

SIGNAL ANALYZERS

HP 141T Spectrum Analyzer System, 20 Hz to 40 GHz

Model 141T System

- 20 Hz to 18 GHz, external mixing to 40 GHz
- Absolute amplitude calibration
- Tracking generators for component test
- Tracking preselector simplifies measurements



Hewlett Packard's 141T Spectrum Analyzer system permits measurements at frequencies ranging from 20 Hz to 18 GHz with four plug-in tuning sections. For measurements in the 18 to 40 GHz region, an accessory external mixer may be used with the microwave tuning section. The modularity of the system allows you to keep pace with changing measurement requirements.

An HP 141T Spectrum Analyzer system is comprised of a main-frame/display, one tuning section, and one IF section. Each tuning section covers a different frequency range permitting purchase of those which best meet current requirements. The HP 8556A covers from 20 Hz to 300 kHz, the HP 8553B from 1 kHz to 110 MHz, the HP 8554B from 100 kHz to 1250 MHz, and the HP 8555A from 10 MHz to 18 GHz. The IF sections, the HP 8552A or HP 8552B, provide bandwidth/gain selection and detection. Unless otherwise noted, the specifications shown here apply to a spectrum analyzer which contains an HP 8552B IF section.

For swept frequency testing of components, the HP 8443A or HP 8444A Tracking Generator can function as a swept signal source which, through locking, accurately tracks the frequency to which the analyzer is tuned. A microwave tracking preselector, the HP 8445B, simplifies measurements and improves the dynamic range of the HP 8555A Tuning Section for dense signal environments.

The spectrum analyzer displays amplitude and frequency accurately with a large dynamic range.

The following pages contain detailed performance specifications for each configuration of the spectrum analyzer, preselector, and tracking generators.

Absolute Amplitude Calibration

Calibrated frequency and amplitude measurements may be made over the entire frequency range. Logarithmic or linear scaling allow display of amplitude in dBm or voltage respectively. A warning light is provided to indicate uncalibrated conditions due to improper control settings.

Frequency Calibration

Three scan modes allow simple, accurate measurements. In the FULL SCAN mode the entire tuning section band is displayed. A marker is provided to identify and select signals of interest.

After a signal is selected in the FULL SCAN mode, switching to PER DIVISION mode allows analysis of the signal in narrow scans. Noise sidebands and low deviation FM are examples of measurements that might be made in this mode.

The analyzer can be used as a fixed tuned receiver by selecting the ZERO SCAN mode. In this mode the analyzer provides a time domain display with a calibrated time base, controlled by the scan time setting. Demodulating AM radio is a simple example of a ZERO SCAN measurement.

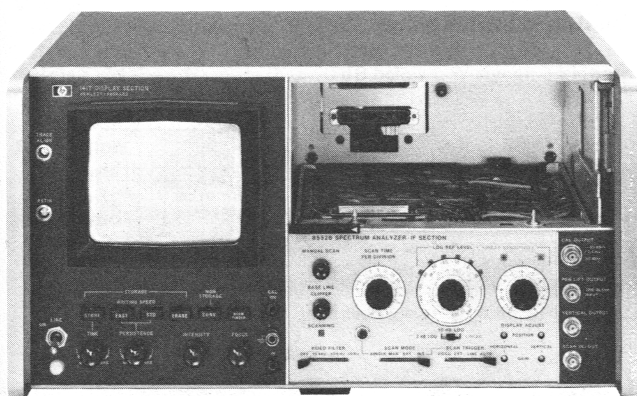
High Resolution

In frequency domain analysis it is often necessary to resolve close-in sidebands, such as line related modulation. Bandwidths as narrow as 10 Hz are provided in the HP 8553B to obtain this resolution. Use of such narrow bandwidths is made possible by frequency stabilization.

High Sensitivity, Low Distortion

For best measurement accuracy, a wide dynamic range is essential. Wide dynamic range requires both high sensitivity and low internal distortion.

Signals as low as -142 dBm can be measured using the HP 8553B tuning section. For most measurements the HP 141T system offers in excess of 70 dB distortion free dynamic range. For many measurements with the HP 8555A Tuning section, the HP 8445B Preselector can increase dynamic range to greater than 100 dB.



HP 141T, 8552B

Mainframe/Storage Display

The HP 141T Mainframe provides variable persistence and storage. When narrow bandwidths are selected, sweep time must be reduced to maintain amplitude calibration. Variable persistence permits displayed traces of constant intensity even for long sweep-times. The storage feature allows traces to be held for comparison or photographing.

IF Section Features

In addition to providing calibrated bandpass filtering the IF Section offers several user convenience features. Selectable video filters improve signal discernibility when S/N is low and permit display of average noise level. Recorder outputs, compatible with analog XY recorders, are provided. Amplitude and frequency calibration from the front panel are possible using the internal calibration source.

Tracking Generators for Component Test

Tracking generators—leveled sources which track the tuned frequency of the analyzer—allow precise frequency measurements on two port devices with high dynamic range. Three tracking generators permit characterization of device performance up to 1500 MHz with a nominal dynamic range of 100 dB. The HP 8556B includes a tracking generator and the HP 8443A and HP 8444A may be used with the HP 8553B and HP 8554B Tuning Sections respectively.

HP 8750A Storage-Normalizer

Digital trace storage and display with the HP 141T System is possible with the HP 8750A (Opt. 001) and an external oscilloscope. Digital storage provides a flicker-free display for any sweep speed and allows comparison of two traces. When a tracking generator is used, the normalization feature of the HP 8750A reduces the effect of system frequency response on the measurement.

General Specifications

HP 141T Spectrum Analyzer System

Input impedance: 50 Ω nominal. Reflection coefficient <0.30 (1.85 SWR), input attenuator ≥ 10 dB.

Maximum input level: peak or average power +13 dBm (1.4 V ac peak), ± 50 V dc.

Attenuator: 0 to 50 dB in 10 dB steps.

Scan time: 16 internal scan rates from 0.1 ms/div to 10 sec/div in a 1, 2, 5 sequence, and manual scan (8552B only).

Scan Time Accuracy

0.1 ms/div to 20 ms/div: $\pm 10\%$.

50 ms/div to 10 s/div: $\pm 20\%$.

Scan Mode

Int: analyzer repetitively scanned by internally generated ramp: synchronization selected by scan trigger

Single: single scan with front panel reset.

Ext: scan determined by 0 to +8 volt external signal.

Manual: scan determined by front panel control.

Scan trigger: for internal scan mode, select between

Auto: scan free-runs.

Line: scan synchronized with power line frequency.

Ext: scan synchronized with >2 volt (20 volt max.) signal.

Video: scan internally synchronized to envelope of RF input.

Auxiliary Outputs

Vertical output: 0 to -0.8 V for full deflection.

Scan output: -5 V to +5 V for 10 div CRT deflection.

Pen lift output: 0 to 14 V (0 V, pen down).

Display Characteristics

HP 141T

Plug-ins: accepts Models 8552A/B, 8553B, 8554B, 8555A and 8556A.

Cathode-Ray Tube Type

Post-accelerator storage tube, 9000 volt accelerating potential; aluminumized P31 phosphor.

Cathode-Ray Tube Graticule

8 $\times$ 10 division (approx, 7.1 cm $\times$ 8.9 cm) parallax-free internal graticule.

Persistence

Normal: natural persistence of P31 phosphor (0.1 second).

Variable

Normal writing rate mode: continuously variable from less than 0.2 second to more than one minute.

Maximum writing rate mode: from 0.2 second to 15 seconds.

Erase: manual; erasure takes approximately 350 ms.

Storage time: normal writing rate; more than 2 hours at reduced brightness (typically 4 hours).

Fast writing speed: more than 15 minutes.

EMI: conducted and radiated interference is in compliance with MIL-STD 461A Methods CEO3 and REO2, CISPR publication 11 (1975), and Messemphaenger-Postverfuegung 526/527/79 (Kennzeichnung Mit F-Nummer/Funkschutzzeichen).

Temperature range: operating, 0°C to +55°C; storage, -40°C to +75°C.

Power requirements: 100, 120, 220, or 240 V $\pm 5\%$. -10%. 50 to 60 Hz, normally less than 225 watts (includes plug-ins used).

Weight

Model 8552A or 8552B IF section: net, 4.1 kg (9 lb). Shipping 6.4 kg (14 lb).

Model 141T display section: net, 19.2 kg (43 lb). Shipping, 26 kg (57 lb).

Tuning section: see following pages.

Size: model 141T with plug-ins: 221 H $\times$ 425 W $\times$ 416 mm D (8.8" $\times$ 16.8" $\times$ 16.4").

Special order: chassis slides and adapter kit.

Ordering Information

HP 141T Variable Persistence Display

Opt 908: Rack Flange Kit

HP 8552A Economy IF Section

HP 8552B High Resolution IF Section