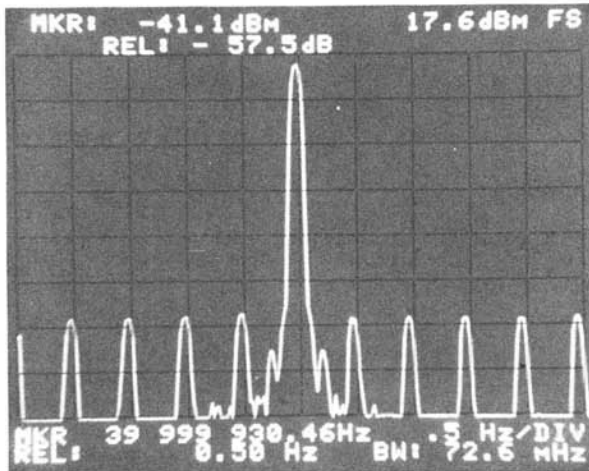


SIGNAL ANALYZERS

Automated Spectrum Analysis, Carrier Noise Analysis

Models 3047A, (continued,) 11729B

Direct Spectrum Mode



Direct spectrum measurement with 0.072 Hz bandwidth

In the Direct Spectrum Mode the system hardware is used as a down converter to bring 19 kHz to 40 MHz signals into the frequency range of the HP 3582A Real Time Spectrum Analyzer. This allows the very high resolution and measurement speed of the Real Time Spectrum Analyzer to be used up to 40 MHz. In this mode the system is capable of resolution bandwidths as narrow as 0.02 Hz and is one to two orders of magnitude faster than a swept spectrum analyzer. The system provides these measurements over the wide dynamic range of 70 dB, calibrated in both frequency and amplitude.

Noise Sideband Mode

While the HP 3047A can measure very high quality sources in the Phase Noise Mode, moderate performance sources can be measured more easily in the Noise Sideband Mode. In this mode the system measures both AM and PM noise without additional hardware. The system software connects the HP 3047A input to the HP 3585A and the output of the analyzer is fed into an internal phase detector. The output of the detector is connected to the HP 3582A Analyzer and the phase noise measured over the .02 Hz to 25 kHz range. In addition, a second detector is provided which outputs the AM noise of the signal to the second channel of the HP 3582A Analyzer.

Sources with noise greater than the HP 3585A Spectrum Analyzer's local oscillators are very easy to measure with HP 3047A in this mode. The source under test is just connected to the HP 3047A and the measurement is run. There is no need for a high quality reference or for a frequency discriminator.

Ordering Information

HP 3047S Phase Noise Measurement System

By ordering the system instrumentation, software and controller under this model number, total system compatibility is insured.

HP 3047A System Instrumentation

Includes HP 3582A and HP 3585A Spectrum Analyzers, HP 35601A Spectrum Analyzer Interface, system software and system rack with all associated power and signal cabling.

(Specify one power line option)

300: 100 Vac operation

320: 120 Vac operation

330: 220 Vac operation

340: 240 Vac operation

HP 9836A Controller configurations are priced beginning

Full details on available system options and recommended controller configurations are given in the HP 3047S Ordering Information Guide.

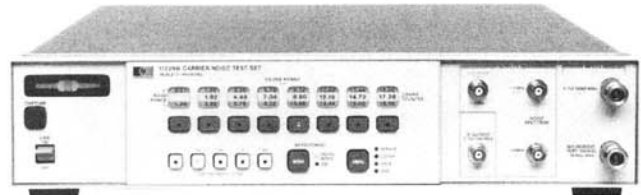
Price

\$ 0

\$50,520

\$15,645

- 5 MHz to 18 GHz
- Phase noise and AM noise measurements
- Low system noise floor



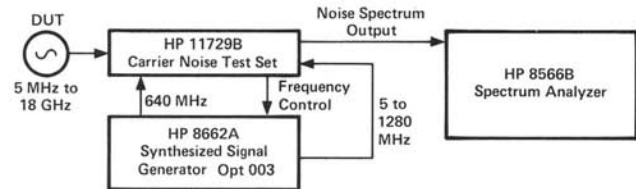
HP 11729B



HP 11729B Carrier Noise Test Set

Versatile Noise Measurements

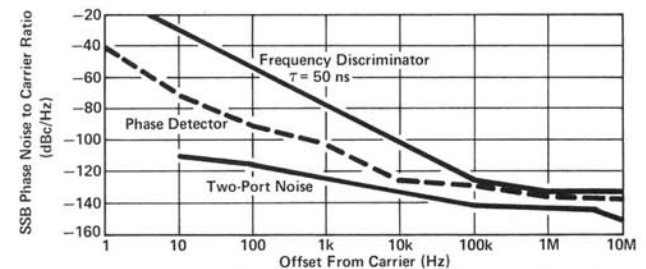
The HP 11729B, combined with an HP 8662A synthesized signal generator and a baseband spectrum analyzer, form a complete broadband measurement system for phase noise and AM noise testing of microwave oscillators, 5 MHz to 18 GHz. With one versatile measurement system, direct AM noise measurements and two methods of phase noise measurements can be made, at offsets from the carrier of <1 Hz to 10 MHz. These three operating modes allow a wide variety of sources, from low noise stabilized sources to free-running sources with high drift to be measured. The HP 11729B may be ordered with either full frequency coverage, or in a number of band configurations to better match the application.



Complete carrier noise characterization system can be assembled from standard instruments.

Built-in Low Noise Reference

The HP 11729B/8662A combination includes the critical low noise microwave reference signal (which determines the system noise floor). The wide frequency range and low system noise floor of the HP 11729B/8662A enable a single system to be used on a broad range of sources. Typical system noise for a 10 GHz source is less than -123 dBc/Hz at a 10 kHz offset, allowing characterization of most high-performance sources.



Typical HP 11729B/8662A system sensitivity using the phase detector and frequency discriminator methods at X-Band. Typical HP 11729B two-port noise.

Two Phase Noise Measurement Modes

A choice of two phase noise measurement methods optimizes the measurement to the type of oscillator being measured. The phase detector method is ideal for synthesizers or stable free-running sources. The HP 11729B/8662A simplifies the phase detector method by providing all the necessary circuitry, including the low noise microwave reference source, the loop VCO, and a variable bandwidth phase-lock-loop.

The frequency discriminator method is best suited for sources with high level, low-rate phase noise such as free-running sources. The HP 11729B/8662A implements a convenient frequency discriminator (delay line/mixer technique), allowing sources to 18 GHz to be tested with a discriminator operating at an IF frequency less than 1.3 GHz. The HP 11729B/8662A contain all necessary hardware, except a simple user-supplied delay element that can be as simple as a length of inexpensive 50-ohm coaxial cable.

Direct AM Noise Measurements

The HP 11729B Option 130 offers convenient, direct AM noise measurements with typical sensitivity of less than -165 dBc/Hz. The HP 8662A provides a convenient calibration signal, and the same baseband analyzer used for phase noise measurements can be used for AM noise measurements.

Fully Programmable for System Integration

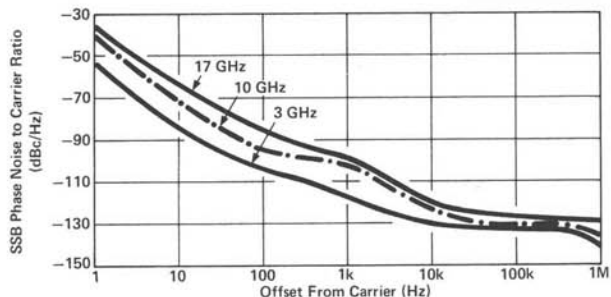
The fully HP-IB programmable HP 11729B/8662A is easily configured into manual or automatic carrier noise measurement systems with available spectrum analyzers (such as the HP 8566B, 8568B, 3561A, 3585A, or 3582A). In addition, the HP 11729B/8662A is an integral part of the HP 11740S automatic phase noise measurement system. The choice of analyzer determines the offset frequencies that can be measured. System noise floor is set by the HP 11729B/8662A. (For more information, refer to the HP 11729B Product Notes.)

Abbreviated HP 11729B/8662A Specifications

Frequency Range: 5 MHz to 18 GHz in 8 bands.

Absolute System Noise Floor, Phase Detector Method

System noise is specified only when the HP 11729B is used with an HP 8662A Option 003. (The HP 8663A Option 003, operated below 1280 MHz, may be used in place of the HP 8662A with no change in system performance.) These system noise specifications apply for the phase detector method, locking via the EFC of the HP 8662A crystal oscillator. Locking via the HP 8662A dc FM changes the noise on the tunable HP 8662A signal, and therefore total system noise. See the HP 11729B data sheet for more information.



Typical HP 11729B/8662A System Noise (phase detector method, locking via EFC).

Test Signal Requirements

Amplitude: +7 dBm minimum to +18 dBm maximum (typically useable to -15 dBm with noise floor degradation).

RF Source Requirements

HP 8662A or 8663A Option 003.

HP 11729B Outputs

IF Output

Bandwidth: 5 to 1280 MHz.

Level: +7 dBm minimum.

Noise Spectrum Outputs

- Noise Spectrum Output <1 MHz: dc coupled, 600 Ω nominal.
- Noise Spectrum Output <10 MHz: 10 Hz to 10 MHz, 50 Ω nominal, nominal 40 dB of gain over <1 MHz output.
- Auxiliary Noise Spectrum Output: dc coupled, 600 Ω nominal.

Phase Lock Loop Function

Frequency Control Outputs

To crystal oscillator: $\pm 10V$.

To dc FM: $\pm 1V$.

Lock bandwidth factor: nominal 1, 10, 100, 1k, 10k selectable.

Loop characteristics: dependent on method of phase lock chosen; typical loop bandwidths can range from 0.5 Hz to 100 kHz.

Remote Programming

All front panel functions are HP-IB programmable. In addition, the HP 11729B can output current settings and out-of-lock indication.

Interface functions: AH1, SH1, T5, L3, TE0, LE0, SR1, RL1, PPI, DC1, DT0, C0.

AM Noise Detection (Option 130)

Frequency: 5 MHz to 18 GHz.

Input level: 0 dBm minimum to +18 dBm maximum.

AM noise floor (at +10 dBm input level, dBc/Hz):

Offset from Carrier (Hz)	Typical	Specified
1k	-147	-138
10k	-152	-145
100k	-161	-155
1M	-165	-160

General

Operating temperature range: 0° to +55°C.

Power: 100, 120, 220, 240 V, +5%, -10%; 48 to 66 Hz; <75 VA max.

Weight: net, 10.4 kg (23 lb); shipping, 13.2 kg (29 lb).

Size: 425 W x 99 H x 551 mm D (21.7 x 16.8 x 3.9 in.). 1 MW x 3 1/2 H x 20 D System II module.

Ordering Information

HP 11729B Carrier Noise Test Set (5 MHz to 18 GHz)

Price

\$21,500

Note: Each of options 003 to 027 (only one may be ordered) also includes 0.005 to 1.28 GHz coverage

Option 003 (1.28 to 3.2 GHz)	less \$8500
Option 007 (3.2 to 5.76 GHz)	less \$8500
Option 011 (5.76 to 8.32 GHz)	less \$8500
Option 015 (8.32 to 10.88 GHz)	less \$8500
Option 019 (10.88 to 13.44 GHz)	less \$8500
Option 023 (13.44 to 16.0 GHz)	less \$8500
Option 027 (16.0 to 18.0 GHz)	less \$8500
Option 130: AM noise detection	\$1100
Option 140: Rear panel connectors	\$500
Option 907: Front panel handle kit	\$43
Option 908: Rack mounting flange kit	\$25
Option 909: Front panel handle plus rack mounting flange kit	\$65
Option 910: Extra operating and service manual	\$30