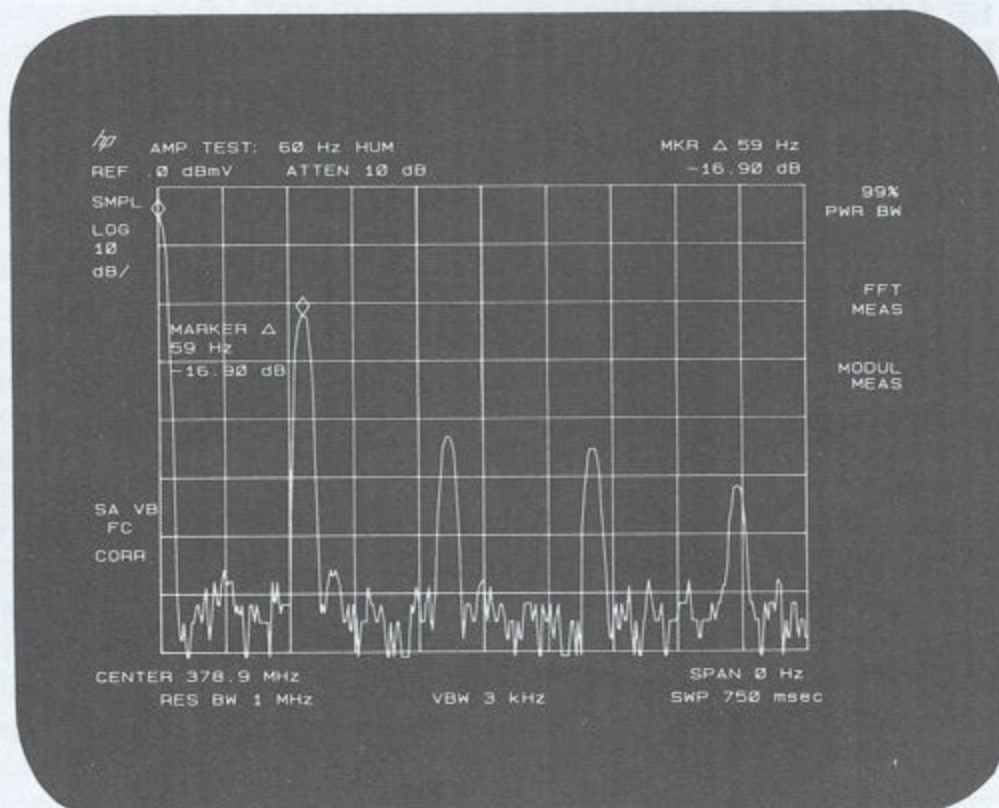
## Hardworking Functions

The many built-in functions make complex measurements much easier. SIGNAL TRACK captures a signal in a crowded spectrum and holds it at center screen, thus allowing the operator to "zoom in" by changing frequency span. Marker functions display signal amplitude with 0.05 dB resolution. PEAK SEARCH places a marker on the highest signal displayed; NEXT PEAK moves the marker to the next highest signal. Other marker keys measure amplitude and frequency differences between signals and pause the analyzer at a marker while a demodulated signal is monitored.

The spectrum analyzer uses trace storage, two active traces, and trace math to eliminate frequency response variations caused by the analyzer and an external source. The screen displays the frequency response of the input signal alone (see below). Related functions are MAX HOLD, which displays a signal's peak amplitude and frequency drift, and VIDEO AVERAGE, which smooths displayed-noise peaks.



Special functions perform measurements such as %AM, 99% power bandwidth, and signal-to-noise. The 3 dB POINTS and 6 dB POINTS softkeys determine filter bandwidth. An FFT (Fast Fourier Transform) measures AM sidebands. Even though the analyzer's minimum IF bandwidth is 1 kHz, the FFT detects sub-Hz signals and transforms the RF display into a low-frequency display (see below).



EQUIPMENT CONFIGURATION FOR AUTOMATIC TESTING

## Automatic Control

Three computer-interface options are available to automate the spectrum analyzer's many functions: HP-IB<sup>1</sup>, HP-IL<sup>2</sup>, and RS232C. Programs can be written using a desktop or handheld computer. With over 80 programming commands built into the analyzer, any front-panel measurement can be automated and results can be stored as well. Even without a computer, the interface will send display data to a printer or plotter. The HP 8590A improves your efficiency with fast, repeatable, automatic measurements.

## Portability and Performance

With this analyzer you can get the same quality test results in the field that you get in the factory. The analyzer weighs only 30 pounds and has a "briefcase" handle to make carrying easy, and it's small enough to slip under an airline seat. It can be taken anywhere—from isolating electromagnetic emissions in a mainframe computer to troubleshooting signal interference in the field. Automatic tests can be made using the HP-71B handheld computer, which fits into the analyzer's optional front cover. Wherever you need performance, you can depend on the HP 8590A.

## Add-on Features

For specialized test needs, the portable spectrum analyzer is compatible with accessories such as computers, multi-pen plotters, a video monitor, and more. The HP 8444A Tracking Generator turns the HP 8590A into a stimulus-response system that makes frequency-response and insertion-loss measurements on RF components. Use a preamplifier and the HP 11940A Close Field Probe with the analyzer and tracking generator for a swept, broadband system that does EMI troubleshooting. To record important test results, use the HP ThinkJet Printer or the HP-71B Handheld Computer (a program is available for storing up to 30 display traces along with analyzer control settings).

<sup>1</sup>HP-IB is Hewlett-Packard's hardware, software, documentation, and support for IEEE-488 and IEC-625 worldwide standards for interfacing instruments.

<sup>2</sup>HP-IL is the Hewlett-Packard Interface Loop for serial-interfacing instrument systems.

# SIGNAL ANALYZERS

## HP 8590A Specifications

### Frequency

**Frequency range:** 10 kHz to 1.5 GHz with 4-digit resolution

**Readout accuracy:**  $< \pm(5 \text{ MHz} + 1\% \text{ of span})$  (50- $\Omega$  termination on 1<sup>st</sup> LO Out)

### Frequency stability

**Drift:**  $< 50 \text{ kHz}/5 \text{ min.}$  after 2-hour warmup and 5 min. after setting center frequency

**Signal track:** signal held at display center compensates for drift

**Noise sidebands:**  $< -65 \text{ dBc}$  at 30 kHz offset (1 kHz RBW, 30 Hz VBW)

**Frequency span range:** zero and 50 kHz to 1.5 GHz with 4-digit resolution

**Readout accuracy:**  $< \pm 3\%$  of indicated frequency span

### Bandwidth (-3 dB nominal)

**Resolution BW (RBW):** 1 kHz to 3 MHz in 1,3 sequence (Gaussian shape)

**Video BW (VBW):** 30 Hz to 3 MHz in 1,3 sequence

**Sweptime range:** 20 ms to 100 s

**Readout accuracy:**  $\leq -10\%$  of indicated setting

### Amplitude

#### Amplitude range (1 MHz to 1.3 GHz)<sup>3</sup>

**50- $\Omega$  calibration:** -115 dBm to +30 dBm

**75- $\Omega$  calibration (Opt. 001):** -63 dBmV to +77 dBmV

**Readout resolution (with markers):**  $< 0.05 \text{ dB}$  for log scale;  $< 0.05\%$  of Ref. Level for linear scale

**Amplitude units:** dBm, dBmV, dBuV, volt, watt

**Amplitude scale:** 1-20 dB/div. in 1 dB steps and linear

**Maximum input power:** +30 dBm (1 W) continuous; 0 V dc

**Maximum dynamic range:** 70 dB for on-screen viewing; 70 dB for signal-to-distortion; 95 dB for IF compression-to-noise

**Displayed average noise:** 1 MHz to 1.3 GHz (0 dB input attenuation, 1 kHz RBW, 30 Hz VBW)<sup>3</sup>

**50- $\Omega$  calibration:**  $< -115 \text{ dBm}$

**75- $\Omega$  calibration (Opt. 001):**  $< -63 \text{ dBmV}$

#### Gain compression

**RF input:**  $< 1 \text{ dB}$  for -10 dBm total power at input mixer

**Internal IF:**  $< 1 \text{ dB}$  when signals are higher than Ref. Level and total power at input mixer is -20 dBm

#### Spurious responses

**Second Harmonic:**  $< -70 \text{ dBc}$  for -45 dBm at input mixer, input  $> 5 \text{ MHz}^3$

**Third-order intermod.:**  $< -70 \text{ dBc}$  for two -30 dBm signals at input mixer,  $> 50 \text{ kHz}$  signal separation

**Residual responses:**  $< -95 \text{ dBm}$  for no input signal (0 dB input atten. and 50- $\Omega$  termination on RF Input and 1<sup>st</sup> LO Out)

### Amplitude Accuracy

#### Frequency response

**Absolute variation:**  $< \pm 1.5 \text{ dB}$  referenced to Cal Out signal (10 dB atten.)

**Peak variation:**  $< \pm 1 \text{ dB}$  referenced to mid-point between highest and lowest peak excursions

#### Calibrator accuracy (for 299.9 MHz $\pm$ 300 kHz Cal Out signal)

**50- $\Omega$  calibration:**  $< \pm 1 \text{ dB}$  for -20 dBm level

**75- $\Omega$  calibration (Opt. 001):**  $< \pm 1 \text{ dB}$  for +27 dBmV level

#### Reference level setting (log scale)

**0-60 dB atten.:**  $< \pm 1.75 \text{ dB}$  for +30 to -120 dBm range

**10 dB atten.:**  $< \pm 1.25 \text{ dB}$  for 0 to -120 dBm range;  $< \pm 0.5 \text{ dB}$  for 0 to -59 dBm range

**Resolution BW switching:**  $< \pm 0.25 \text{ dB}$  for 3 kHz to 3 MHz RBW range<sup>†</sup>

**Log scale switching:** no significant error for 1-20 dB/div. scale range

**Log scale fidelity:**  $< \pm 0.1 \text{ dB/dB}$  change over 70 dB range with  $\pm 0.75 \text{ dB}$  max. over -60 dB range from Ref. Level;  $\pm 1.0 \text{ dB}$  max. over -70 dB range from Ref. Level

**Linear scale fidelity:**  $< \pm 3\%$  of Reference Level setting

### Input/Output Characteristics

#### Front-panel connectors

**RF input:** 50- $\Omega$  BNC (standard); 75- $\Omega$  BNC (Opt. 001)

**Probe power output:** +15 V, -12.6 V, GND, 150 mA max.

#### Cal output

**50- $\Omega$  BNC (standard):** -20 dBm, 299.9 MHz

**75- $\Omega$  BNC (Opt. 001):** +27 dBmV, 299.9 MHz

**1<sup>st</sup> LO output:** 50- $\Omega$  BNC, +10 dBm, 2.05 to 3.55 GHz

#### Rear-panel connectors

**Aux video output:** 50- $\Omega$  BNC, 0 to 1 V

**Monitor output:** 50- $\Omega$  BNC, NTSC format, 19.2 kHz horiz. sync.

**High sweep In/Out:** BNC, high TTL = sweep, low TTL = retrace

**Sweep output:** BNC, 5 k- $\Omega$ , 0 to +10 V ramp

**Aux IF output:** 50- $\Omega$  BNC, -10 to -60 dBm, 21.4 MHz

**Ext. trigger input:** BNC, TTL levels, positive edge trigger

**Interface connector:** HP-IB (Opt. 021), HP-IL (Opt. 022), or RS232C (Opt. 023)

**HP-IB codes:** SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C1, C2, C3, C28

### General

**Temperature:** 0° to 55°C operating; -40° to +75°C storage

**Temperature stability:** 2 hours after storage at a constant temp. between 0° and +55°C and 30 minutes after analyzer turn-on at the same constant temperature

**EMI compatibility<sup>3</sup>:** CISPR pub. 11 (1985) and FTZ 526/527/79

**Audible noise:**  $< 37.5 \text{ dBA}$  pressure and  $< 5.0 \text{ Bels}$  power (ISO DP7779)

**Power requirements:** 86-127 or 195-253 V RMS; 47-66 Hz; 120 VA max.

**Weight (characteristic):** 13.5 kg (29.8 lb)

**Size (characteristic):** 213 mm (8.4") H  $\times$  366 mm (14.4") W  $\times$  460 mm (18.1") D

**Warranty<sup>3</sup>:** One year limited warranty for materials and workmanship

### Recommended Accessories

**HP 2225A/B/D** ThinkJet Printer

**HP 7440A** ColorPro Plotter

**HP-71B/HP-75D** Handheld Computer

**HP 8444A Opt. 059** Tracking Generator

**HP 82913A** Monitor

**HP 10855A** Broadband Preamplifier

**HP 11940A** Close Field Probe

**HP 11867A** RF Limiter

**HP 11694A** 50-75 $\Omega$  Matching Transformer

**HP 11852A** 50-75 $\Omega$  Minimum Loss Pad

**Rack Slide:** P/N 1494-0060 (for HP 8590A Options 908/909)

**Transit Case:** P/N 9211-5604

### Ordering Information

**HP 8590A Portable RF Spectrum Analyzer**

**Option 001:** 75- $\Omega$  Input Impedance

**Option 021:** HP-IB Interface

**Option 022:** HP-IL Interface

**Option 023:** RS232C Interface

**Option 040:** Front Panel Cover

**Option 908:** Rack Mount Without Handles

**Option 909:** Rack Mount With Handles

**Option 910:** Extra Operating and Installation

Manuals

**Option 915:** Support Manual and Extra Operating and Installation Manuals

### Price

\$9500

\$0

\$450

\$450

\$450

\$200

\$250

\$300

\$24

\$110

<sup>3</sup>Refer to Installation Manual (08590-90003) and Operation Manual (08590-90005) for more information.