

# TELECOMMUNICATIONS TEST EQUIPMENT

## Microwave Radio Noise and Interference Test Set; Digital Radio Constellation Analyzer Vector Signal Generator

Models 8780A, 8980A, 8981A, 3709B, 15709A

### HP 8780A

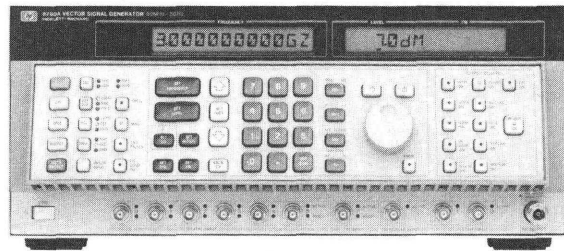
- 10 MHz to 3 GHz synthesizer
- BPSK, QPSK, 8PSK, 16QAM, Optional 64QAM
- Burst digital modulation

### HP 8980A

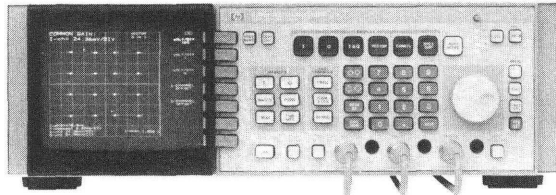
- Analyzes coherent phase and amplitude modulation
- 350 MHz I vs. Q bandwidth
- Markers for measuring phase, amplitude and time
- 12-bit digitizing for HP-IB measurements

### HP 8981A

- Adds 50 MHz to 200 MHz I/Q demodulator
- Demodulates up to 70 MHz B.W. communications signals
- $<0.5^\circ$  quadrature error and  $<0.1$  dB amplitude imbalance



HP 8780A



HP8980A/8981A



### HP 8780A Vector Signal Generator

The HP 8780A Vector Signal Generator is a synthesized source with exceptional modulation for modern digital microwave radio and satellite communications testing. The Vector Signal Generator offers a wide variety of modulation using both digital and analog inputs. It generates standard formats from BPSK to 64QAM and traditional modulation like FM, AM, and pulse, as well as sophisticated complex modulation.

### HP 8980A Vector Analyzer and HP 8981A Vector Modulation Analyzer

The HP Vector Analyzers are two-channel X-Y sampling oscilloscopes designed to analyze the in-phase (I) and quadrature phase (Q) components of modern digital microwave radio signals such as QPSK, 16QAM, and 256QAM. The HP 8981A adds a 50 MHz to 200 MHz demodulator.

### Applications

The vector signal generator, vector analyzer and vector modulation analyzer are well suited to testing modern terrestrial and satellite receivers and transmitters.

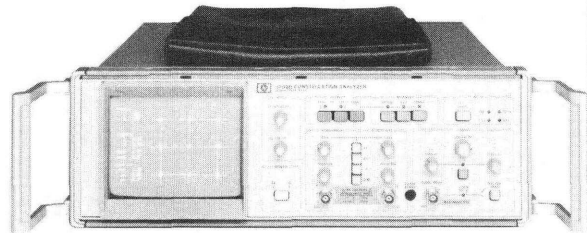
The HP 8780A standard modulation patterns — BPSK, QPSK, 8PSK, 16QAM and 64QAM (with Opt. 064) — are easily generated using standard data generators. Asynchronous TDMA modulation can be simulated using the Burst feature along with one of the PSK modulations. A coherent carrier output simplifies quadrature and gain alignment of vector (I/Q) demodulators.

The HP 8980A constellation analysis feature gives non-intrusive measures of closure, quadrature error, and lock angle error for partial response and QAM formats from QPSK to 256QAM. In addition, the HP 8981A extends these measurements to LF signals by accurately demodulating them to measure modulators.

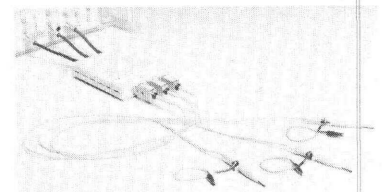
For more information about the HP 8780A, HP 8980A and the HP 8981A, refer to the Signal Generator and Signal Analyzer section of this catalog.

### HP 3709B

- For troubleshooting, fine-tuning and preventive maintenance
- Identifies digital radio impairments
- Analyzes magnitude of distortions



HP 3709B



HP 15709A

### HP 3709B Constellation Analyzer

The HP 3709B is used to characterize the performance and condition of digital radios both in-service and out-of-service by analysis of constellation patterns. In addition to displaying constellation patterns, the HP 3709B measures the linear and non-linear distortions revealed by the patterns, and can provide a formatted report containing the pattern and measurement results on a Thinkjet printer.

### Measurements

**Constellation:** amplitude, closure, lock- and quad-angle errors, non-linear distortion (rms, am-am, am-pm).

**Modulation schemes:** QPSK, 16QAM, 64QAM, 256QAM, 9QPR, 25QPR, 49QPR, 81QPR.

### Monitor Points

(1) **I and Q signals:** Any of the above schemes with signal levels in the range 30 to 400 mV p-p across the constellation. (dc offset must be no more than 0.5 X signal amplitude).

(2) **Clock:** 1 MHz to 80 MHz (100 mV to 1 V p-p)

**Impedance level:** All HP 3709B inputs are 75 ohm terminated.

### Options

001: 50 ohm unbalanced input connectors

003: Siemens series 1.6/5.6 mm input connectors

130: High Impedance Interface Kit. Contains 1 x HP 15709A High Impedance Interface and 3 x HP 10435A 1 metre 10:1 probes

**Special Options:** A low bit rate version (0.1 - 8 MHz) is available to special order.

### HP 15709A High Impedance Interface

This specially designed accessory provides three high impedance, filtered inputs which allow the HP 3709B to be connected to radios without protected 75 or 50 ohm monitor points, using standard oscilloscope passive probes (eg HP 10435A 10:1, 1 metre probe).

**Gain:** X 5 (= overall X 0.5 gain when used with 10:1 probes)

**Impedance:** 1 Mohm.

### HP 3709B Constellation Display

**Option W30:** Extended Repair Service.

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**\$12.250**

+ \$300