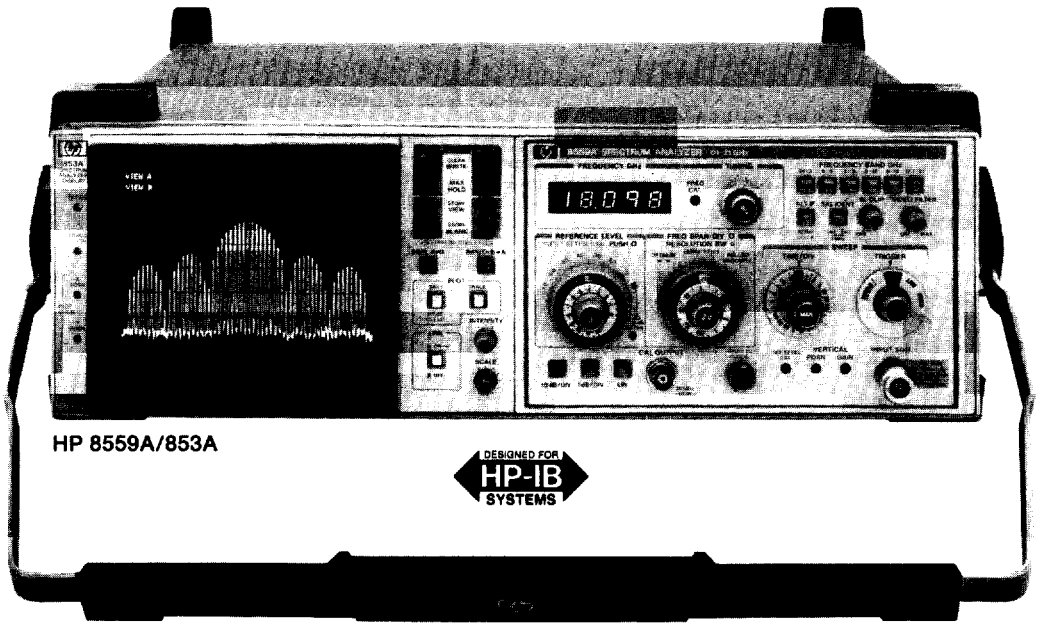
SIGNAL ANALYZERS

Spectrum Analyzer, 0.01 to 21 GHz

Models 8559A/853A

- Rugged portability
- Simple three-knob operation
- Direct plotter control
- Display annotation and storage accessories
- Digital display with trace arithmetic
- Resolution bandwidths from 1 kHz to 3 MHz
- Absolute amplitude calibration in all bands



HP 8559A/853A

HP 8559A Spectrum Analyzer Plug-In

Performance Plus Economy

The HP 8559A is a 0.01 to 21 GHz spectrum analyzer plug-in for use with the HP 853A or 182T display. The high performance and convenient operation of this economical unit is ideally suited for a variety of applications in production, R&D or field service environments.

Simple 3-Knob Operation

Preset the HP 8559A to the color coded, "basic operation" settings, and use the coupled controls to make most measurements in three easy steps. Tune to the signal; the LED readout displays its frequency. Zoom-in on the signal by reducing the span width; the resolution bandwidth, video filter, and sweep time automatically change to an optimum value for a calibrated display. Then, change the reference level to bring the peak of the signal to the top of the screen for the most accurate amplitude measurement. A signal identifier is available in all bands to provide assurance of correct measurements.

Absolute Amplitude Calibration

Signal levels can be read directly in dBm from the CRT without the use of external standards or calculations. The signal level represented by the top CRT graticule line is always indicated by the reference level control, and vertical scale factors of 10 dB/Div, 1 dB/Div, or linear can be selected.

HP 11870A Low Pass Filter (dc to 2.6 GHz)

For RF measurement applications needing extended coverage to 2.6 GHz, the HP 11870A low pass filter will reject signals above 3 GHz by more than 60 dB for image-free measurements over the entire 10 MHz to 2.6 GHz range.

HP 853A Spectrum Analyzer Display

Digital Display

The HP 853A is a digital display mainframe for use with the HP 8559A spectrum analyzer plug-in. Signals are displayed on either of two independently stored digital traces. Display processing capabilities include maximum hold, digital averaging, and trace normalization for extended measurement capability. A built-in microprocessor manages the display operation and provides access to built-in test routines for display calibration and test (accessible via the front panel).

HP-IB Capability Includes Direct Plotter Control

A hard-copy record of the displayed traces and graticule can be made on a digital plotter via HP-IB by simply using the HP 853A's front-panel pushbuttons; a controller is not required. Although analyzer controls are not programmable, some HP-IB applications include using a controller for recording trace data or for operator prompts on the HP 853A CRT. The digital display and processing functions can be remotely programmed, and analyzer sweeps can be initiated via HP-IB.

Two Configurations

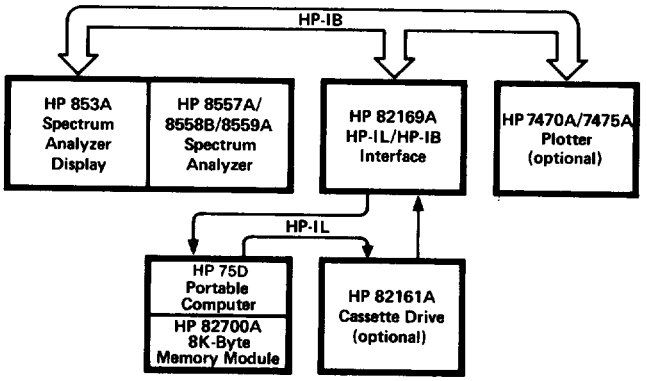
The display is offered in two styles. The HP 853A (pictured) is a ruggedized, portable mainframe complete with tilt-bail handle and drip proof, protective front cover. The HP 853A is ideally suited for rugged, field service environments and any areas where system mobility is required. The HP 853A Option 001 offers the digital display in a full module bench or rack mount configuration.

Software

The Solid State Camera Software provides a low cost, portable alternative to CRT photos. One program, "Camera," allows the user to annotate the display with a title and with spectrum analyzer control settings. Both trace and annotation can be permanently stored in the computer's memory (3 traces), on magnetic card (1 trace each), and on magnetic cassette (over 80 traces). After being stored, the display information can later be recalled for viewing on the HP 853A display or for making hard copies with a plotter. Another program, "Limitgen," allows test limit lines to be drawn on the HP 853A display.

The HP 853A software adds measurement capability to many spectrum analyzer applications: EMI measurements are aided by display limit line generation; FCC digital radio masks can be drawn on the display; recording spectrum analyzer display data is useful for proof-of-performance testing, electric field strength measurements, remote location testing, and communication band occupancy monitoring; and production measurements are enhanced by display comparison testing to specification lines or to ideal response shapes.

To implement the software for the HP 853A, the following parts and equipment configuration are needed (refer to other sections of this catalog for ordering and pricing information): HP 853A Spectrum Analyzer Display; HP 8557A, 8558B, or 8559A Spectrum Analyzer; HP 75D Portable Computer; HP 82700A 8k-Byte Memory Module; HP 82169A HP-IB Interface; HP 82708A Magnetic Cards; HP 82715A Card Holders; Solid State Camera Software HP part number 75-00853; HP 7470A or 7475A Plotter (optional); HP 82161A Cassette Drive (optional); and HP 82176A Cassettes (optional).



HP 8559A Specifications

Frequency Specifications

Frequency range: 0.01 to 21 GHz in six selectable ranges.

Freqnency Spans

Fullband: displays entire spectrum of selected band.

Per divison: 10 kHz to 200 MHz/div in a 1, 2, 5 sequence.

Zero span: analyzer functions as a manually tuned receiver.

Frequency Accuracy

Tuning accuracy: 0.01 to 3 GHz: <±(1 MHz +0.3% of center frequency); 3 to 21 GHz: <±(5 MHz +0.2% of center frequency).

Frequency span accuracy: <±5% of displayed frequency separation.

Spectral Resolution

Resolution bandwidths: eight selectable resolution (3-dB) bandwidths from 1 kHz to 3 MHz in a 1, 3 sequence. Bandwidth and frequency span are independently variable or may be coupled for optimum display when control markers are aligned (▶◀).

Resolution bandwidth accuracy: 3-dB points are <±15% (except for 3 MHz bandwidth: <±30%).

Selectivity: (60-dB/3-dB bandwidth ratio) <15:1

Spectral stability: (fundamental mixing, bands 0.01-3 GHz and 6-9 GHz)

Residual FM: <2 kHz p-p in 0.1 second.

Noise sidebands: ≥70 dB down, ≥30 kHz from center of CW signal with 1 kHz resolution bandwidth and video filter at MAX.

Amplitude Specifications

Amplitude range: -111 to +30 dBm.

Maximum Input (safe) Levels

Total power: +20 dBm (100 mW, 2.2 Vrms) with 0 dB input attenuation; +30 dBm (1 watt, 7.1 Vrms) with ≥10 dB input attenuation.

Voltage: ±7.1 Vdc or 7.1 V RMS (<100 Hz).

Peak pulse power: +50 dBm (100 watts, 10 μsec pulse width, 0.01% duty cycle) with ≥30 dB input attenuation.

Gain compression: <0.5 dB for a −10 dBm input level, with 0 dB input attenuation.

Average noise level: see table below for maximum average noise level with 1 kHz resolution bandwidth, 0 dB input attenuation, and video filtering at MAX.

Frequency Range (GHz)	Avg. Noise Level (dBm/1 kHz)	Frequency Response (± dB max.)	Amplitude Accuracy[1] (± dB max.)
0.01-3	-111	1.0	2.3
6.0-9	-108	1.0	2.3
3.0-9	-103	1.5	2.8
9.0-15	-98	1.8	3.1
6.0-15	-93	2.1	3.4
12.1-18	-92	2.3	3.6
18.0-21	-90	3.0	4.3

Alternate IF: regular IF at 3.0075 GHz; alternate IF available at 2.9925 GHz for all frequency bands (minimum frequency is 25 MHz).

Calibrated Display Range

Log: 70 dB with 10 dB/div scale; 8 dB with 1 dB/div scale.

Linear: 8 divisions with linear (LIN) amplitude scale.

Amplitude Accuracy

Calibrator: −10 dBm ± 0.3 dB (into 50 Ω), 35 MHz ± 400 kHz.

Reference level: 10 dB steps and a 12 dB vernier for calibrated adjustment from −112 dBm to +60 dBm[2].

Step accuracy (with 0 dB input attenuation): −10 to −80 dBm: ±0.5 dB; −10 to −100 dBm: ±1.0 dB.

Vernier accuracy: ±0.5 dB.

Frequency response: see table above; includes input attenuator, mixer flatness, and mixing mode gain variation (band to band), with 0 or 10 dB input attenuation.

Input attenuator: 0 to 70 dB, selectable in 10 dB steps.

Step accuracy: <±1.0 dB per 10 dB step (0 to 60 dB, 0.01 to 18 GHz).

Maximum cumulative error: <±2.4 dB (0 to 60 dB, 0.01 to 18 GHz).

Bandwidth Switching (amplitude variation)

3 MHz to 300 kHz: <±0.5 dB.

3 MHz to 1 kHz: <±1.0 dB.

Display Fidelity

Log incremental accuracy: ±0.1 dB/dB from Reference Level.

Log maximum cumulative error: ≤±1.5 dB over 70 dB range.

Linear accuracy: ±3% of Reference Level.

Spurious Responses

Second harmonic distortion: typically >70 dB below a −40 dBm signal with 0 dB input attenuation.

Third order intermodulation distortion: typically >70 dB below two −30 dBm input signals separated by ≥50 kHz with 0 dB input attenuation.

Residual responses: <−90 dBm with 0 dB input attenuation and no signal present at input (0.01[3]–3 GHz, 6–9 GHz).

Signal identifier: available in all frequency bands and spans, useable from 10 MHz to 100 kHz/div.

Sweep Characteristics

Sweep Time

Automatic: sweeptime is automatically adjusted to maintain absolute amplitude calibration for any combination of frequency span, resolution bandwidth and video filter bandwidth.

Calibrated sweep times: 2 μsec to 10 sec/div in a 1, 2, 5 sequence (except 2 sec/div), ±10% accuracy (±20% for 5/10 sec/div).

Manual sweep: spectrum analyzer may be swept manually in either direction with front panel control.

Signal Input Characteristics

Input impedance: 50 Ω nominal; precision type-N female connector.

Input SWR: typically <2.0, 0 dB input attenuation; <1.3, 10 dB input attenuation.

HP 853A Characteristics

For information on the HP 853A Display, see page 681 in the HP 8557A Spectrum Analyzer section.

General

General Specifications

For information on HP 182T compatability, temperature range, EMI compliance, and power requirements, see page 681 in the HP 8557A Spectrum Analyzer section.

Weight

HP 8559A: net, 5.5 kg (12.1 lb). Shipping 9.1 kg (20 lb).

HP 853A: net, 15.9 kg (35 lb). Shipping 18.6 kg (41 lb).

HP 853A Opt 001: net, 14.5 kg (32 lb). Shipping, 17.3 kg (38 lb).

Size

HP 853A/8559A: 158.8 H x 501.7 W x 524.3 mm D (6.25″ x 19.75″ x 20.65″).

HP 853A Opt 001/8559A: 133 H x 425.5 W x 473.7 mm D (5.25″ x 16.75″ x 18.65″).

Ordering Information	Price
HP 8559A Spectrum Analyzer	$11,825
Opt 910: Extra Operating and Service Manual	add $20
HP 853A Portable Spectrum Analyzer Display	$5,550
Opt 001: Full Module Bench/Rack Configuration	less $200
Opt. 910: Extra Operation and Service Manual	add $25
Solid State Camera Software: HP part no. 75-00853	$50
HP 182T Cabinet Style, Normal Persistence Display	$4,030

[1]Using IF substitution, total accuracy is sum of frequency response, calibration, and reference level errors.

[2]Input level not to exceed maximum levels.

[3]25 MHz with Alternate IF ON.

[4]A simple modification is required for HP 8559A plug-ins with serial prefix 2208A and lower (modification kit, HP part number 00853-60059).