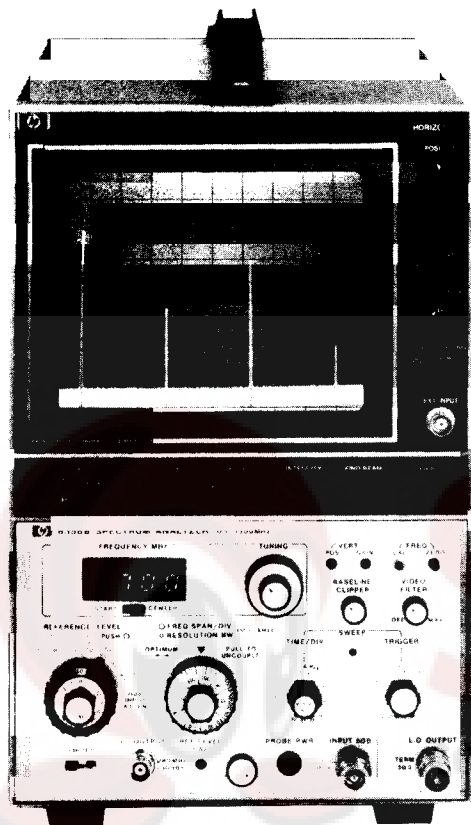


# SIGNAL ANALYZERS

Spectrum analyzer, 0.1 to 1500 MHz

8558B/182T & 8444A

- Simple, 3 knob operation
- Digital frequency readout
- Display of signal levels directly in dBm



8558B/182T

## 8558B Spectrum analyzer

### Economy plus performance

The Model 8558B is a 0.1 to 1500 MHz spectrum analyzer which plugs into any model 180-series oscilloscope display. This low cost, easy-to-use analyzer provides high accuracy in both amplitude and frequency measurements.

### Simple, 3-knob operation

Most measurements are a simple three step process. Tune to the signal to be measured; its frequency is displayed on the LED readout. Zoom-in on the signal by decreasing the frequency span; bandwidth, sweep time, and video filtering are set automatically. Raise the signal to the top of the CRT; read its amplitude (in dBm) off the reference level control.

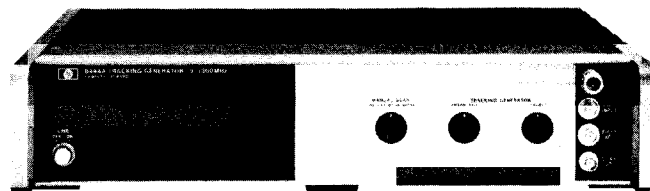
### Absolute amplitude calibration

Signal levels can be read directly from the CRT in dBm (dBmV for Option 002) 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 scale factors of 10 dB/div, 1 dB/div, and linear can be selected.

### Optional 75 ohm input

Two options are available which allow measurements in 75 ohm systems: Option 001 has 75 ohms impedance and retains the dBm power calibration; Option 002 is also 75 ohms, but the amplitude is calibrated in dBmV for measurements on systems such as CATV.

- Resolution bandwidths from 1 kHz to 3 MHz
- Optional 75Ω input with dBm or dBmV calibration
- Available 0.5 to 1300 MHz Tracking Generator



8444A Opt. 058

## Suggested displays

The 8558B will function with any 180-series display. However, the following are suggested: For a low cost, large screen display, the Model 182T is ideal; the Model 181T offers variable persistence and storage; and the Model 180TR offers a rack mount configuration. In addition, it is advantageous to order the 180T, 180TR, 181T, 181TR or 182T displays which provide a long persistence P39 phosphor (except the 181T and 181TR variable persistence displays) and four non-buffered, rear panel outputs compatible with most X-Y recorders. 100 volt operation available as option 003.

## 8444A Option 058 Tracking generator (0.5 – 1300 MHz)

Make swept frequency response measurements to  $\pm 1.5$  dB from 0.5 to 1300 MHz with greater than 90 dB of dynamic range. The output is absolutely calibrated at 0 dBm and continuously variable to -10 dBm. The frequency of unknown signals as well as the frequency of any point on the frequency response curve can be measured using the external counter output and Model 5383A Counter up to 500 MHz or Model 5341A Opt. 003 Counter to 1300 MHz.

## 8558B Specifications

### Frequency specifications

**Frequency range:** 100 kHz to 1500 MHz.

**Frequency display span** (on a 10-division CRT horizontal axis): 14 calibrated spans from 100 MHz/div to 5 kHz/div in a 1, 2, 5 sequence. In "0" the analyzer is a fixed-tuned receiver.

**Accuracy:** frequency error between any two points on the display is less than  $\pm 5\%$  of the indicated frequency separation.

**Digital frequency readout:** indicates center frequency or start frequency of the frequency display scan. Two ranges: 0 to greater than 195 MHz with 100 kHz resolution; 195 MHz to 1500 MHz with 1 MHz resolution. ZERO control allows frequency readout to be adjusted for accurate calibration anywhere in the frequency range; CAL control removes frequency hysteresis. Resolution 100 kHz.

**Accuracy** (after zeroing on the LO feedthrough and operation of the CAL button, 20°-40°C):

**0 – 195 MHz:**  $\pm 1$  MHz +20% of FREQUENCY SPAN PER DIVISION setting ( $\leq 1$  MHz per division).

**195 – 1500 MHz:**  $\pm 5$  MHz +20% of FREQUENCY SPAN PER DIVISION setting.

### Stability

**Residual FM:** less than 1 kHz peak-to-peak for time  $\leq 0.1$  sec.

**Noise sidebands:** more than 65 dB below CW signal, 50 kHz or more away from signal with a 1 kHz resolution bandwidth and full video filter.

### Resolution

**Bandwidth ranges:** 3 dB resolution bandwidths of 1 kHz to 3 MHz in a 1, 3, 10 sequence. Resolution bandwidth may be coupled to frequency display span at a ratio of two display spans per resolution bandwidth.

**Resolution bandwidth accuracy:** individual resolution bandwidth 3 dB points calibrated to  $\pm 20\%$ .

**Resolution bandwidth selectivity:** 60 dB/3 dB resolution bandwidth ratio  $< 15:1$ .

**Video filter:** post-detection filter used to average displayed noise. Bandwidth variable from approximately 3X Resolution Bandwidth to approximately 0.01X Resolution Bandwidth. In the MAX position provides a noise averaging filter with a bandwidth of approximately 1.5 Hz.

## Amplitude specifications

### Absolute amplitude calibration range

**Log calibration range:** from -115 dBm to +30 dBm in 10 dB steps. Reference level vernier, 0 to -12 dB continuously.

**Log display ranges:** 10 dB/div on a 70 dB display, and 1 dB/div on an 8 dB display.

**Linear display:** from 2.2 microvolts (-100 dBm) full scale to 7.1 volts (+30 dBm) full-scale in 10 dB steps. Full-scale signals in linear translate to approximately full-scale signals in log.

### Dynamic range

**Average noise level:** <-107 dBm with a 10 kHz resolution bandwidth (0 dB input attenuation).

**Spurious responses:** for input signal level ≤ Optimum Input Level setting, all image and out-of-band mixing responses, harmonic and intermodulation distortion products are more than 70 dB below input signal level, 5 MHz to 1500 MHz; 60 dB below, 100 kHz to 5 MHz.

**Spurious responses due to 3rd order intermodulation distortion:** for two input signals 10 dB above Optimum Input Level setting 3rd Order Intermodulation distortion products are >70 dB below the input signals, 5 - 1500 MHz; 60 dB below, 100 kHz to 5 MHz (signal separation ≥50 kHz).

**Residual responses** (no signal present at input): <-100 dBm with 0 dB input attenuation.

### Amplitude accuracy

**Frequency response** (flatness): ±1.0 dB.

**Switching between bandwidths** (at 10°-40°C):

**3 MHz to 300 kHz:** ±0.5 dB.

**3 MHz to 1 kHz:** ±1.0 dB.

**Reference level accuracy** (at fixed center frequency, fixed resolution bandwidth): ±1.5 dB (includes input attenuator and IF gain accuracy. May be improved using IF or RF substitution techniques).

**Amplitude log display:** ±0.1 dB/dB but not more than ±1.5 dB over full 70 dB display range.

### Calibrator

**Amplitude:** -30 dBm ±1.0 dB.

**Frequency:** 280 MHz ±50 kHz, crystal controlled.

## Input specifications

**Input connector:** type N female.

**Input impedance:** 50Ω nominal.

Typical reflection coefficient <0.20 (1.5 SWR) for all Optimum Input Level settings except -40 dBm (0 dB input attenuation).

**Input attenuator:** 70 dB range.

Accuracy ±0.5 dB per 10 dB step but not more than ±1.0 dB over full 70 dB range.

### Maximum input levels

**AC or peak:** peak or average power +10 dBm (1.0 V ac peak) incident on mixer (0 dB input attenuation), +30 dBm (10 V ac peak or 1 W), incident on input attenuator. (MAX input markings on front panel indicate maximum input allowable for <1 dB gain compression or attenuator overload).

**DC:** ±50 V dc.

## Output characteristics

**LO output:** +10 dBm nominal, 50 ohms; 2.05-3.55 GHz.

**Cal output:** -30 dBm, 280 MHz with 2nd through 5th harmonics greater than -60 dBm.

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

Powers 1120A, 1121A, 1123A, or 1124A high impedance probes.

**Note:** the following oscilloscope display rear panel outputs refer to 180T, 180TR, 181T, 181TR displays and older 180-series displays with Option 807 only.

**Vertical output:** (AUX A on oscilloscope display rear panel.) 0 to 0.8 V for 8-division deflection on CRT display; 50Ω output impedance.

**Pen lift/blanking output:** (AUX B on oscilloscope display rear panel.) 0 to 15 V (0 V, pen down). Approximately 10 kΩ impedance when blanked. Compatible with HP 7004B, 7034B, 7005B, and 7035B X-Y RECORDERS.

**21.4 MHz IF output:** a 21.4 MHz output linearly related to the RF input to the analyzer. Bandwidth controlled by analyzer Resolution Bandwidth setting. Amplitude controlled by input attenuator, IF gain vernier, and first six IF step gain positions (-10 through -60 dBm Ref Level with 0 dB input attenuation). Output is approximately -10 dBm for full-scale signals on the CRT. (AUX C on oscilloscope display rear panel, 50Ω output impedance.)

**Horizontal output:** (AUX D on oscilloscope display rear panel.) -5.0 to +5.0 V for 10 div CRT deflection, 5 kΩ output impedance.

## Sweep characteristics

### Sweep time

**Auto:** sweep time is automatically controlled by Frequency Span, Resolution Bandwidth, and Video Filter.

**Manual:** sweep determined by front panel control, continuously variable across CRT in either direction.

**Calibrated sweep time:** 16 internal sweep times from 0.1 ms/div to 10 sec/div in a 1, 2, 5 sequence. For sweep times of 2 ms/div to 10 sec/div, the analyzer is operable in its normal swept frequency mode. Faster sweeps are useful for analyzing modulation waveforms when the analyzer is being operated as a fixed-tuned receiver with 0 Display Span. Sweep times may be reduced to an effective 10 μsec/div by using the 180-series X10 horizontal magnifier.

**Accuracy:** ±10%.

### Sweep trigger

**Internal:** sweep internally triggered by envelope of RF input signal (signal amplitude of 1.0 division peak-to-peak required on CRT display).

**Line:** sweep triggered by power line frequency.

**Free run:** sweep triggered repetitively by internally generated ramp.

**Single:** sweep triggered by front panel sweep trigger switch (spring return position).

## Display characteristics

### Oscilloscope display sections

**180 Series compatibility:** the 8558B is compatible with all 180A, 180AR, 180C, 180D, 180F, 181A, 181AR, 182A, 184A, and 184B mainframes. It is operable with the 183A, 183B mainframes, but the display is limited to 6 divisions by the 6-division CRT. The following 180-series oscilloscope displays are recommended for use with the 8558B Spectrum Analyzer because they provide 4 non-buffered rear panel auxiliary outputs (for unattenuated vertical, horizontal, and penlift outputs) and P39 medium-persistence CRT phosphor (except with 181T, 181TR which provide variable persistence):

180TR	P39 phosphor
181T	P31 phosphor with variable persistence
181TR	P31 phosphor with variable persistence
182T	P39 phosphor

100 volt operation of 180 series mainframes available as Option 003. See HP Service Notes 180A/AR-10, 180C/D-2, 181A/AR-8 and 182A/C-1 for information needed to modify standard displays to provide auxiliary outputs.

## Model number and name

	Price
8558B Spectrum Analyzer	\$4675
182T Display	\$1500
180TR Display	\$1500
181T Display	\$2400
181TR Display	\$2500
8444A Opt. 058 Tracking Generator	\$3800
Option 001: 75 ohm input (BNC), dBm calibration	add \$100
Option 002: 75 ohm input (BNC), dBmV calibration	add \$100