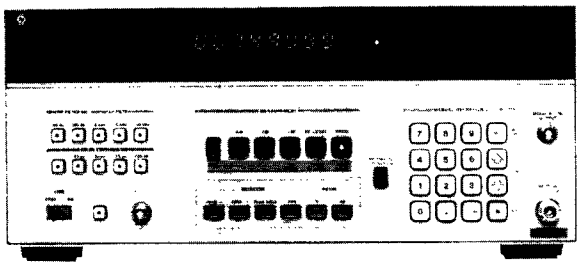
SIGNAL ANALYZERS

Modulation Analyzer, 150 kHz to 1300 MHz

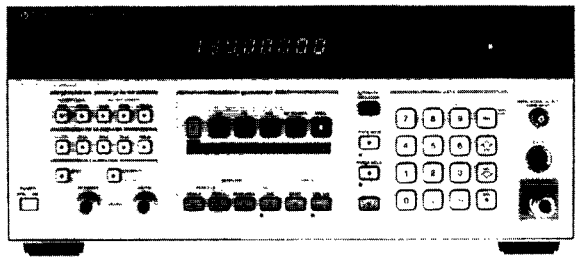
Models 8901A, 8901B

- Measures AM and FM to 1% accuracy
- Measures RF frequency
- Measures RF Power
- Low internal noise
- Completely automatic

DESIGNED FOR HP-IB SYSTEMS



HP 8901A



HP 8901B

HP 8901A and HP 8901B Modulation Analyzers

The HP 8901A and HP 8901B modulation analyzers combine the capabilities of several RF instruments to give complete, accurate characterization of modulated signals in the 150 kHz to 1300 MHz frequency range. Both instruments very accurately measure modulation and recover the modulation signal. They determine RF frequency and measure RF power. The major additional capabilities of the HP 8901B are its improved power meter accuracy, its ability to use external power sensors, to make adjacent channel power measurements or carrier noise measurements (with options 030-037) and its ability to count audio frequencies and measure distortion on 400 Hz and 1 kHz signals. Both instruments are fully automatic and make all major measurements with the push of a key or under HP-IB control.

Modulation Measurement Accuracy

Very accurate modulation measurements along with very low internal noise enable the HP 8901A/B to characterize even high performance signal sources. Their detection systems are configured for wideband recovery of the entire modulation spectrum so that highly precise measurements such as signal-to-noise or distortion can be made on the modulation signal. Modulation depth and deviation accuracy is generally ±1% of reading. Residual AM noise in a 50 Hz to 3 kHz bandwidth is <0.01% while FM noise is <8 Hz for 1300 MHz carrier frequencies, decreasing linearly to <1 Hz below 100 MHz. Because the AM and FM demodulators are independent and highly insensitive to each other and because the analyzer has very low residual AM and FM, accurate incidental AM and FM measurements can be made.

Three detectors are available for depth and deviation measurements: positive peak, negative peak, and an average-responding detector with rms (sinewave) calibration. A PEAK HOLD function captures and displays the maximum peak modulation of a signal and is ideal for making transient measurements such as modulation limiting on mobile radios. The HP 8901B also has a true rms detector and the ability to measure peak to peak divided by two.

For measuring convenience, two high-pass (50 Hz and 300 Hz) and three low-pass (3 kHz, 5 kHz and >20 kHz) post-detection filters are included for filtering the recovered modulation. The >20 kHz Bessel filter minimizes overshoot on square-wave modulation. This allows accurate measurement of signals which are digitally modulated, such as FSK. Four de-emphasis networks commonly used in FM systems (25, 50, 75, and 750 μs) are also provided.

A modulation output provides calibrated signal levels relative to the displayed modulation reading. The HP 8901B can make measurements on this demodulated signal such as frequency and distortion level.

Modulation calibrators (standard on the HP 8901B, Option 010 on the HP 8901A) provide two precision modulation standards. One is an amplitude modulated signal whose depth is calibrated to better than 0.1% accuracy. The second standard is a frequency modulated signal with peak deviation calibrated to 0.1% accuracy. The HP 11715A AM/FM Test Source is necessary to fully test and calibrate other modulation parameters.

Frequency Measurements

The HP 8901A/B modulation analyzers are more than just high quality modulation meters. They also perform as frequency counters. Resolution for the HP 8901A's 150 kHz to 1300 MHz frequency counter is 10 Hz below 1000 MHz, and 100 Hz above 1000 MHz. Resolution is 1 Hz for the HP 8901B. Sensitivity is −25 dBm (12 mV rms) below 650 MHz, and −20 dBm (22 mV rms) above 650 MHz. The standard instrument's time base stability is $1x10^{-6}$/month, or an optional time base is available with $1x10^{-9}$/day stability.

RF Power Measurements

The HP 8901A uses a diode detection circuit to measure RF input power. This technique measures peak voltage and is calibrated from 1 mW to 1W for sinewave inputs. The RF level measurement accuracy is ±1.5 dB from 150 MHz to 1300 MHz.

The HP 8901B delivers the accuracy and resolution of a high performance power meter. The HP 8901B, with the HP 11722A Sensor Module, measures power from +30 dBm to −20 dBm at frequencies from 100 kHz to 2.6 GHz. The HP 8901B also accepts all HP 8480 series power sensors for extended measurement capability.

Adjacent Channel Power and Direct Spectrum Noise Measurements

The HP 8901B offers optional selective power measurement capability (options 030-037). With this capability you can quickly and accurately make adjacent channel power measurements to CEPT standards. The HP 8901B provides a choice of selectable filters for testing transceivers with 12.5, 25 and 30 kHz channel spacings.

To meet the CEPT standard at frequencies greater than 300 MHz, the HP 8901B requires an external local oscillator (LO) such as the HP 8656B Synthesized Signal Generator. Dedicating a signal generator as the external LO is not necessary. When not being used as the LO, a built-in RF switch in the HP 8901B routes the signal generator's output out the back panel.

Used with a low-phase-noise external LO, the HP 8901B also makes single-sideband (SSB) noise measurements to 1.3 GHz. To make the noise measurement, you just select the carrier noise filter and the frequency offset from the carrier (5 kHz to 1300 MHz). The HP 8901B then makes a selective power measurement (2.5 kHz BW) and converts the power to a 1 Hz bandwidth. The noise floor of the HP 8901B is −150 dBc/Hz. The HP 8901B's measurement accuracy is better than ±0.5 dB down to −139 dBc.

Phase noise usually dominates the carrier-noise measurement at most offsets of interest, so direct-spectrum noise measurements provide a convenient and simple way to measure phase noise of many sources. Adding the HP 11793A Microwave Converter and a low-phase-noise microwave source such as the HP 8673B Synthesized Signal Generator extends this measurement to 26.5 GHz.